

# Inspection/Maintenance Issues and Options

*Strengthening Inspection/Maintenance*

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# Inspection/Maintenance Considerations

## → Political Commitment

## → Effectiveness

- × Enforcement
- × Test types
- × Network design
- × Frequency
- × Quality of repairs

## → Cost

- × Economies of scale
- × Sophistication
- × Capital
- × Operations

## → Economic Impact

- × Ability to pay for repairs
- × Waivers
- × Scrappage
- × Alternatives

## → Roles & Responsibilities

- × Audits
- × Oversight
- × Training
- × Repairs
- × Testing



# Political Commitment

- ✈ Cost
  - ✖ Expensive program
  - ✖ Commit resources over long period of time
- ✈ Coordination
  - ✖ Coordinate government agency roles
  - ✖ Create and sustain system to manage program
- ✈ Public Opinion
  - ✖ Withstand negative reactions
  - ✖ Be willing to force vehicle retirement
  - ✖ Be willing to require repairs



# Roles and Responsibilities

- ✈ Environmental Agency Role
  - ✖ Set standards and establish procedures
  - ✖ Oversee program and collect data
  - ✖ Certify inspectors and repair technicians
  - ✖ Conduct audits and evaluate program benefits and costs
- ✈ Police Role
  - ✖ Insure vehicle owners participate in program
- ✈ Test Industry Role
  - ✖ Set up and run inspection stations and remote sensing tests
  - ✖ Train inspectors and repair technicians
  - ✖ Conduct public education campaign
- ✈ Repair Industry Role
  - ✖ Fix failed vehicles



# Enforcement

- Most critical factor to the success of I/M
  - ✘ Without good enforcement, stop now!
  - ✘ Critical to getting emission reduction benefits
- Enforcement mechanisms are required to:
  - ✘ Insure all subject vehicles get tested
  - ✘ Insure tests are honest and fair
  - ✘ Insure failed vehicles are properly repaired
  - ✘ Insure failed vehicles are honestly retested
  - ✘ Prevent adjustment after retest



# Enforcement Features

## → Getting cars tested:

- × Registration denial
- × Windshield sticker
- × Computer list checking
- × Penalties

## → Ensuring honest tests:

- × Automated systems
- × No money exchange
- × Covert audits
- × Penalties

## → Insure repairs work:

- × Technician training
- × Transient testing
- × Standards for HC, CO and NOx

## → Prevent readjustment:

- × Remote sensing
- × Penalties



# Network Type

## → Centralized

- × High through-put test only lanes run by government or contractor

## → Features

- × Best approach
- × Most cost effective
- × Cheapest to manage
- × Lowest fraud problems
- × Best quality control

## → Decentralized

- × Repair shops licensed to conduct test and perform repairs

## → Features

- × Requires extensive quality assurance
- × Big fraud problem
- × Low quality control
- × Expensive due to loss of economies of scale



# Vehicle Coverage

## ✈ Gasoline Powered

- ✖ Light duty cars & trucks  $\leq$  8500 pounds gross vehicle weight
- ✖ Medium and heavy duty trucks
  - ⊕ Test cycle and standards
  - ⊕ Cost effectiveness
- ✖ Carbureted vs. fuel injected
  - ⊕ Use same test but different standards

## ✈ Diesel Powered

- ✖ Test procedure
- ✖ Emission measurement
  - ⊕ NO<sub>x</sub>
  - ⊕ Particulate vs. smoke



# Test Frequency

## ✈ Annual Tests

- ✘ Test performed once per year
- ✘ Best for old technology vehicles
- ✘ More expensive
- ✘ More emission benefit

## ✈ Biennial Tests

- ✘ Test performed once every two years
- ✘ Best for new technology vehicles
- ✘ Less expensive
- ✘ Less emission benefit



# Repairs

- Effective repairs achieve emission reductions
  - ✘ Inadequate or incomplete repairs are common and don't lower emissions or may even increase emissions
  - ✘ Improper repairs sacrifice vehicle performance
  - ✘ Leads to readjustment after repair
  - ✘ Need to lower emissions and maintain good performance
- Technicians must have skills to conduct repairs
  - ✘ Need training for an *emission* focus
  - ✘ Diagnosis is the key
  - ✘ Need basics on emission controls, engine operation, etc.
  - ✘ Need test equipment and training in its use
- Repair industry support
  - ✘ Repair industry must support program goals
  - ✘ Need to understand details of how program works



# Economic Impacts

- ✈ Ability to pay for repairs or replacement
  - ✖ Are consumers willing to bear the cost of repairs?
  - ✖ Are the parts available?
  - ✖ Real world repairs often do not lower emissions
- ✈ Relief mechanisms
  - ✖ Cost waivers
  - ✖ Scrappage
  - ✖ Vehicle buy back
  - ✖ Can consumers sell vehicles that won't pass?
  - ✖ Repair cost assistance



# Estimating Costs

- Many of the considerations discussed here affect cost
- Factoring these all together can be complicated
- Spreadsheet tools make it easier; two tools:
  - × Centralized I/M Programs
  - × Decentralized I/M Programs
- Available for download
  - × <http://www.epa.gov/otaq>



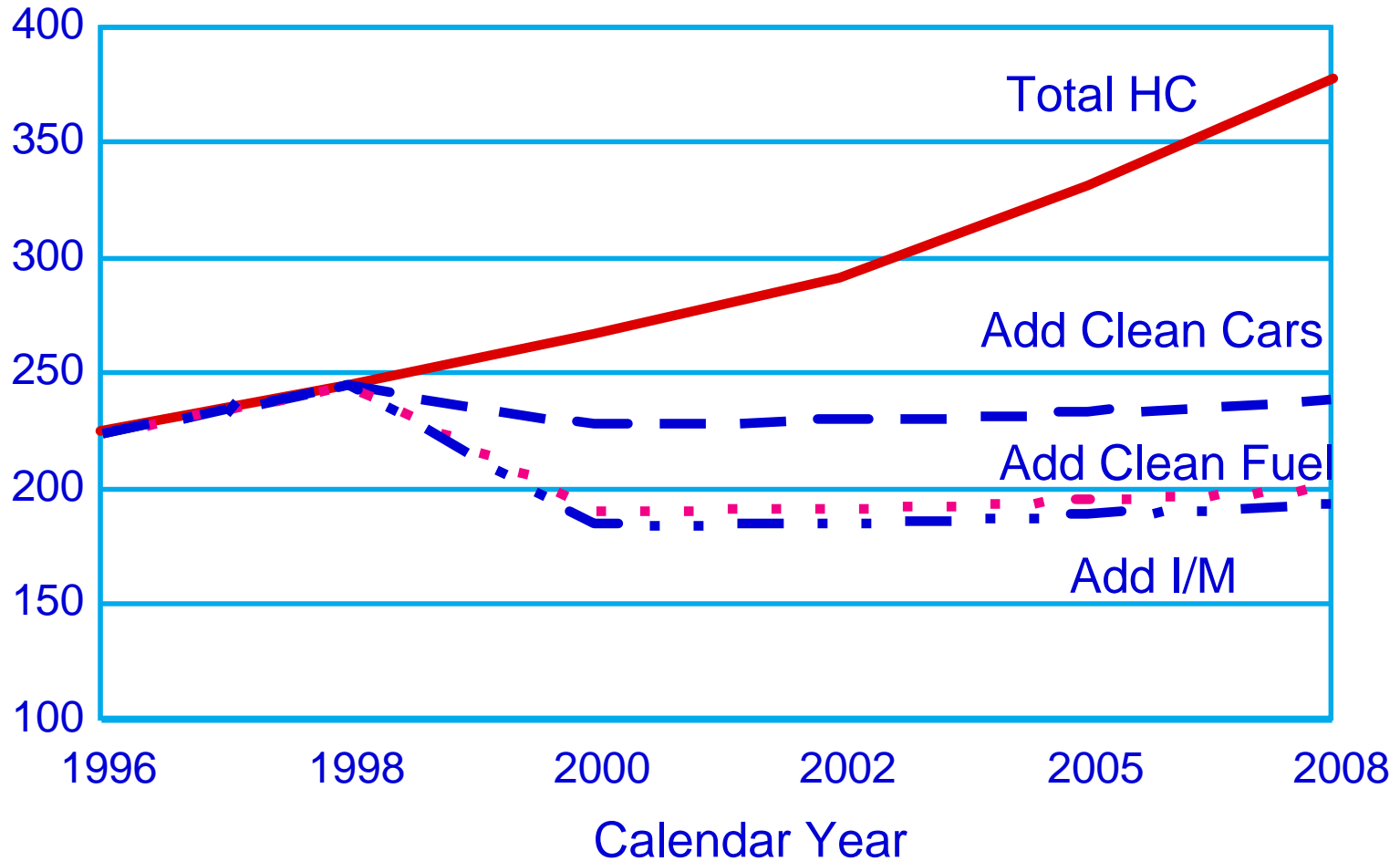
# Major Inputs Needed to Calculate Costs

- Local Currency
- Present Auto Population
- Auto Population Growth Rate
- Percent of Vehicles Exempt
- Inspection Frequency
- Program Length
- Annual Operating Hours
- Lane Loading Percentage
- Lane Efficiency Factor
- Stringency Factor
- Number of Lane Positions
- Exhaust Test Type
- Loaded Preconditioning
- Fast Pass Algorithm
- Dynamometer Type
- Exhaust Test Equipment
- Evaporative Test Type
- Time for Other Checks
- Maximum Lanes per Facility
- Minimum Number of Test Facilities
- Minimum Number of Total Lanes



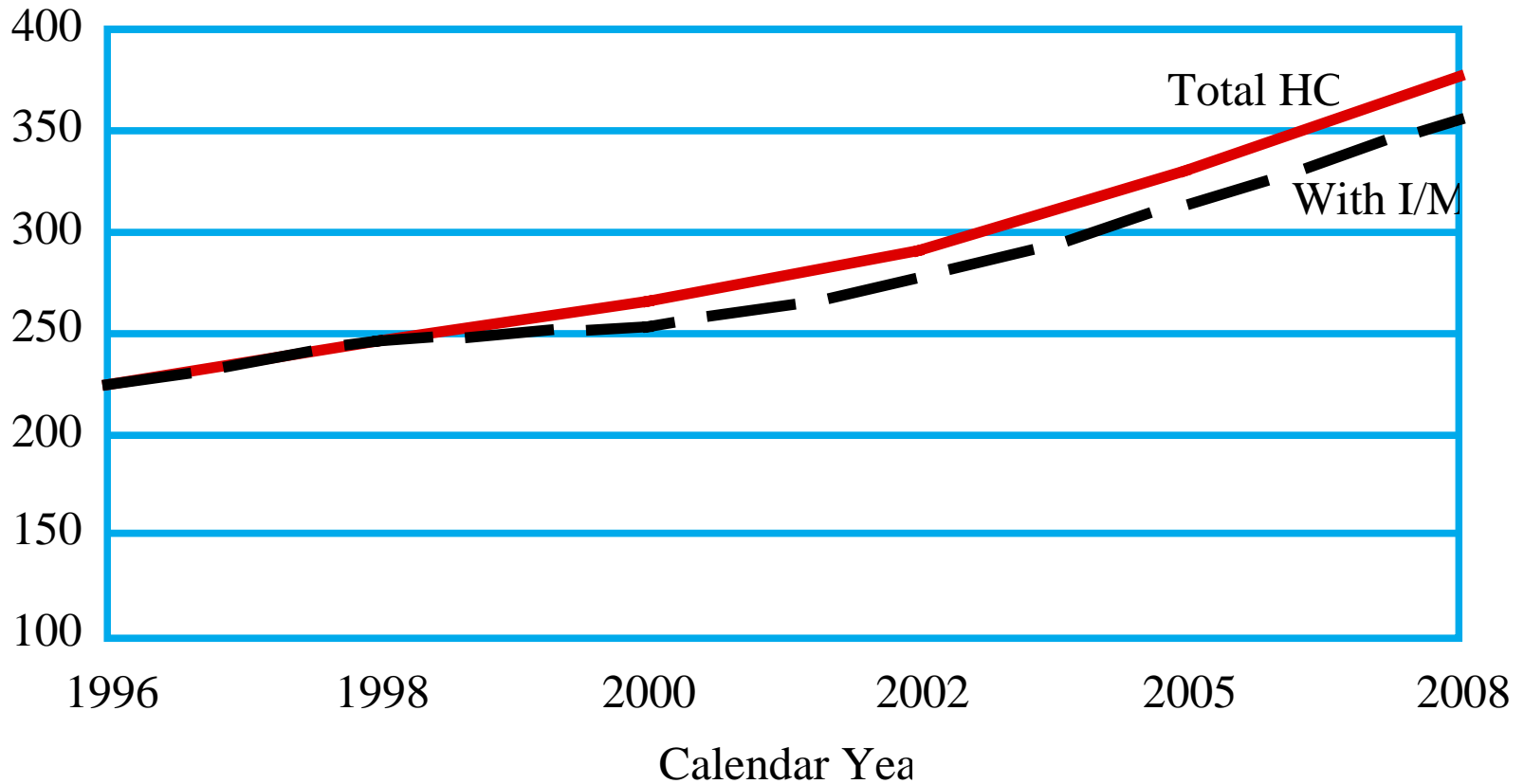
# Emission Impacts

## Cairo Example



# Emission Impacts

## Cairo Example, I/M Only



# Bottom Line

- ➔ I/M is expensive
- ➔ Cost-effectiveness is highly dependent on several factors:
  - ✘ Network type
  - ✘ Enforcement
  - ✘ Test type
  - ✘ Repair effectiveness
- ➔ If you cannot do it well, don't do it at all
  - ✘ Spend scarce resources on programs that can work for you



# More Information

[www.epa.gov/otaq](http://www.epa.gov/otaq)

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