Earning Official Ozone Air Quality Credits for Alternative Fuel Vehicles in Clean Cities

Christopher L. Saricks

National Conference for Ozone Action Programs

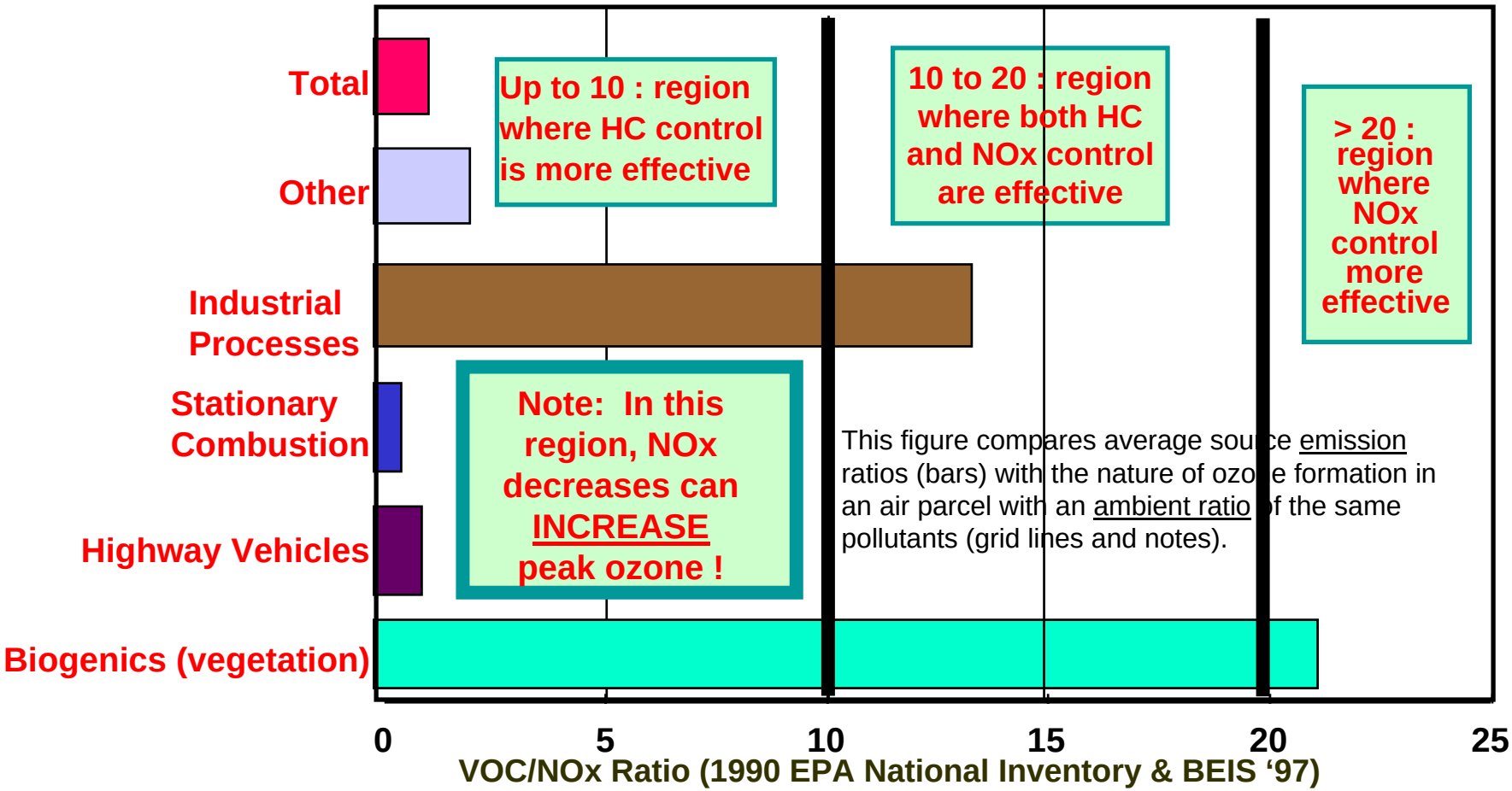
Phoenix, AZ

December 6, 1999

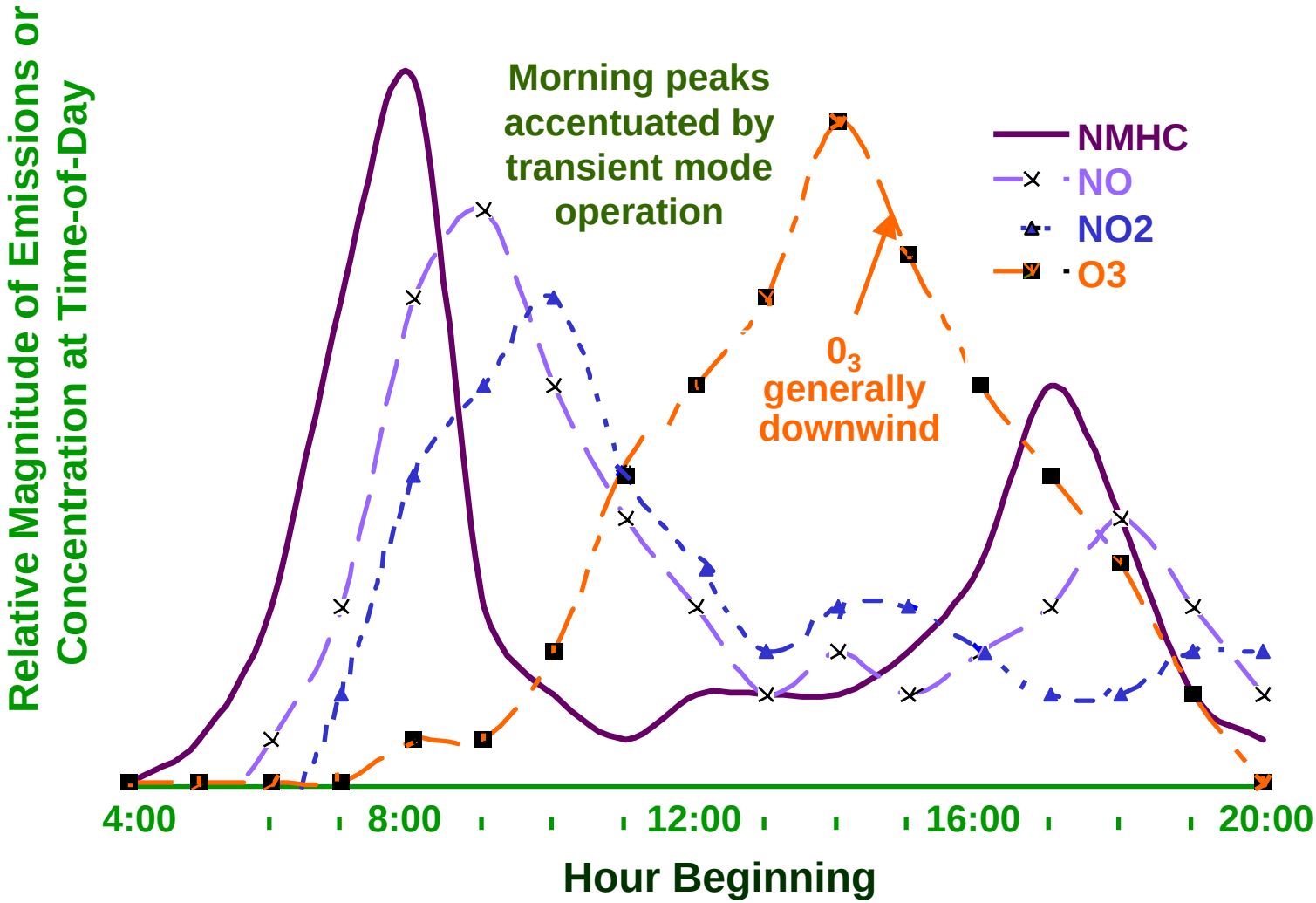
VMEP -- A Key Facet in the Continuing Evolution of Mobile Source Regulation

- Credit generation is from voluntary effort, which may be seasonal or episodic
- The means of quantifying the benefit must be reliable and defensible
- It must be accompanied by any necessary adjustments for compliance and/or programmatic uncertainty

Ozone mitigation depends on which precursor is ambient "limited": In the core of a commercial or governmental area (VOC-limited), NMHC reductions are best. In rural areas rich in vegetation (NOx-limited), NOx cuts are best.

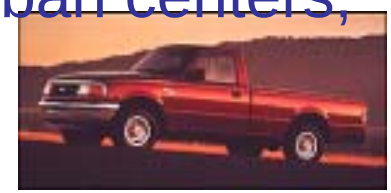


Classical Chronology of Ozone Formation: (NMOG + NOX (+ CO) + Sunlight + Time)

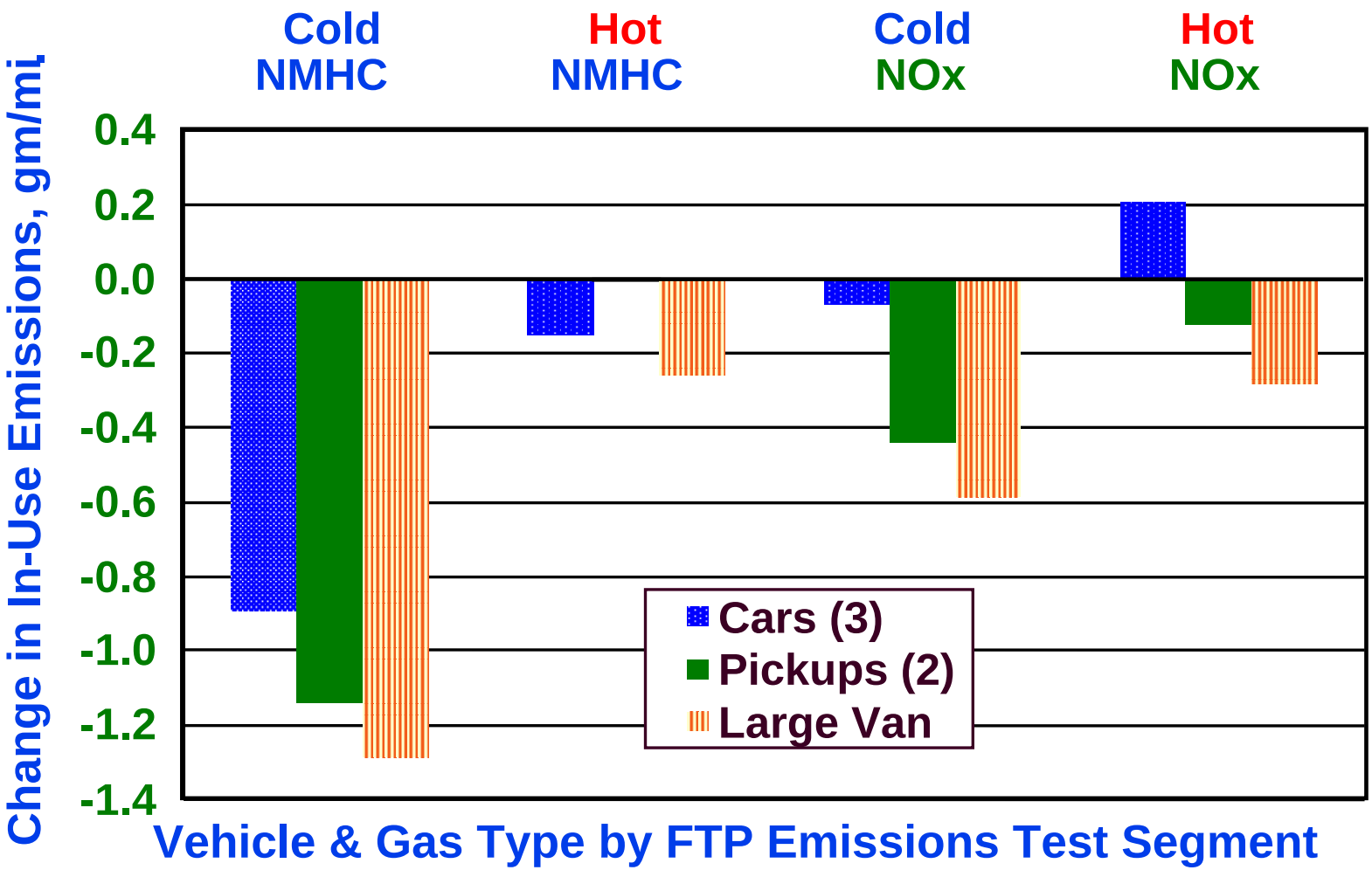


How do AFVs fit this frame?

- Extremely low NMHC emissions, especially with NGV, LPG, and electrics; gaseous fuels generate virtually no evaporative hydrocarbons
- No morning cold starts mean fewer VOCs added to the precursor “soup”
- Fleet operations are often heaviest close to urban centers, where NMHC reductions are of greatest value



Estimated Mean Change in Per-Mile In-Use Tailpipe Emissions: CNG-for-Gasoline Switch



Clean Cities coalitions have been increasing their AFV fleets for years. Now VMEP gives them a penalty-free means to get emission reduction credits for AFVs.

- Credits will always be incremental -- more AFVs = more net reductions
- Beginning with 1998 MY OEM LD vehicles, year-to-year credits will build against gasoline counterparts through at least 2004
- Argonne is working with EPA-OMS to make available a VMEP credit estimation tool for Clean Cities that should be generally applicable.

Introducing AirCred

- Designed to make credit calculation for AFV emission reductions straightforward and simple

How AirCred Works

- AirCred is based on EPA's MOBILE5b model combined with emission test certification data for new light-duty AFVs and their gasoline-fueled counterparts.
- It starts with the MOBILE5b-computed emission factor (by vehicle type) appropriate to midsummer, ozone-season conditions in each Clean City (about 60 different values are available).
- The "clean gap" between AFV and conventional counterpart emissions of NMHC, CO, and NOx (for both the entire Federal Test Procedure and bag 1 [cold start] of the test only--the latter applicable only to cars and light duty trucks) determines the magnitude of the g/mi credit that can be be taken for AFV driving in each Clean City, relative to MOBILE5b's emission rates.

How AirCred Works (cont.)

- After the Clean City of interest has been selected from a list menu, AirCred prompts for
  - the number of AFV cars, light trucks, and buses acquired in that consortium area during a one-year period, by fuel type
  - the average miles per day driven by each of these categories
  - the number of days driven per week by each of these categories
  - the fraction of each AFV type population that is centrally fueled.
- If cold-start credits are also sought, AirCred prompts for
  - the fraction of daily regional VMT occurring between 6:30 and 9 a.m.
  - whether the vehicles in each category are turned off for one hour or more at lunch time

How AirCred Works (cont.)

- There are two results screens: one showing current-year 24-hour (FTP) credits and an optional one showing cold-start credits and cumulative FTP/MOBILE5b credits for the current year.
  - For the 24-hour credits, the total mass attributable to each AFV type in the local fleet is shown.
  - The cumulative set adds in residual credits for AFVs acquired after 1997 that are still in service.
- Results are reported in tons per day and pounds per day; the user can then multiply this value by the number of days in the ozone season to take the appropriate annual credit. A multiplier equal to the number of days in the year is inappropriate because the emission factors applied reflect only warm season conditions.

Requirements

- AirCred runs on a WINDOWS 95™ or later platform and requires 430 kB of storage space for the executable module.
- Two utility files must be available or added to the Windows system subdirectory:
  - MSVBVM60.DLL utility file (1.34 MB)
  - OLEATUT32.DLL utility file (585 kB) version of June 1998 or later
- Both files will be provided to all users requesting the diskette version of the model.

Current and Future Implementation

- AirCred currently computes actual credits for electric light-duty vehicles, dedicated and dual-fueled natural gas LDVs and LDTs, and NG-fueled transit and school buses (replacing diesel buses) through the year 2000 ozone season.
- It is expected that both propane- and alcohol dedicated and dual (flex)-fueled vehicles as well as electric hybrids will be added during FY2000, and that 24-hour and cold start credits will be computed for each Clean City through at least 2004.
- Addition of medium-duty vehicle credits and credits against Tier 2-certified gasoline and diesel vehicles is also contemplated. The model will be updated at least annually as new certification data for AFVs are obtained.