

# Feebate Review & Assessment

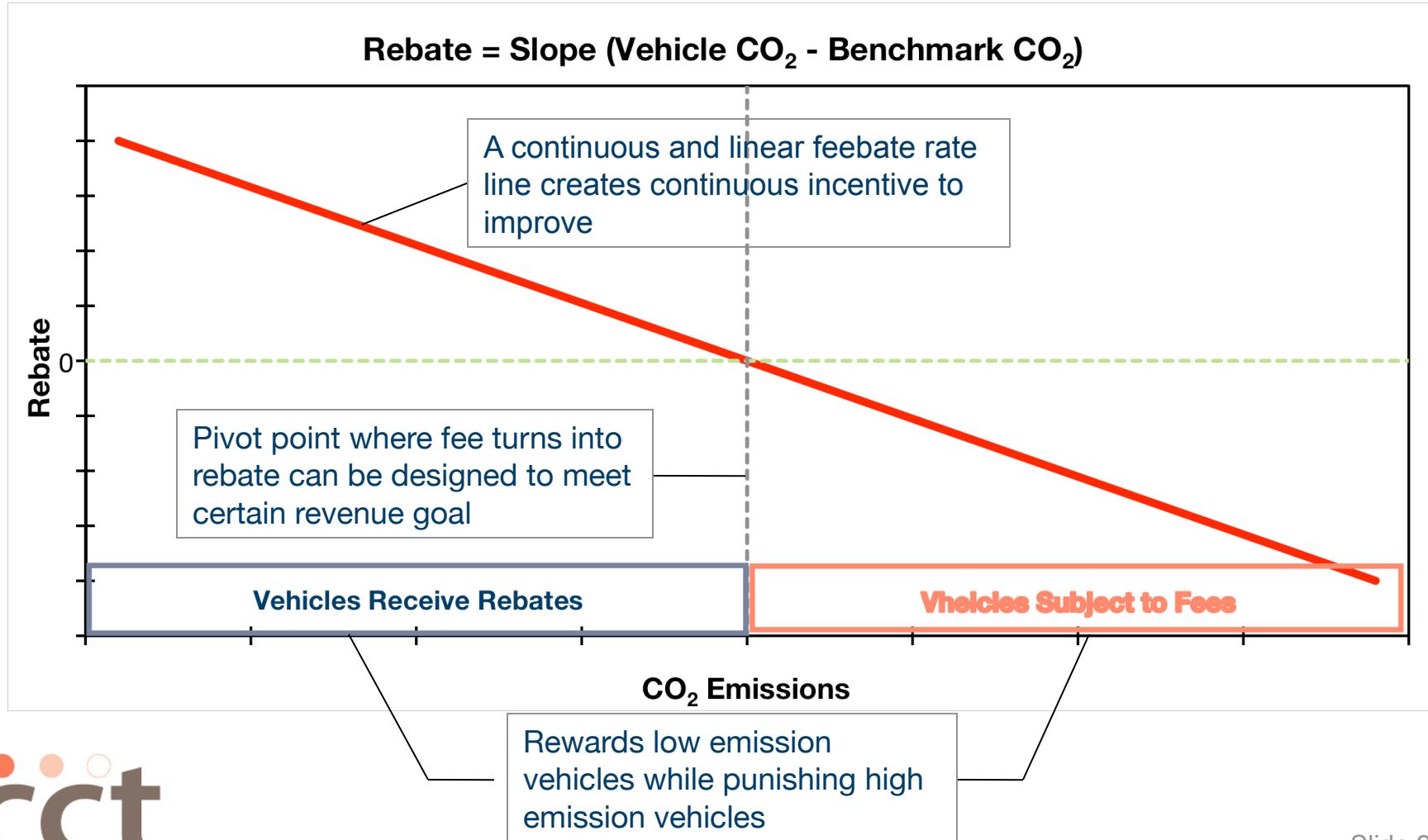
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LowCVP Webinar

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# Feebate Illustration



# Encouraging Technology Spread Across the Fleet

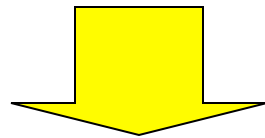
## Direct and Indirect Influences on Transportation Sector GHG Emissions

Factor/Entity		Vehicle Miles Traveled	Vehicle Efficiency			Carbon content
Strategy	Primarily affects		Leap-Forward Technology	Technology spread	Smaller vehicles	Alternative fuels
Fuel price (taxes)	Consumers	+			+	+ (if fuel price difference)
Land Use & Infrastructure	Consumers	+				
Technology mandates/incentives	Manuf.		+			+ (w/ enough dollars)
<b>CAFE</b> or <b>Feebates</b>	Manuf.			++	(possible but small impact)	+

CAFE and Feebates fill the same gap between societal and consumer value of fuel savings

# Fix FE or Cost?

- CAFE fixes the **amount** of FE improvement, but
  - If standard is set too high, incremental costs skyrocket and market may not accept technology or vehicles
  - If level is too low, cost-effective technology is not used
    - No incentive to do more than the absolute minimum
  - Is not responsive to market or technology changes
- Manufacturer revenue-neutral incentive programs fix the **cost** of fuel economy improvements
  - Economically sound
  - **Continuous incentive to improve FE**
  - Automatically adjusts to technology changes
  - Fuel economy, however, is not fixed



**CAFE provides certainty of fuel economy increases**

**Feebates provide certainty of cost-effectiveness**

# Small Impact on Consumers

- Market shifts:
  - Real fuel prices are low
    - Will decline further as CAFE increases
  - Most customers only value 2 to 3 years of fuel savings
- Fuel economy technology:
  - Customers are largely indifferent\*:
    - Technology increases cost and improves fuel economy
    - Even at \$1/gal, customers value the fuel savings roughly the same as the cost increase - little net change in present value
    - Both cost increase and fuel savings are minor factors in purchase decision

# Large Impact on Manufacturers

- Very efficient incentive to implement FE technology
- Manufacturers will install **all** technology that costs less than the fixed change in the CO2 incentive
  - Reduces the overall cost of producing the vehicle
  - Increases mpg, which has some value to customers
- Engineers love technology: feebates are a tool to get cost effective technology past the accountants
- DOE modeling (1995 & 2005) found about 90% of the impact was due to manufacturer response

**Can make feebates transparent to customers and dealers with little impact on overall effectiveness**

# Size-Based Attribute Adjustments

Greatly reduces or eliminates:

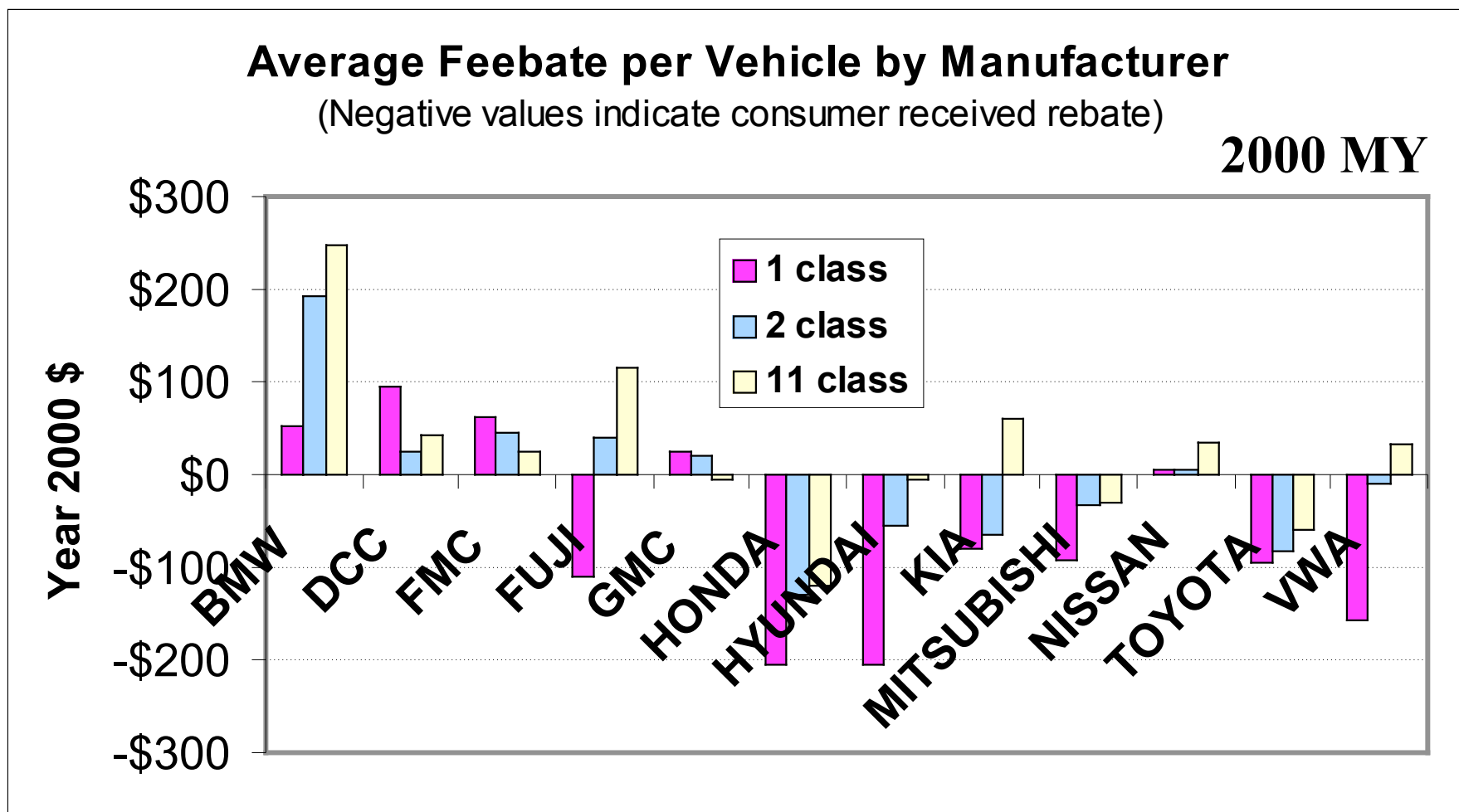
- (A) Impacts on customer choice (size mix shifts)
- (B) Competitive impacts between manufacturers (wealth transfers)
- (C) Any perceived safety effect

**Little impact on overall effectiveness**

Note that attribute-based systems can be used with either:

- FE standards (to fix the amount of efficiency improvement)
- Incentive programs (to fix the cost of efficiency improvements)

# Increasing number of pivot points reduces the disparity of impacts





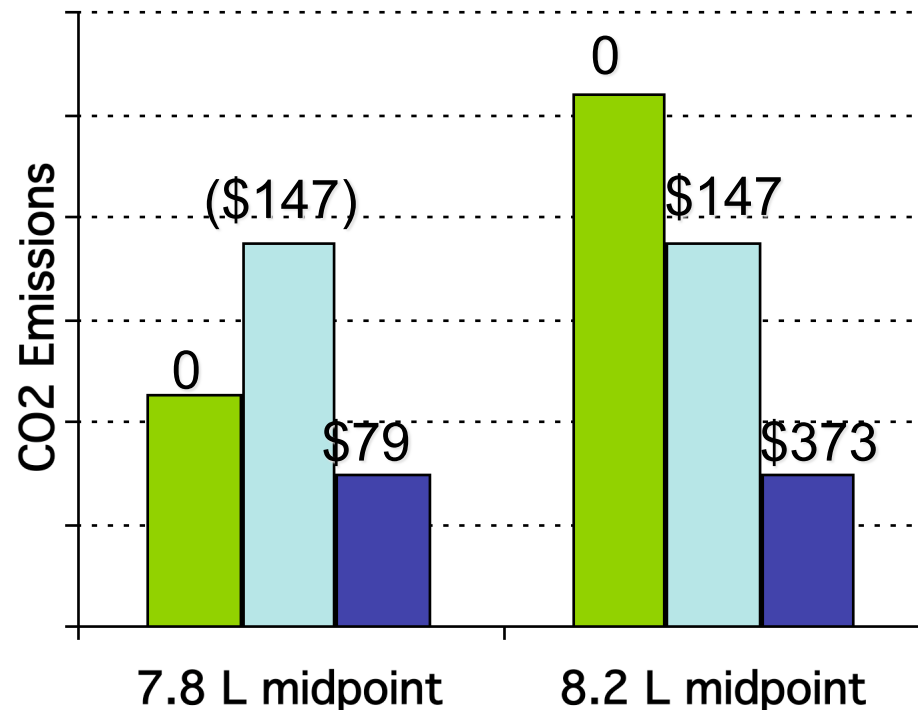
# Mid-Point Doesn't Matter for Technology

## Vehicle & emissions

- Baseline efficiency – 8 L/100km
- In-use FE shortfall – 15%
- Lifetime travel – 240,000 km
- Lifetime CO2 emissions – 58.7 tons  
[5.2 # CO2 per Liter of gasoline]

## Add technology

- Improve FE by 4% @ \$150 cost
- Feebate valued at \$100/ton CO2
  - \$27.27 / ton C
  - About \$1 / gallon gasoline
  - About \$0.26 / liter gasoline



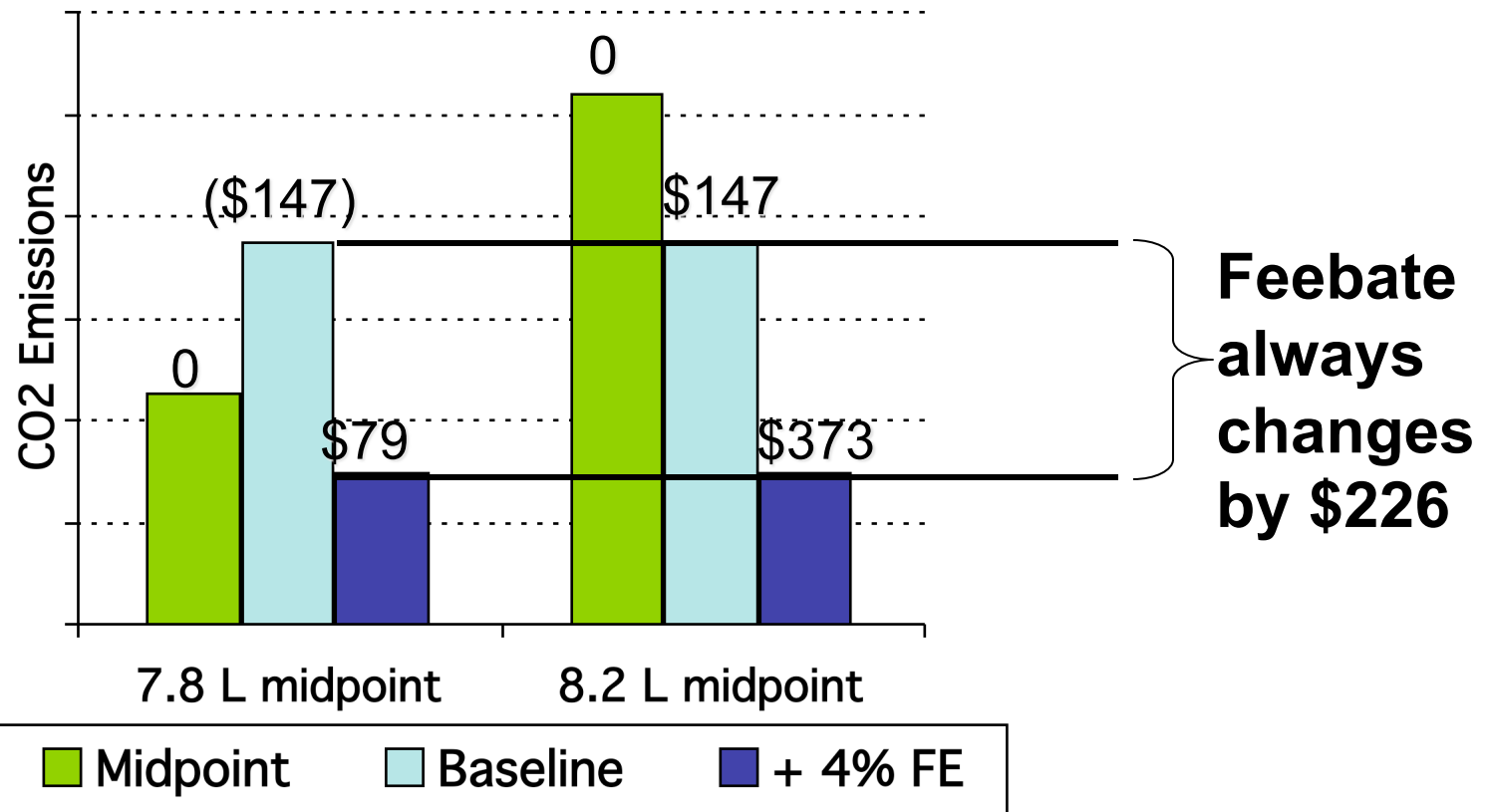
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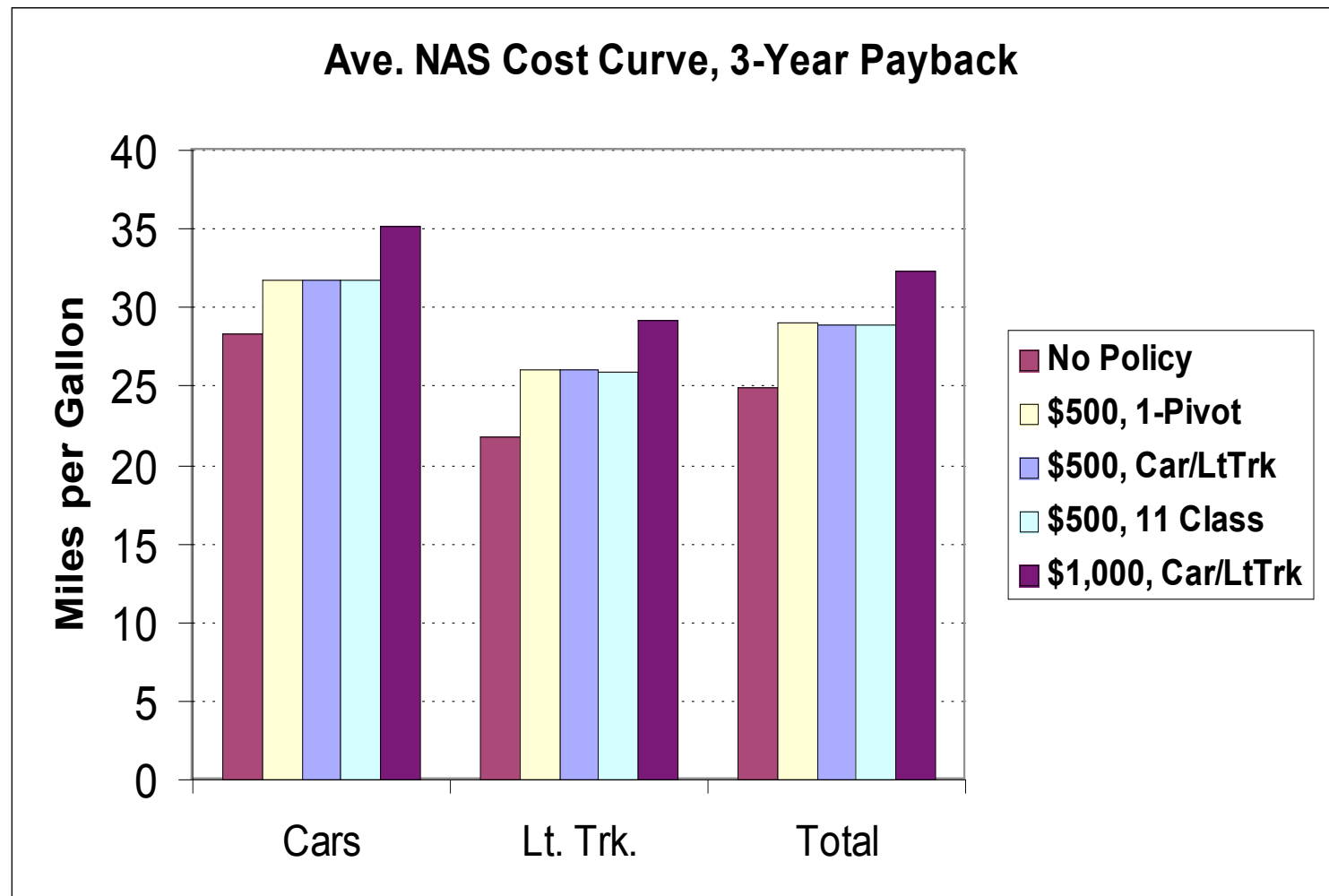
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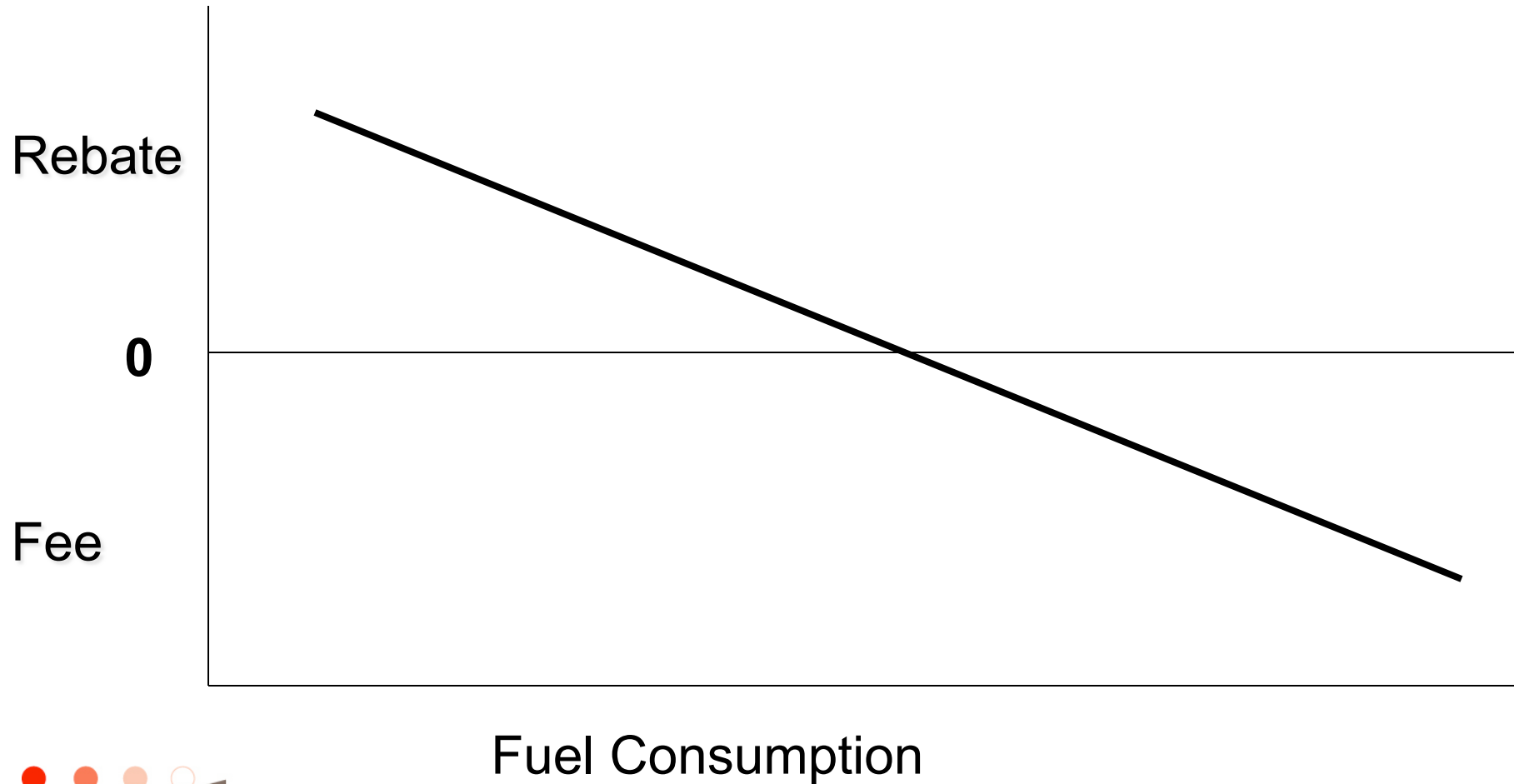


The number and placement of pivot points have little influence on the level of fuel economy achieved.

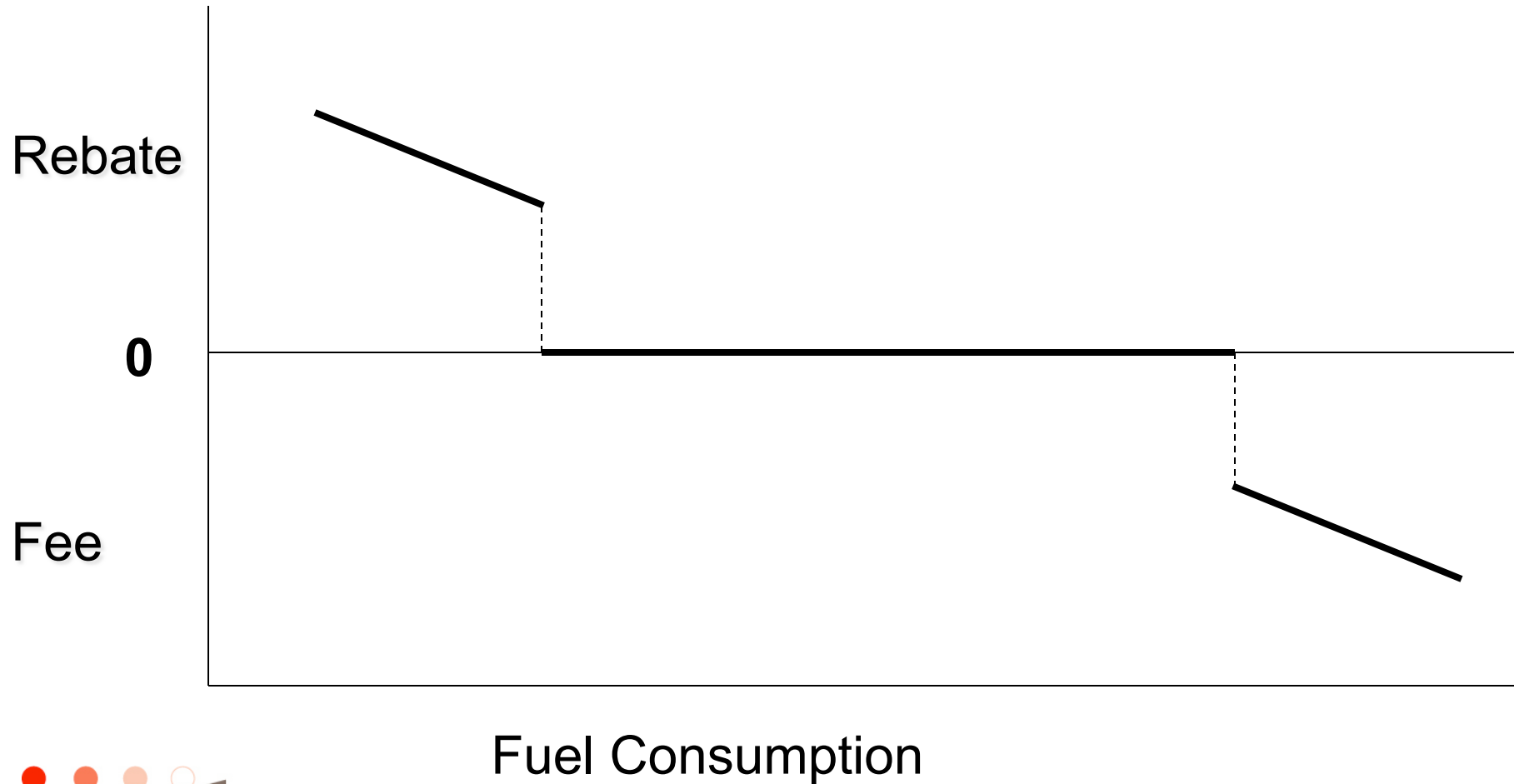
## The rate (R) matters



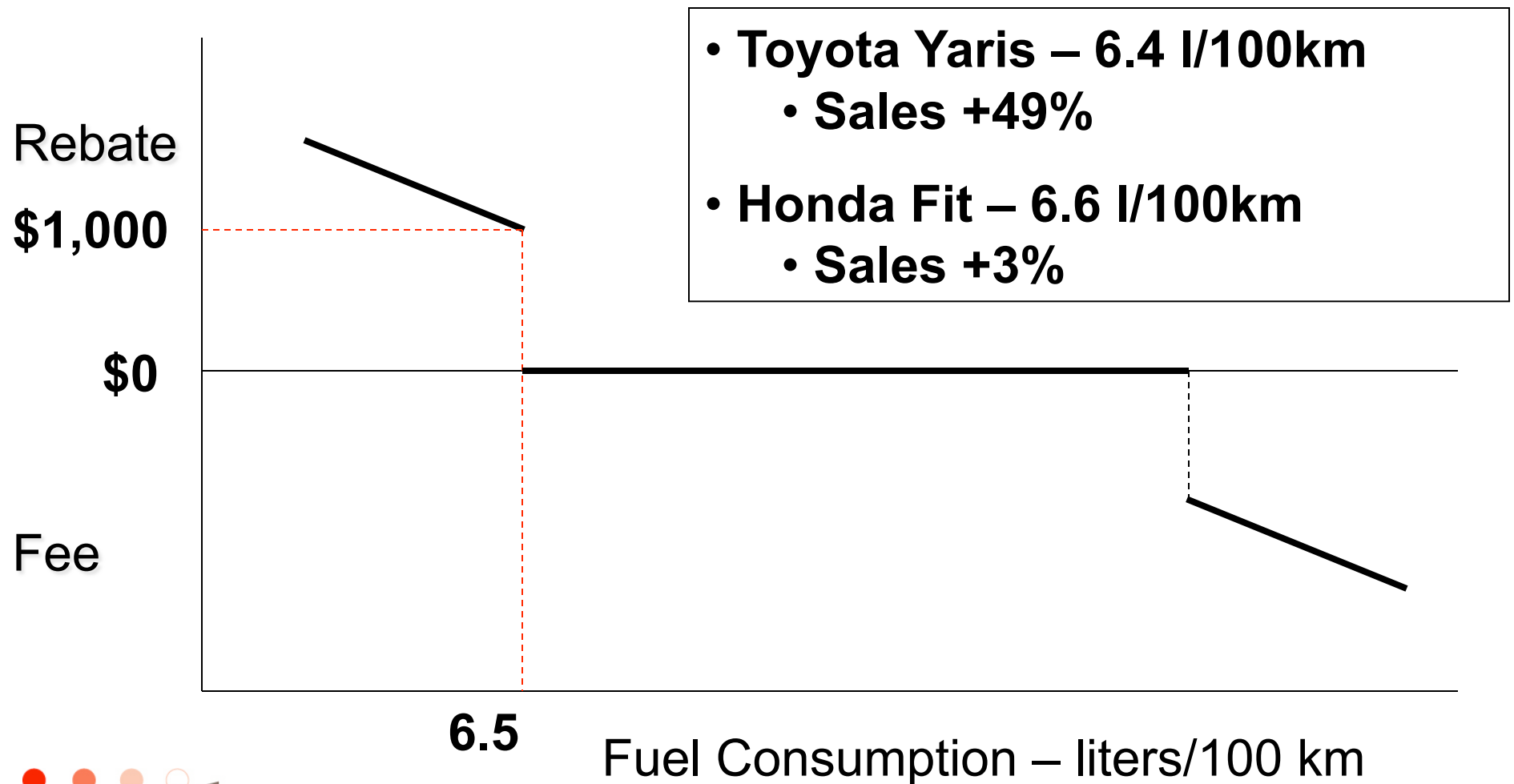
# This is a Feebate Program



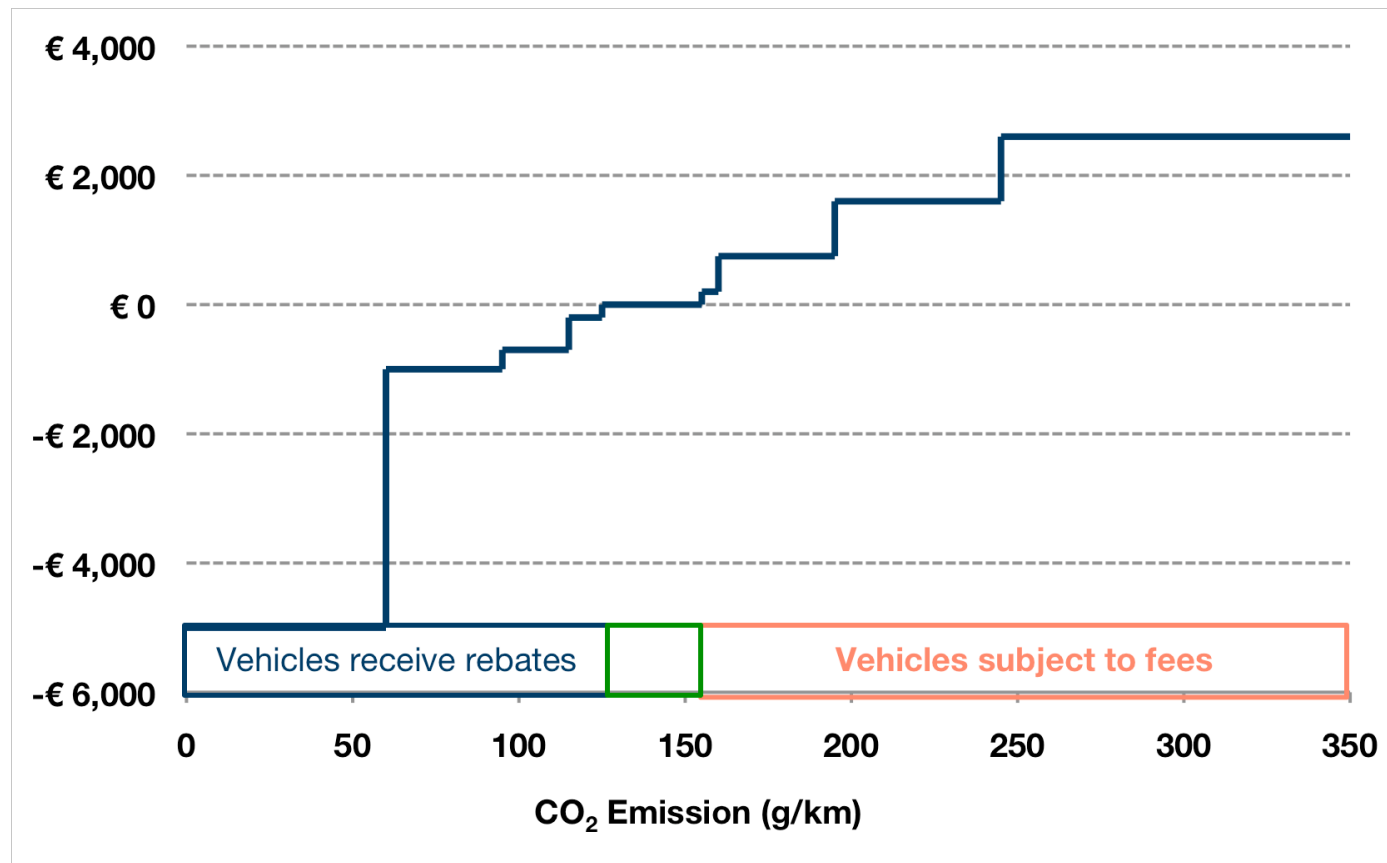
# This is NOT a Feebate Program



# Canadian Incentives



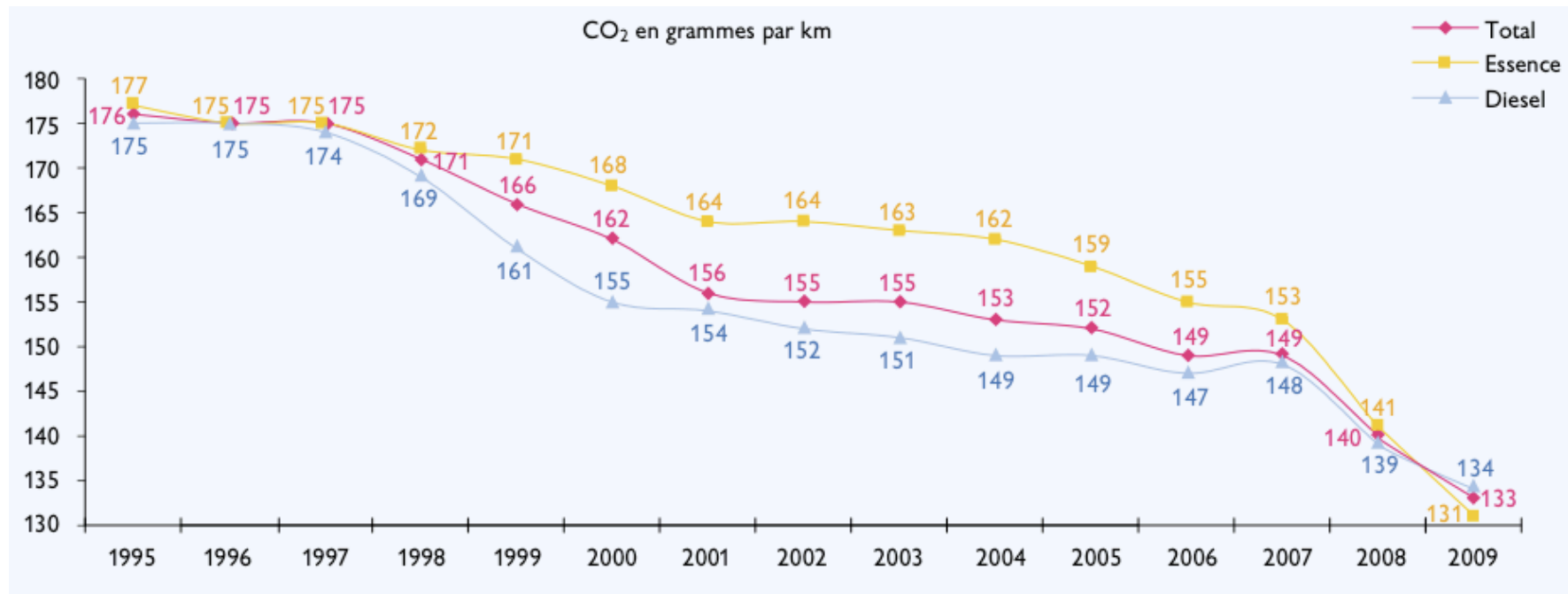
# French Bonus Malus (2008)



- The only deviation from an ideal design: non-linear

# France: CO<sub>2</sub> emissions

- 2001–2007 avg. reduction new vehicle CO<sub>2</sub> = 1 g/km per year
- 2008: emissions drop 9 g/km and 2009 by 7 g/km, Ministry of Transport attributes to introduction of bonus/malus system



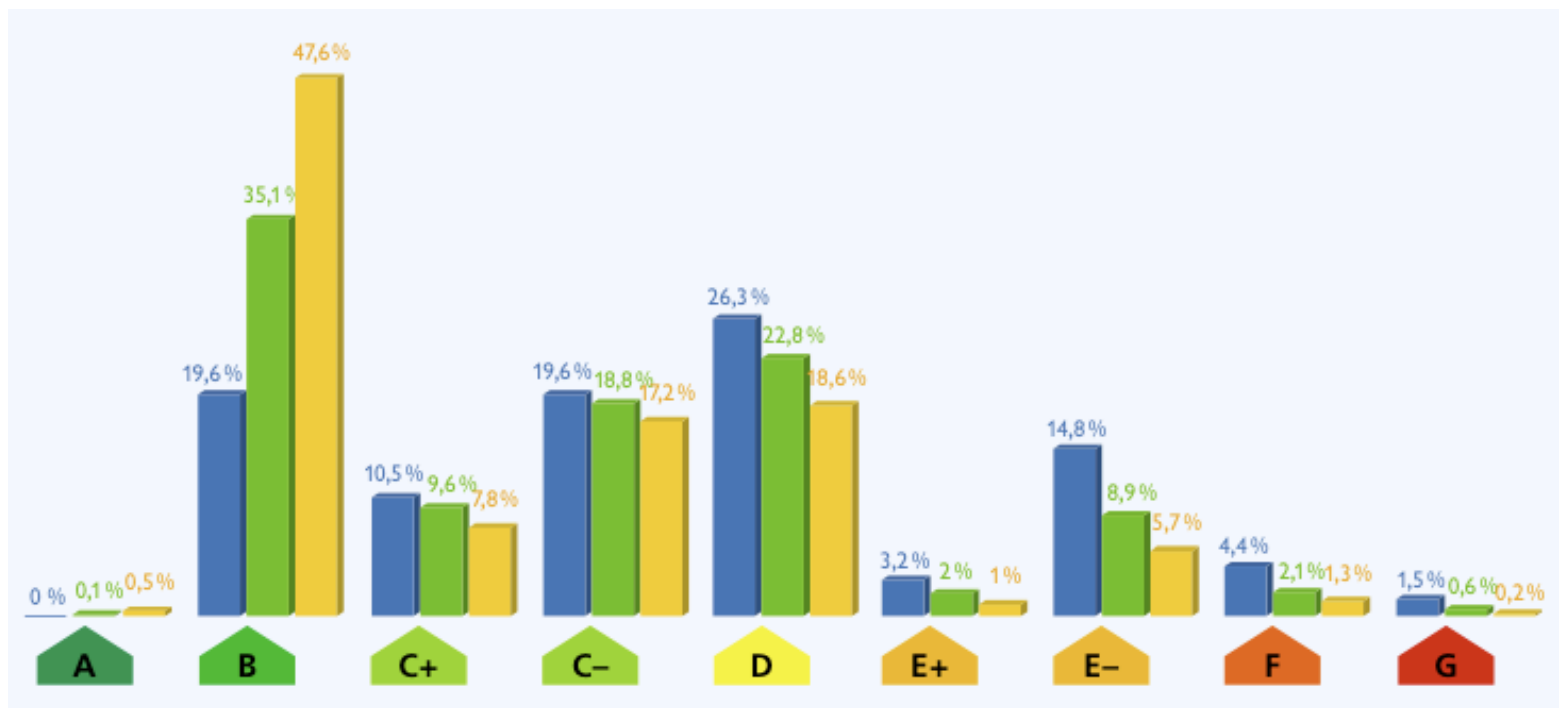


# France: Feebate classes

Bonus/malus category	CO <sub>2</sub> [g/km]	Malus [€]	Label category
A+	<60	-5,000	A
A	61-100	-1,000	
B	101-120	-700	B
C+	121-130	-200	C
C-	131-140	0	
D	141-160	0	D
E+	161-165	200	E
E-	166-200	750	
F	201-250	1,600	F
G	>250	2,600	G

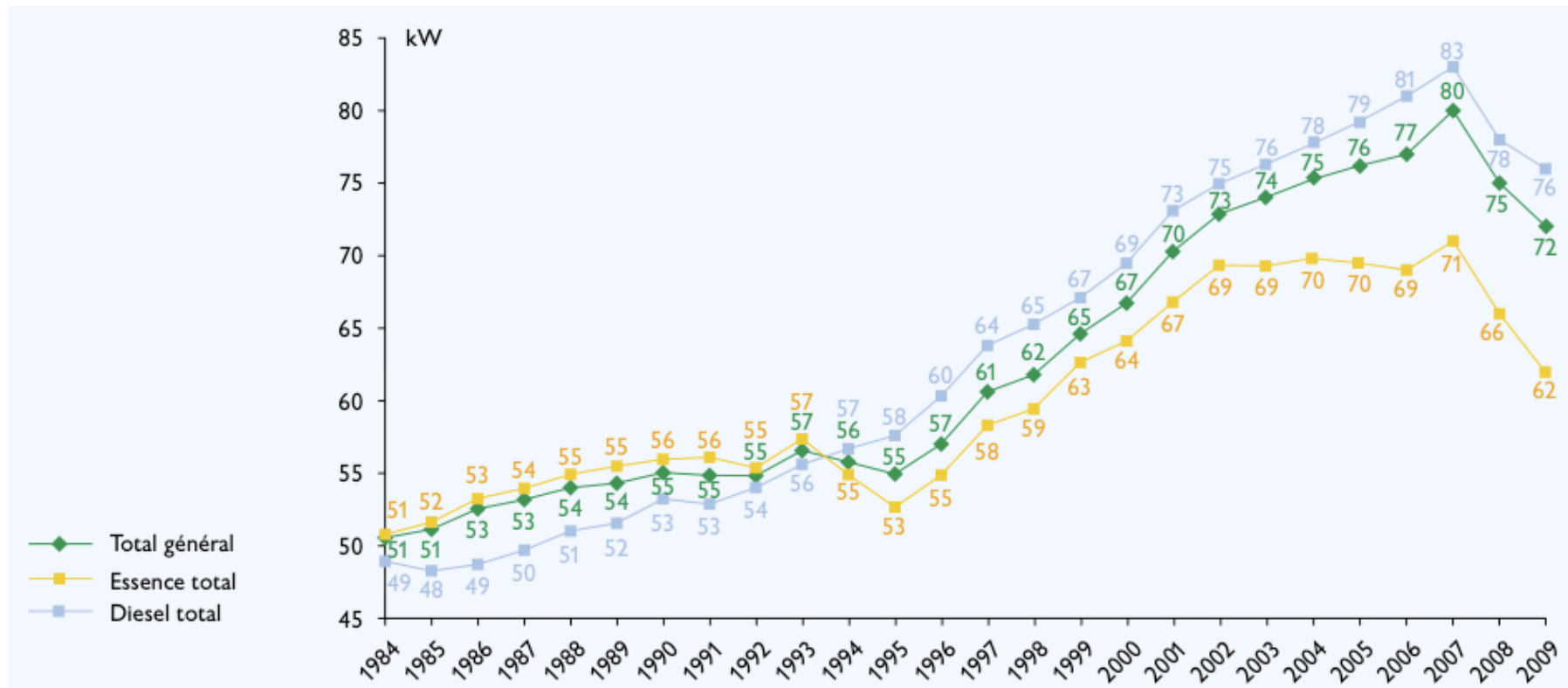
# France: Sales by feebate classes

- Strong increase in vehicles of category “B” (€ 700 bonus, 101-120 g/km)  
→ bonus seems to be effective in influencing purchase decision
- Almost no vehicles in category “A” and none in “A+” (<100 / <60 g/km)  
→ practically none available for purchase
- Slight decrease in category “C+” (€ 200 bonus, 121-130 g/km)  
→ € 200 seems to be not enough bonus for influencing cust. decision

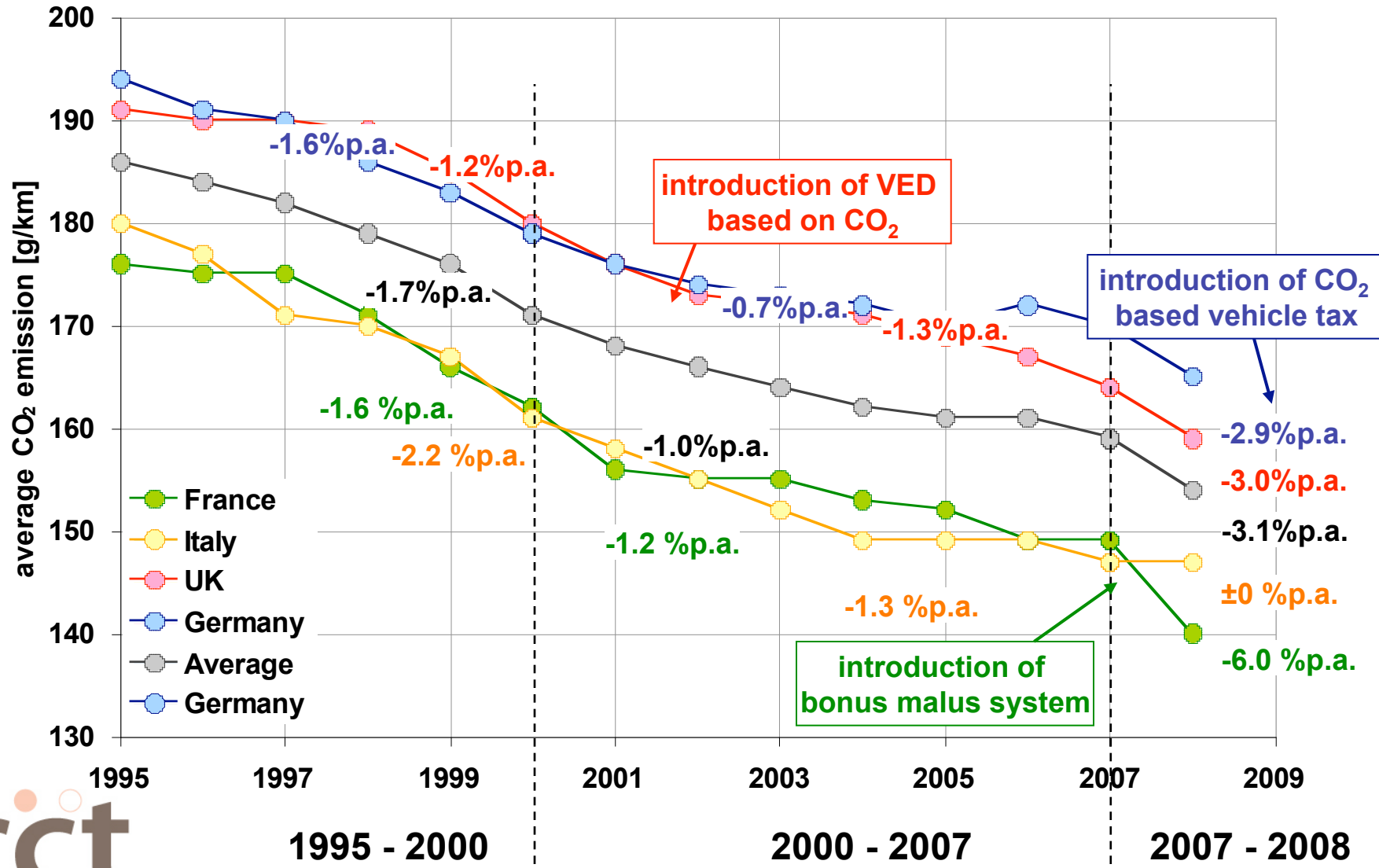


# France: Average power

- Average installed power of new passenger cars declined 8 kW since 2008, greatest decrease since 1984.



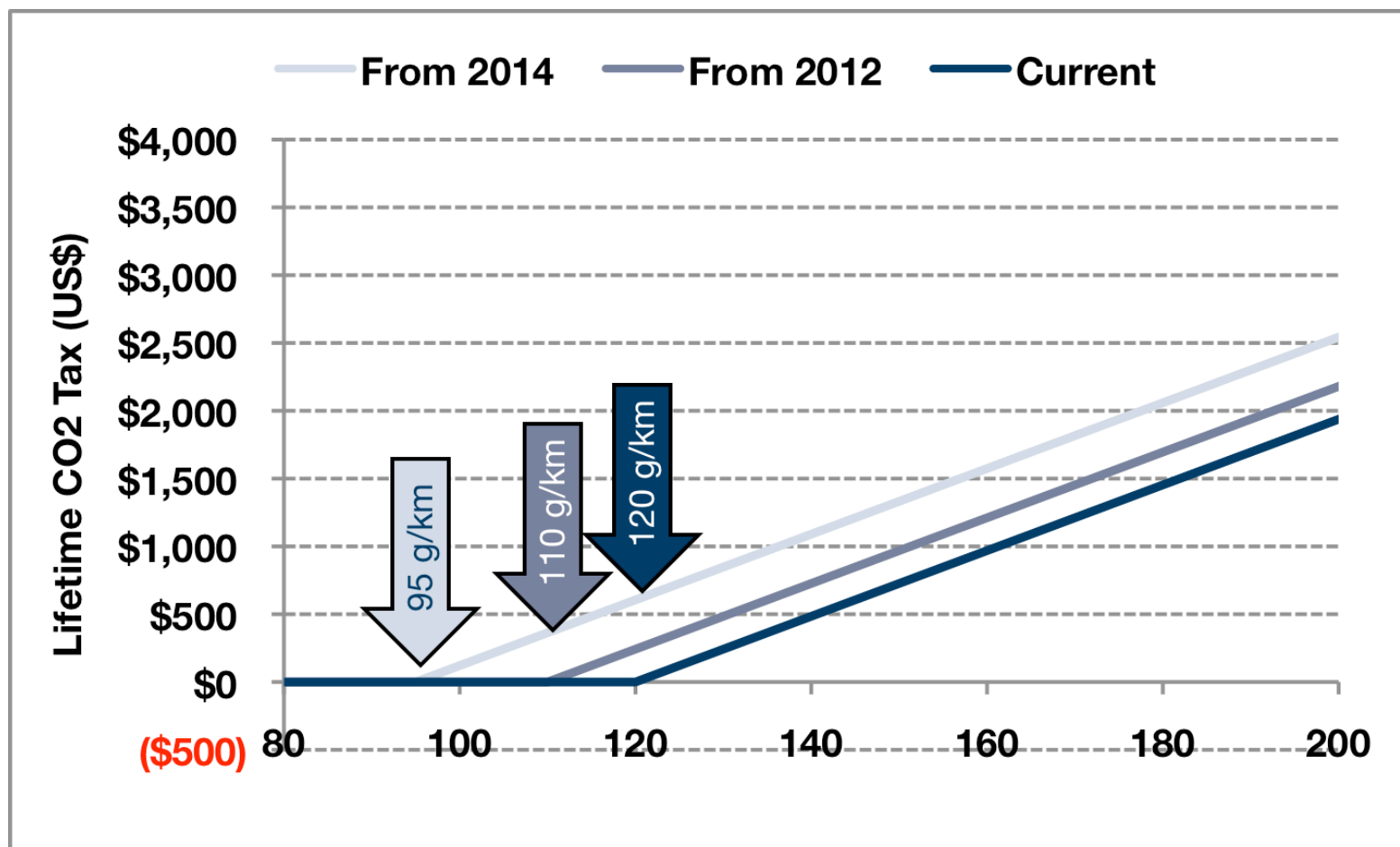
# Europe (main markets)



# France: Costs of system

- Due to success of feebate system it costs the French Government:
  - Approx. 300 Mio. € per year direct costs
  - Additionally about 300 Mio. € decline in VAT revenues, due to higher sales of smaller and cheaper cars.

# Example of a Linear Design: German CO<sub>2</sub> Tax



Annual CO<sub>2</sub> tax component linear at €2 for each marginal increase of gCO<sub>2</sub>/km starting at 120 g/km per car in 2009. The threshold will be strengthened overtime. The continuous linear structure provides incentive for lowering CO<sub>2</sub> emission at every level.

# Adding Feebates to CAFE

- Somewhat redundant, but still benefits for adding feebates to fuel economy/GHG standards
  - Better long-term signal for technology development
  - Pays customers to choose FE over performance
  - Continuous incentive – does not need to be updated
  - Incentive to manufacturers to exceed requirements
- Sends appropriate price signals to customers
  - Although direct effect on customers is minor, price signals help them accept changes mandated by CAFE and GHG requirements

# Perception Problems

- Feebates are generally misunderstood, due to preconceived ideas about design. Proper design can address all of the claimed problems:
  - Ineffectiveness
  - Transfer of wealth away from domestic manufacturers
  - Reduction in vehicle sales
  - No better than CAFE
  - Burden on consumers
- A justified criticism is the complexity of the structure and the difficulty in overcoming misconceptions:  
**requires large expenditure of “political capitol”**



# Conclusions

- ***Should*** have a higher tax on gasoline
  - Addresses many problems
  - Signals market to curb petroleum demand
  - Helps reclaim some monopoly rent on oil
- Feebates effective at paying manufacturers to put technology into production
- Feebates have relatively little impact on customers
  - Do impact fuel economy versus performance tradeoff
- Feebates offer continuous incentive to improve and good long-term price signal for R&D
- Size adjustments can be added with little impact on overall effectiveness
- Could be an important first step for countries that have not established efficiency standards