


Transport Emissions Reduction Methods

- Fossil fuel alternatives
- Improve mass transit
- Enhance non-motorized transit

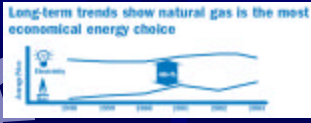


Goals to Reduce Emissions From Transportation

- Short term
 - Intensify conversion to alternative fuels
 - Increase tariffs on fossil fuels
- Long term
 - Improve mass transit systems
 - Improve non-mechanized transit
 - Transport emissions standards
 - Shift to new technology

Natural Gas Vehicles

- NG is a combustible mixture of hydrocarbons (mostly methane)
- One of the cleanest burning fuel alternatives
- Cheaper to refuel and maintain
- 30-40% less CO₂ emissions
- Incentives:
 - Canada's greenhouse gas incentive gives the Toronto 1 NG bus for every 4 NGVs sold
 - California allows NGVs to use the carpool lanes



Long-term trends show natural gas is the most economical energy choice

http://www.nvontario.com/nat_times_jan02.pdf

Biodiesel

- Biodiesel is a replacement for diesel
- Made from new and used vegetable oil and animal fat
- Up to 20% biodiesel (B20) can be used with petroleum diesel without engine modifications
- Glycerol bi-product
 - Used for cosmetics and pharmaceuticals
- B20 reduces emissions of CO₂ by 15% (B100 reduces by 75%)
- Fewer particulates, CO, and SO₂ emissions

Methanol

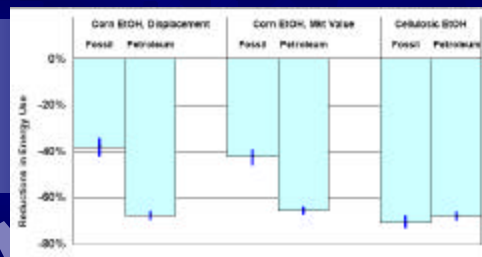


- Methanol is an alcohol fuel
- Produced from natural gas, coal, or biomass
- 85% methanol 15% gasoline mixture (M85) for light-duty, 100% methanol (M100) for heavy-duty applications
- Low emissions (except formaldehyde)
- Methanol can easily be made into hydrogen (can be used for hydrogen fuel cells)

Hydrogen Fuel Cells

- Ongoing research in the US and EU
- Hydrogen produced from natural gas, and possibly biomass, ethanol, methanol, or electrolysis of water
- Abundant sources
- No emissions, only water as a bi-product of H₂ and O₂ reaction
- Technology may not be available to the public for 10-20 years

Ethanol



Hybrid Vehicles



- Two engines: combustion and electric
- Engine configuration allows more aerodynamic design
- Low emissions due to high fuel economy
- Fly-wheel braking used to recharge generator

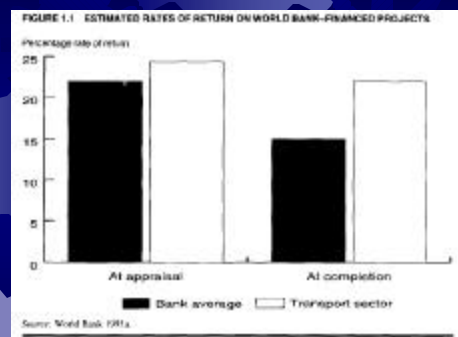
Develop Efficient Transit Systems in Less Developed Nations

- *Humankind has entered 'an urban millennium' that will require more effort to make cities livable...* -- U.N. Secretary-General Kofi Annan
- Current worldwide population of 2.5 billion expected to double in 30 years with 70% in developing countries
- Investment opportunities for mass transit industries in developed nations

Transit in Less Developed Nations



- Planning and design help from international community
- Affordable mass transit to ensure usage over personal vehicles
- Rail a quick & affordable option



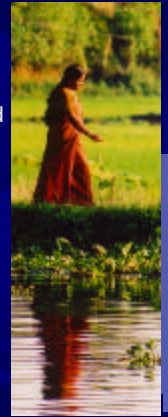
Improve Mass Transit in Developed Nations

- Plan communities for transit rather than privately owned vehicles
 - Vehicle miles traveled increased 68% in the U.S. Between 1980 and 1997
 - The average U.S. Household spends 18% of its annual budget on transportation
- High-speed rail systems



Non-motorized Transport

- Effective for both developed and developing nations
- Bike paths
- Walkways
- Right of way interchanges
- Improved zoning to minimize commutes



Policies for Annex I Parties

- Mandate increased fuel efficiency standards for all fossil fueled vehicles
- Potential tariffs on fossil fuels and allocate revenue for mass transit
- Subsidize alternative fuels
- Provide "fast track" approval for corporate investment in Annex II transit

Policies for Annex II Parties

- Encourage World Bank and IMF to invest in transit
- Reduce emissions from 2-stroke engines
- Incremental reductions of emissions
- Cost-effective over state-of-the-art

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