The Case for Removing Aromatics From Gasoline

Public Health, Energy Security, and Climate

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Energy Future Coalition

- Broad-based, non-partisan public policy initiative
  - Founding members: Timothy Wirth, Boyden Gray, John Podesta
  - Business, labor, environmental leaders
  - Key issues: climate, security, energy access
  - Politically realistic policy options

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Aromatics in Gasoline

- Toxic hydrocarbon compounds
  - Benzene, toluene, xylene
  - Add octane to the fuel (cf. lead, manganese/MMT)
  - Many of the earliest-known examples of aromatic hydrocarbons, such as benzene and toluene, have distinctive pleasant smells.
    - In the 19th and early-20th centuries, benzene was used as an after-shave lotion.
- U.S. >25% of every gallon of gasoline
- EU up to 35% limit

Emissions Impacts

- Air toxics: Also known as hazardous air pollutants – known, or suspected to, cause cancer and other serious health problems.
- Air quality, public health impacts
  - Benzene is carcinogenic
  - Emissions increase particulates, ozone
    - Pulmonary disease, asthma
  - Aromatics contribute significantly to the formation of secondary organic aerosols – $PM_{2.5}$

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Aromatics Replacement

- Could be substantially reduced by biofuels
  - Adequate supply available
  - Low to no incremental cost
  - Public health benefits look very large
- Benefits of substitution
  - High octane value of biofuels
  - Can directly replace aromatics on a 2:1 basis

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Why Biofuels?

- Available today in the market
  - Corn ethanol in distressed oversupply
  - Advanced biofuels rapidly emerging
    - Ethanol, butanol, gasoline
- Potentially very low in GHGs
  - Transportation 1/3 of emissions
  - Few alternatives to petroleum
- Increase transportation fuel flexibility
  - Reduced oil dependence
- Economic benefits
  - Increased farm income, rural development

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Replacing Aromatics

- Remaining issues
- Further air quality modeling needed
  - Comparative effect of biofuels substitution
- Further research needed
  - Relative health effects of organic vs. inorganic particulates, aldehydes

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The Regulatory Context

- 2007 EPA MSAT rule (Mobile Source Air Toxics)
  - Benzene, toluene, and xylene designated as hazardous air pollutants under the Clean Air Act
  - Clean Air Act Amendments of 1990 require EPA "to control hazardous air pollutants from motor vehicles and motor vehicle fuels," by setting standards that reflect "the greatest degree of emissions reductions achievable through the application of technology which will be available."
  - Rule reduced benzene content of gasoline from 0.97% to 0.62% – and was silent on the others – when much larger reductions are achievable

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A Vision of Clean Transportation

- Plug-in hybrid with 40-mile electric range
  - Recharge at night on wind or coal with carbon capture
  - Short commute allows owner to resell power to the grid during the day
    - Flattening peak demand, balancing load
  - Electric drives allow lighter cars, smaller engines
  - Biofuels support long-distance driving
  - Oil completely displaced

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For more information…

- Reid Detchon, Energy Future Coalition: detchon@energyfuturecoalition.org
  - www.EnergyFutureCoalition.org

- More about aromatics:
  - http://www.energyfuturecoalition.org/pubs/EFC_Aromatics.pdf
  - http://www.trolp.org/main_pgs/issues/v10n1/Gray.pdf