

Market-Based Transportation Options for a Lower Carbon Future



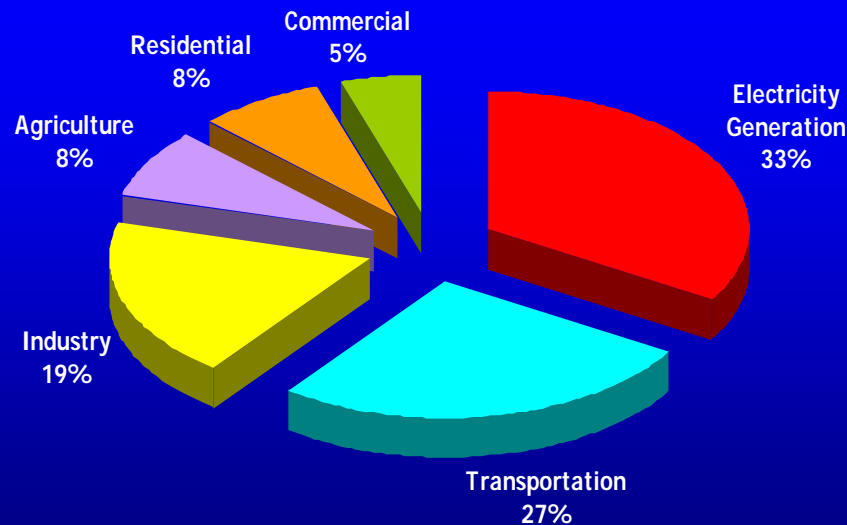
Washington Climate Advisory Team
Market-based Mechanisms Ad Hoc Committee

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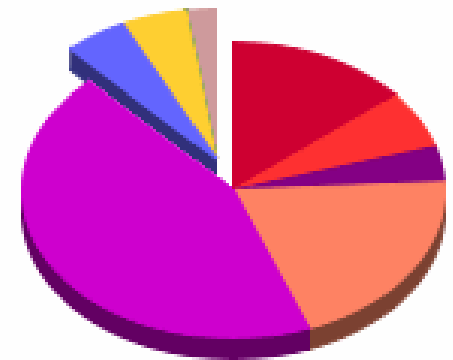
The Center for Climate Strategies

Greenhouse Gas Sources



Transportation is
27% of U.S.
emissions and
44% in
Washington

| Sector | MtC | % |
|----------------------------|-------------|--------------|
| Energy | 23.9 | 134.1 |
| Electric Utilities | 3.8 | 21.3 |
| Residential | 1.7 | 9.5 |
| Commercial | 1.1 | 5.9 |
| Industrial | 5.4 | 30.5 |
| Transportation | 11.9 | 66.8 |
| Fugitive Emissions | 0.0 | 0.0 |
| Industrial Processes | 1.3 | 7.3 |
| Agriculture | 1.4 | 7.6 |
| Land-Use Change & Forestry | -9.3 | -52.3 |
| Waste | 0.6 | 3.3 |
| Total | 17.8 | |



* Represents shares of total emissions excluding LUCF.


Transportation and Climate Change: The Basic Facts

- Transportation: 44% of WA GHG emissions
- Miles are increasing by 2.0% per year
- Each gallon of gasoline burned emits 20 pounds of CO₂ which lasts in the atmosphere for 100 years.
- Technology changes are essential
- But technology changes alone will not solve the problem long-term (especially if we continue to sprawl)

Transportation and Climate Change: More Basic Facts

- Sprawl makes providing most essential public services more energy-intensive
- According to the Center for Clean Air Policy, planning can reduce future emissions trajectory by 5 - 20%
- The state, communities and regional governments are the ones making these decisions.

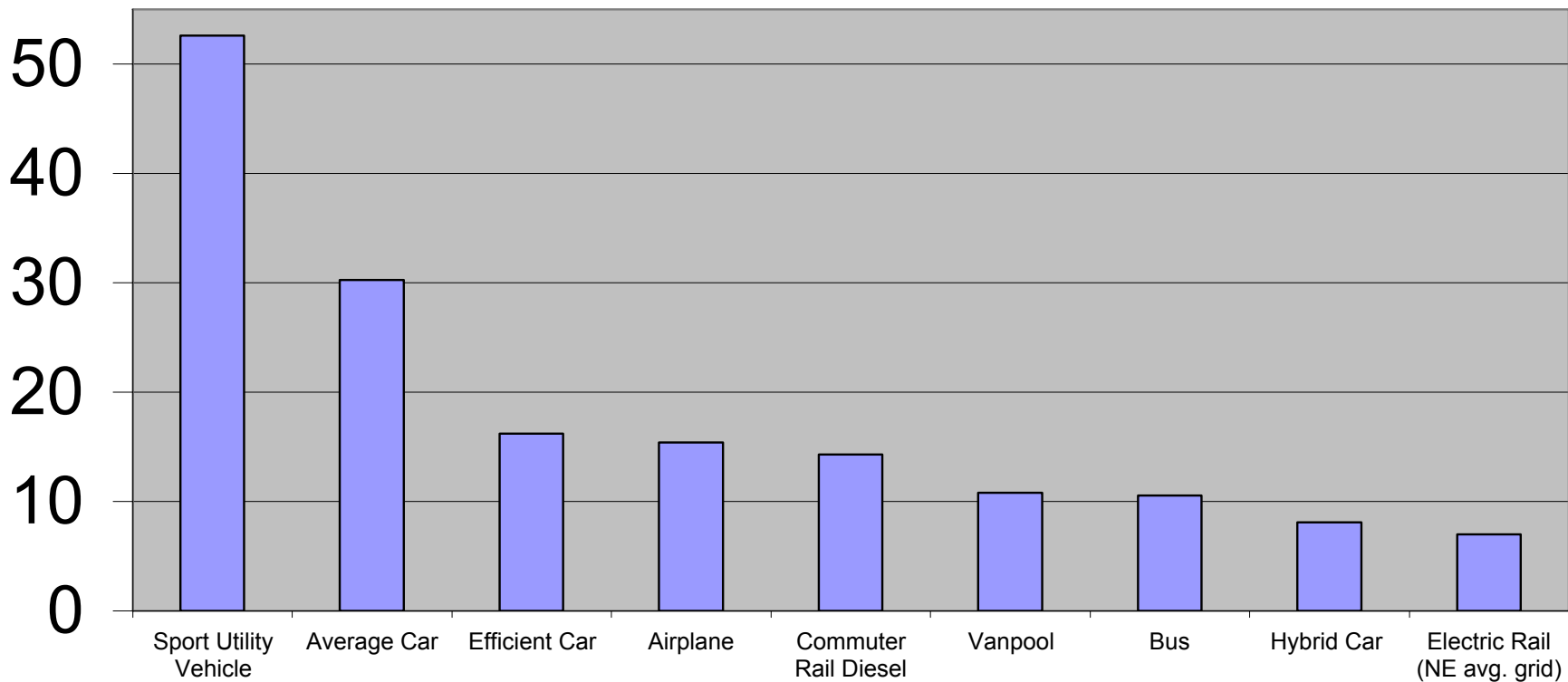
Four Basic Ways to Reduce CO₂ from the Transportation System

- Improve the fuel conversion efficiency of the vehicle. (ie. hybrids)
 - Reduce the carbon intensity of the fuel used (biofuels, CNG)
 - Move to higher occupancy vehicles (transit and carpools)
 - Reduce the need for travel in the first place (*like energy efficiency for the transportation sector*)
- 

Rough Comparative CO₂ Emissions by Mode

Carbon Emissions on a 500 mile trip

(expressed in number of 5-pound bags of charcoal)



What Influences Transportation Decisions?

| | Factor | | |
|---------------------------|------------------|---------------------------------------|-----------------------------|
| Entity | Travel Demand | Vehicle Technology | Fuel GHG (lifecycle) |
| Consumers | travel decisions | purchase decisions, vehicle operation | vehicle choice, fuel choice |
| Vehicle Manufacturers | (indirect) | efficiency vs. weight & power | engine technology |
| Fuel Producers | Fuel price | NA | product mix |
| Land Use & Infrastructure | travel options | NA | NA |

General Considerations for the Transportation Sector

- Should it have a separate market or be part of broader market?
- All things equal, broader market more economically efficient
- GHG reductions through travel demand reduction may offer many co-benefits (e.g., energy security, congestion) but has to happen through many, many marketplace and consumer choices.

Vehicle Technology: What reductions can it offer?

- Gasoline and diesel vehicles
 - CAFE for light trucks: +2.1% mpg per year 2005-2011
 - If continued would be -31% g/mile by 2030
 - Proposals: -18% to -30% g/mile by 2016 (cars)
 - - 30% g/mile by 2016 with few year payback
 - -40 to -50% g/mile over the longer term

Potential Market Instruments for Low GHG Vehicles

CAFE or Pavely - GHG Regulation

Feebates

Gas Taxes

Incentives for consumers to purchase low GHG vehicles (e.g., tax credits for hybrids); preferential parking for clean vehicles, HOV lane access, reduced registration fees, etc.

Incentives to manufacturers/others to develop breakthrough technologies

Non-traditional financing for consumers

Regulating the Vehicles

- Cover vehicle manufacturers directly
 - This option would place car manufacturers into a market and then require that they hold allowances to match the average or direct emissions from the vehicles they sell:
 - Manufacturers are price-responsive
 - Similar to CAFE compliance but more direct
 - Manufacturers have no control over VMT
 - Emissions must be estimated;
 - No fuel price incentive to discourage driving or motivate interest in efficiency
 - Initially coverage low but can cover growing percentage over time
- CAFE Standards increase
- Vehicle GHG standards (Pavley)

Lower Carbon Fuel Sources: What reductions can they offer?

Ethanol from biomass and waste

Needs to be made from cellulose and not corn!

Currently more expensive than gasoline

Biodiesel from plant and animal oils

Methanol from waste and plants

Currently produced at \$1.60/gal gas eq

Battery electric vehicles fueled from efficient renewable energy (especially in the PNW)

GHG Characteristics of Fuels

Ethanol

- Corn: 15% GHG savings, Sugar cane \approx 40%, cellulosic \approx 80%
 - Limits on imports (Brazil); costs need to come down for cellulosic
- 24% lower energy content \rightarrow 30% more frequent refueling (E-85)
- Air quality concerns
- Penetration depends on land availability/ conflicts & feed stocks

GHG Characteristics of Fuels

Diesel

- 18% GHG savings (not accounting for black carbon)
- Biodiesel offers an additional 15% GHG savings (B-20)
- Ultralow Sulfur Diesel + controls will increase diesel use, but \$\$ to meet CA standards

Hydrogen

- GHG savings require source of low-GHG hydrogen
- Stationary applications may be more attractive

Potential Transportation Programs

Low GHG Fuels

- Low GHG fuel standard
- Feebates for fuels
- Incentives for fuel suppliers to produce/sell low GHG fuels
- Incentives for consumers to purchase low GHG fuels
- Funding for low GHG fuel infrastructure

Transportation Market Barriers: Low GHG Fuels

- Fuel cost impact of "gas tax" equivalent of \$10-30/ton CO₂ is only \$.10 - \$.30 per gallon of gasoline.
 - Price not high enough to provide enough incentive for significant technology development in fuel industry.
 - Incremental fuel costs not high enough to command changes in customer gasoline purchase behavior.
- Infrastructure cost associated with certain alternative fuels very high
- Other issues: energy security concerns

What is the Low Carbon Fuel Standard?

- CA executive order requiring passenger car fuels to emit 10% fewer greenhouse gases in 2020
- CARB to establish regulations
- Full Life Cycle Accounting: penalizes carbon-intensive fuels and values low carbon fuels
- Could be met by use of ethanol at low blends, electricity, biodiesel, compressed natural gas, E85, hydrogen
- Credits can be generated from electricity sold for use in electric cars or plug-in hybrids (and in CA electricity will be a capped sector)

Key Options for Market-based Transportation Fuel Approach

Cover Oil Upstream

- Comprehensive
- Sends price signal with every gallon used
- Covered entities have limited compliance options
- Consumers relatively unresponsive to gasoline price changes

Low-Carbon Fuel Standard (LCFS)

- Comprehensive
- Takes into account life-cycle GHG emissions
- Life cycle analysis is challenging
- Doesn't put a hard cap on emissions
- All things equal, not as economically efficient as cap and trade

Considering using the Market to Improve Travel Efficiency

- Land Use Planning and Development so we don't need the car
- Transit Improvements: new technology and more dedicated funding streams
- Roadway Efficiency and Pricing
- Car Sharing
- Boosting knowledge of road conditions in real time
- New Telecommuting options
- Travel Blending - new mesh network applications for ridesharing

Potential Transportation Measures

Encourage Low GHG travel modes

- Support good planning with carbon in mind (resources: data, models, training)
- Require alternative analyses in regional transportation plans
- Target infrastructure funding
- Use Pricing approaches (congestion charge, parking, PAYD insurance)
- Provide incentives for transit, TOD, bike, walk, demand management
- Tires: after-market rolling-resistance labeling or standards, require service stations to have tire gauges for free, require frequent tire pressure checks for commercial vehicles/taxis
- Education & training for consumers on efficient driving behavior

Market Failure: VMT Reductions

Trading doesn't adequately encourage changes in land use patterns & transportation infrastructure, due to:

- Short term focus of trading
- Multiple parties in land use & infrastructure planning
- Uncertain GHG benefits

Current infrastructure and land use decisions shape future travel patterns and emissions for 100 years

Delaying smart growth policies puts more pressure on tech. & fuels and increases compliance costs

- Low or negative \$/ton when include fuel savings

Slowing VMT Growth through Well-directed State Investments

- Focus the current transportation and infrastructure funding to efficient locations and modes.
 - Billions will be spent anyway; they can be used reduce the GHG impacts
- Metropolitan regions and cities and towns need the tools and resources to assess the the carbon impacts of alternative transportation and land use scenarios.

Zoning: changing the DNA of development

- Lift outdated prohibitions on mixed-use, multi-family, accessory apartments, housing over retail
- Concentrate development around existing infrastructure, saving money
- Respond to consumers who want to walk for simple errands, drive less, spend less money on gas
- Make the traditional towns and villages legal again..... and steer development away from woods and meadows and farmland

Closing Thoughts

- It is very difficult to get transportation sector GHGs below 1990 levels but big reductions are needed in this area.
- If the reductions don't come from the transportation sector, more pressure will be placed on other sectors, which are also growing and produce more jobs.
- We need progress in all areas of transport: vehicle technology, fuels, reduction in miles traveled, freight movement and ports, & aviation

Closing Thoughts

We need to assess the opportunity costs of delayed action given that:

- Vehicles stay on the road for 15 years
- Emissions stay in the atmosphere for 100 years or so.
- Many small decisions sum to our land use patterns and many of these are happening at the municipal and regional level. (We need partnerships.)
- Land use and infrastructure decisions affect future carbon emissions for a century or more.

For More Information

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