

The Wedge from the Reduced Use of Vehicles

BAU

Activity level(AL)

- 2 billion cars (light-duty vehicles)

Assumptions

- vehicle miles traveled(VMT): 10,000
- miles per gallon(mpg): 30

Conversion factors

- liter per gallon: 3.78
- gasoline gravity: 0.74kg/liter
- weight per gallon: 2.8kg
- carbon content in gasoline: 85% by weight
- carbon per gallon(cpg): 2.4kg

Emission factor(EF)

- $=\text{VMT} \times \text{cpg} / \text{mpg} = 0.8 \text{ t-C/vehicle/year}$
- “overhead” emissions: 25%
- $\text{EF} = 0.8 \times 1.25 = 1 \text{ t-C/vehicle/year}$

Total emissions

- $=\text{AL} \times \text{EF} = 2 \text{ Gt-C/year}$

Target

Same as in BAU, except for a 5,000 VMT, which leads to an emission factor of 0.5t-C/vehicle/year and total emissions of 1Gt-C/year. Thus, we derive a wedge.

Comments

Note also that the assumption of 10,000 miles of driving per year for the average car is only slightly larger than the 14,000 km/y (8700 miles/y) value used by the U.S. Energy Information Agency as a world average today (S23). The assumption of two billion light-duty vehicles in 2054 is consistent with the 530 million cars in 1999 (S23), if the growth rate in number of cars is 2.4% per year.

Note that the reduced use of vehicles may require alternative transportation, such as mass transit, which may emit carbon. Therefore, some of the reduced emissions from this wedge might be double-counted.

Reference

S23 Energy Information Agency, U.S. Department of Energy, 2003. *International Energy Outlook, 2003*. Report # DOE/EIA-0484. <http://www.eia.doe.gov/oiaf/ieo/index.html>.