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Vehicle Participation in Cap and Trade Schemes

John German

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Background

- Cap and Trade programs are actively being developed worldwide
- Many people ***assume*** vehicles can be incorporated into global cap and trade programs

Is this realistic, or do we need to develop other methods for controlling vehicle carbon emissions?

Incorporating Transportation into Cap & Trade (Pew 2003)

	Environmental Effectiveness – (coverage, certainty, enforceable)	Cost-effectiveness flexibility, predictibility, long-term incentives	Administrative Feasibility – administrative cost, adaptability	Distribution Equity	Political Acceptability
Cap & Trade – upstream	Good	Least cost if includes flexibility measures	Good	Depends on allocation and auctioning provisions	Works by limiting fuel availability and raising fuel cost
Cap & Trade – downstream			Prohibitive administrative cost		
Sectoral Hybrids – tradable standards	Must expand coverage (vessels, locomotives, HD, aircraft, buses) Emission reductions uncertain	No incentive to reduce end-use, Vehicle fuel sales must be exempted from upstream cap & trade Likely considerably more costly than upstream cap & trade	Must translate mpg into annual CO2 (annual VMT assumptions, timing) Requires continuously promulgating adjustments Double-counting risks Evasion if upstream trading allowed	Possible concern	Avoids gasoline price increases
Sectoral Hybrids – capped tradable standards	Emission reductions more certain, although still relies heavily on estimates		Raises issues with allowance allocation, shutdowns, new market entrants, mfr. market share shifts, overall sales		

Direct and Indirect Influences on Transportation GHG Emissions

Entity/Factor	Vehicle Miles Traveled	Vehicle Efficiency	Fuel Carbon Content
Consumers	Travel Decisions	Consumer Preferences, Vehicle Maintenance	Consumer Preferences
Vehicle Manufacturers	(*indirect influence*: vehicle efficiency impact on driving costs)	Vehicle Technology	Vehicle Technology
Fuel Producers	Fuel Price	NA	Product Mix
Land Use & Transportation Infrastructure	Available Travel Options	NA	NA

Source: Steve Winkelman et. al, *Transportation and Domestic GHG Emissions Trading*, Center for Clean Air Policy (2000)

Approaches to Controlling Emissions

- Upstream trading (fuel producers)
- Downstream trading (consumers)
  - Not feasible politically or administratively
- Downstream trading (vehicle manufacturers)
- Upstream/downstream hybrid

Upstream Trading

- Point of regulation: refiners
- Easy and *comprehensive coverage*
  - Lower costs
  - Administratively simpler, though some accounting complexities are introduced
- Challenges:
  - Works by limiting fuel availability and raising fuel price
  - Even at $2.50 per gallon, gasoline costs are lower than historical trends and only a relatively small part of vehicle ownership
    - Only mild impact on VMT and purchase decisions
  - Fuel price very weak lever for vehicle technology
  - Low carbon fuels need coordination with vehicles

Low costs, but also low benefits

Including vehicle makers in trading

- Technology is a big lever – major incentive to include vehicle manufacturers in cap and trade program
- Mechanism is simple - require vehicle manufacturers to turn in allowances for imputed lifetime emissions
- Advantages:
  - Avoids fuel price increase
  - Few entities
  - Vehicle makers control fuel efficiency
  - Vehicle makes can influence fuel type
  - Vehicle makers can influence purchase decisions with vehicle pricing

Problem 1 - Double Counting

- Fuel producers allocated carbon for current year
- Vehicle manufacturers allocated based on projected carbon for vehicle lifetime
- If manufacturers improve efficiency or sell alternative-fueled vehicles, carbon goes down in future
  - Manufacturers take credit now and trade to someone else
  - Fuel producers get credit when in-use vehicles use less fuel
  - Same credits are traded twice!!!
- Solutions

A. Only do upstream trading (not a solution, just giving up)
B. Vehicle manufacturer-only carbon trading
C. Hybrid program

Vehicle manufacturer-only carbon trading

- Vehicle fuel sales must be exempted from upstream cap and trade
  - If vehicle fuel consumption increases, overall carbon emissions exceeds cap
- No incentive to reduce end-use
- Primarily impacts technology and efficiency

Split allocation between oil and autos

	Vehicle manufacturers	Fuel Producers
Baseline	Vehicle sales * Lifetime VMT / in-use MPG * carbon content	Gallons sold * carbon content
2005 – million metric tons CO2	17 * 150 / 21.0 * 19.5 / 2.205 = 1074 mmT	1982 mmT (inc. rail, bus, freight, ship, boat, air, 75-05 LD)
2015 – each reduce 100 mmT	17 * 150 / 23.2 * 19.5 / 2.205 = 972 mmT	How is LD handled versus other transportation sectors?
	What if: sales change, lifetime VMT increases, in-use FE shortfall changes	How are vehicle efficiency improvements handled in the future?
	Actions by one will reduce emissions of the other without any action, although offset in time by fleet turnover If want to influence both manufacturers and oil producers, must hold both accountable for total reductions • Actions by each still influences requirements for the other	

Problem 2 – Manufacturer Allocations

A. Total carbon
   - Holds manufacturers responsible for customer purchase decisions
     - **If sales increase or market shifts to larger vehicles, burden on manufacturer increases**
   - Tends to freeze manufacturers into existing market share
     - Increasing sales makes it more difficult to meet requirements
     - Decreasing sales yields windfall credits without improving efficiency
   - What do you do with new market entrants? Shutdowns?
   - Worse than Uniform Percentage Increase (UPI) – affects both vehicle mix and total sales

Problem 2 – Manufacturer Allocations

B. Carbon Intensity

- Only holds manufacturers responsible for average CO2 per vehicle
- Fair and equitable
- Good lever for improved technology and efficiency

But

- No influence on VMT
- Manufacturers can earn credits even if total CO2 is increasing due to higher sales or VMT

Problem 3 – Accounting

- Manufacturer credits & allocations include assumptions about lifetime vehicle miles traveled (VMT), in-use mpg, and carbon content of fuel
  - How are credits determined for flex-fuel vehicles? How do you handle double-counting with alternative fuel producers?
  - What if lifetime VMT changes? This will cause the vehicle to use more or less carbon than accounted for.
  - What if in-use mpg changes, due to more congestion, higher speeds, more sprawl, etc?
- To avoid double-counting, vehicle improvements must be subtracted from future carbon allocations for other sectors
  - Annual improvements must be estimated by modeling yearly scrappage rates, annual VMT by vehicle age, and in-use FE shortfall
- If vehicle carbon emissions are imputed incorrectly, then extra burden may be put on another sector

Accounting Incompatibility

Accounting not compatible with rest of trading system

- If CO2 prices low, manufacturers encouraged to buy credits
  - Trade future debits in return, not current debits, so total CO2 ceiling for current year goes down
  - Future fleet will use more fuel and less CO2 is allowed
  - Forces oil producers to buy credits in the future
  - Drives up price of CO2 in the future
- If CO2 prices high, manufacturers encouraged to exceed requirements and sell credits
  - Credits are for future years – the efficiency of the existing fleet is not affected
  - Trading these credits raises the current total CO2 ceiling, driving down price
- Creates cyclical CO2 availability and pricing
  - Artificial 10-20 year cycle, based on vehicle turnover

Cross Cutting Issues

- Increasing use of new fuel types
  - Upstream: natural gas covered. Need to certify biomass
  - Downstream: more categories for imputing emissions
- Expanding beyond light-duty vehicles
  - Upstream: covered
  - Downstream: cumbersome
- Non-dedicated Alt Fuel Vehicles
  - Upstream: no problem
  - Downstream: need to estimate fuel mix

Source: Steve Winkelman et. al, *Transportation and Domestic GHG Emissions Trading*, Center for Clean Air Policy (2000)

Additional Concerns and Questions

- Integrating manufacturers would make it impossible to guarantee transportation sector emissions reductions
- Is price signal enough? (Relates to upstream)
- What to do about existing vehicles, non-LDV emissions?
- Who is responsible for existing fleet?
- If efficiency standard is used alone:
  - How to address lack of environmental certainty, cost-effectiveness concern?
- May be reasons beyond carbon to improve efficiency
  - Energy security
  - Trade deficit

Conclusions

- Previous studies have tried to be even-handed
- Problems in integrating vehicle manufacturers into overall carbon trading problem are overwhelming:
  - Double-counting
  - Future emissions versus current credits/debits
  - Separation of cars/light truck fuel use from other fuel users
  - Interactions between efficiency (manufacturers) and price (oil producers)
  - Impact of changes in lifetime VMT, in-use fuel economy shortfall, and sales
  - Uncertainty in future emissions
  - Handling of alternative fueled and flex fueled vehicles
  - Does not account for energy security and trade deficit concerns
- Might be able to handle some of the problems, but not all

What *Might* Work?

- Vehicle-intensity requirements or incentives
  - Possibly class-based
- Manufacturers can buy and sell efficiency credits to and from the government at a fixed rate
  - Keeps the credits out of the overall sector carbon trading system
  - Rates can be set based on going carbon trading rates plus need for the nation to conserve energy
- Government can monitor actual efficiency improvements and in-use VMT and use this data to adjust carbon caps for the other sectors
  - Otherwise, oil producers will have windfall benefits from vehicle manufacturer actions

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