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Fuel Economy

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Needs Spell check

The OTA report does not attempt to address in a comprehensive way the full range of options open to the government to reduce fuel usage by the light-duty highway fleet. Rather the attempt is to discuss solely the potential fuel economy regulations governing the efficiency of the fleet.

I have divided the following brief into six primary sections. For the sake of brevity, I have not included an in depth discussion of the issues, but rather have made reference to appropriate sections if you wish to further explore any particular area.

Market Trends (PGS. 31-35)

Fuel efficiency is a declining priority. In 1980, among consumers, fuel efficiency was the most important factor (1/3 pf all respondents) considered in selecting a new car. In 1987 it was 8th (3% of respondants). Whereas the average new car fleet fuel efficiency is 28 mpg, the light truck fleet averages 21 mpg. The light truck market grew 5x that of automobiles from 1970-1985. This growth has pulled down the overall average for the new light duty fleet to 25.4 mpg in 1990. Increased sales of light trucks in passenger travel is a primary cause of recent stagnation in overall fuel economy improvements, which increased only 1.3 mpg from 1981 to 1990.

Other trends include a growing attraction for fuel hungry, powerful automobiles, additional luxury and safety on new cars, more stringent emission standards, slower turnover of the auto fleet (it will take longer for technology improvements to diffuse into the total fleet), no signs drivers are willing to shift to smaller interior volumes, continued demand for "old fashioned" car models (heavier, rear wheel drives), and growing road congestion (decreasing efficiency).

Strategies Discussed (PGS. 73-78)

Current CAFE standards dictate a 27.5 mpg fleet fuel consumption. This method of regulation has been criticized because manufacturers of small vehicles feel significantly less pressure to maximize fuel economy. Consequently, any new uniform CAFE standard could not maximize pressure on the industry to increase efficiency. Furthermore, the uniform standard has provided an incentive to domestic producers to move production of domestically produced models overseas. In doing this, they can alleviate the pressure on their "domestic fleet" CAFE requirements, and take advantage of room in their "import fleet" (which tends to be comprised of smaller cars).

In 1991, Senator Bryan introduced S. 279. The bill advocated "uniform percentage increases" (UPI) as a means to raise fleet fuel efficiency standards. The plan called for a %20 increase by 1995 and a %40 increase by 2001. These increases were based on a 1988 baseline. The advantage to UPI is that manufacturers of small, efficient vehicles are also pressured to increase their fleet fuel

efficiencies. However the disadvantages are numerous. Firstly, the manufacturer who has already invested in progressive technology would be hard pressed to find additional methods of improving efficiency, in effect punishing forward thinking manufacturers. S. 279 does attempt to mitigate for UPI's tendency to reward companies that have low baselines and penalize those with high baselines by placing a floor of 27.5 mpg and a cap of 40 mpg for 1996, and a floor of 33 mpg and a cap of 45 mpg for 2001. This means companies with high fleet efficiency will not have to improve the full 20% and 40% by 1996 and 2001.

Another CAFE proposal would base each automaker's standard on the size mix of vehicles it produces. Each model would be quantified in terms of interior volume, and each volume would be assigned a target fuel efficiency. A manufacturer would receive a target fleet fuel economy weighted according to the average of the various fuel economy targets assigned to all of its models. This method is referred to as Volume Average Fuel Economy (VAFE). Each model would not have to meet its fuel consumption goal as long as the fleet average was on target. Targets would be set each year, based on the companies' updated sales figures. This would give automakers the flexibility to change sales strategies year to year and still abide by fuel economy regulations.

A third system is presented which relies on the integration of vehicle curb weight, torque, and interior volume. The system was introduced by companies specializing in the luxury/niche market. There are some interesting characteristics, and OTA recommends that the proposed system be further investigated.

Suggested Target Levels (PG. 81)

If no action is taken to further regulate the industry, OTA projects fleet fuel consumption averages will rise to 29.2 mpg by 1995 and 33 mpg in 2001. Most of this improvement will be due to the introduction of engineering improvements already in the development stages. However, with little pain to the automakers, OTA believes Congress can set a corporate fleet fuel efficiency goal for the 1995 model year at 30.0 mpg.

For 2001, OTA defines a "regulatory driven" scenario which projects a total fleet fuel economy of 35.5 mpg. OTA used four critical assumptions in this projection. Firstly, technologies are selected if they provide fuel savings that, with a 10 percent discount rate, will pay back extra costs in 10 years at $2.00/gallon gasoline; Secondly, size and performance of the 2001 fleet is rolled back to 1990 levels; Thirdly, some allowance is made for inclusion of new technologies by 2001; and Fourthly, automakers add technologies according to normal model redesign schedules instead of disrupting the life cycle of parts and model designs.

Methods of Achieving Targets

If Congress wanted to use a CAFE or a UPI scheme, it would have to set the standard slightly under the 30.0/35.5 target and then use a market credit trading system to close the gap. However OTA warns that a credit trading system may not be effective.

OTA concludes that a VAFE standard for automobiles would be an effective way to reach the target fuel consumption levels. In addition, to assign light truck standards, OTA divides the fleet into three subsections: vans, utility vehicles, and pickups and cargo vans. They suggest that vans can be integrated into VAFE calculations for cars and that utility vehicles should be incorporated into VAFE with a 15-20% mileage credit for their rough terrain capability. Lastly, pickup trucks and cargo vans should be rated within a VAFE system, but according to square foot-tons (cargo x load capacity), rather than by cubic feet of space.(PGS. 83-84 and 103-105)

Potential Effect of Higher Fuel Economy Standards on Vehicle Safety.

Unless Congress requests too sharp improvements over a too short a period to allow vehicle redesign, there will be no changes in absolute safety levels. If given enough time, automakers should be able to significantly improve efficiency without downsizing their models. However, the potential for safety problems will exist if automakers emphasize downsizing over technological options for achieving higher fuel efficiency.(PG. 90-98)

A Final Note

It should be pointed out that OTA's estimates are a modification of the analysis done by the Energy and Environmental Analysis, Inc.. The auto industry rejects this analysis. In fact, their own estimates of the potential percentage increase in fuel economy range from less than one-third to one-half EEA estimates. An important point of disagreement betweeen EEA and the automakers is the EEA assumption that the average technology application in 1995 will be better than that in 1987.(PG 62-67 FOR A DISCUSSION OF WHO IS RIGHT)

The remaining estimates come from the conservation groups, which estimate that the U.S. fleet can reach fuel economy levels of 45 mpg or higher in a short period of time. These estimates are accurate but based on an assumption of drastic changes is consumer buying habits (PG.69-71), and OTA does not believe that consumers preference can be changed. However it is true that both OTA's and Industry's estimates are essentially conservative because they only consider technologies already introduced into the fleets and generally ignore potential technologies. (SEE PG. 24-29 FOR A GOOD OVERVIEW OF TECHNOLOGIES AVAILABLE TO INCREASE ENGINE EFFICIENCY)

AUTOMOTIVE FUEL ECONOMY, National Research Council, 1992

The National Research Council (NRC) was charged with the responsibility of estimating "practically achievable" fuel economy for the U.S. light duty vehicle fleet. However, the committee introduces the report with the view that the "practically achievable levels of fuel economy is...the domain of the political process, not this committee." Consequently, the report lacks specific recommendations for practically achievable targets, and instead focuses on "technically achievable" fuel economy levels.

Trends (PG. 13-21)

The trends outlined by NRC mirror those outlines by the OTA. Namely, after nearly two decades of gain, fleet fuel economy decreased 0.9% from 1988 to 1991. The reasons given include increased engine performance, increased sales of light trucks, and more stringent emissions standards. However, the NRC report differs markedly from that of OTA in that it suggests the "fuel economy of the light-duty fleet is not likely to improve over the next few years."

Safety (PG. 51-55)

NRC cited numerous studies correlating increased road fatalities to decreased automobile weights. Between 1975 and 1990 the average wheelbase in the U.S. new passenger car fleet decreased from 110.9 to 101.3 inches, and the average weight declined 900 lbs. However, NRC questions whether it is size or weight which most controls the chances of injury. Again they disagree slightly with OTA safety estimates in that they predict a safety cost from downweighting. However they conclude that the cost will be small, because new fuel efficiency requirements entail no more than a %10 downweighting on average in any size class.

Environmental Issues

The Clean Air Act Amendments of 1990 will limit potential fuel economy by adding weight and impeding the use of emerging technologies. Tier I standards will increase weight by 45-66 lbs and reduce fuel efficiency by 1.5 to 1.8% (0.5 mpg). California standards will reduce efficiency an additional 1.5 to 4%. Also, the threat of more stiff Tier II standards is a technology implementation disincentive for manufacturers. They may forgo investment in interim technologies since Tier II standards threaten these technologies with obsolescence. NRC recommends that the EPA look to stationary sources for further reductions of NOx emissions and discusses various other methods of controlling emissions standards. (PG. 79-81)

Impacts on Auto Industry

NRC does not recommend any changes in the manufacturing process prior to MY 1995.(PG. 98-102) This is a departure from the

OTA conclusion that fuel efficiencies can be pushed to 30.0 by the 1995 model year. Two reasons are given: first, the Japanese have more flexible manufacturing processes and would have lower compliance costs relative to domestic manufacturers; second, the domestic auto industry is in the dumps and can ill afford increased and unexpected costs and risk; third, manufacturers are in the midst of a major wave of investment in new models and major engine plants, which will make it difficult for them to modify fuel economy in vehicles planned through MY 1995.

Projections

The NRC report details three methods of projecting technologically attainable fuel economy. All three projections are based on four assumptions: amenities continue at MY 1990 levels; normal rate of technological progress (no breakthroughs); improved fuel economy measures will be consistent with Tier I emissions standards; no shift in consumer preference with regards to size.

The first method is a projection of the historical trend. The fleet fuel economies for each class of vehicle (by size) were plotted for 1978-1991. The mpg projections for MY 2006 were linear extrapolations from MY 1991. Each MY 2006 estimate was adjusted downwards to reflect a fuel economy penalty of 1% for the added weight from emissions standards, and 2% for the added weight of expected future safety standards. The same plot was also done with an adjustment for changing average vehicle weight, assuming all weights at MY 2001 and 2006 remain at MY 1991 values. The ton-mpg plot reveals that the application of fuel efficiency technologies has not necessarily declined, rather, increased vehicle weight has been the principle culprit in declining fleet fuel economy. (Results Plotted in Fig 7-1, 7-2, and listed in Tables 7-2, 7-3.

The Best In Class (BIC) projections are based on the assumption that the average fuel economy of each vehicle class could eventually reach the level of the best vehicle on the market today (roughly 10 year time frame). The BIC vehicles in the top rank are those that together comprise 5% of the total sales in that class. The BIC fuel economy average is a sales weighted average of these models. Due to high variability in truck size, NRC believes that the BIC method gives only a general indication of potential fuel economies. (Results in Table 7-4, 7-5)

The last projection is an attempt to relate fuel economy to cost. The method uses only proven technologies (Table 2-2), and uses 1990 as a base year. The technologies are added in the order of decreasing cost effectiveness, and the model assumes 100% implementation of each technology before the next is added. This methods allows us to see the incremental costs of each additional fuel efficiency target. Two plots are shown. Plot A represents a "premature abandonment of productive investments." Plot B represents the integration of new technologies according to normal model redesign schedules. There is no time frame given to the model. However it should be noted that while the projected feasible

fuel efficiency rates vary little, the cost projections for these rates vary considerably. (Fig 7-4, 7-11)

Technically Achievable

The committee used three assumptions in determining the "technically achievable" fuel economy rates. First, all new vehicles will need to comply with Tier I emissions standards, Second, interior volume or acceleration performance will remain unchanged, and third, technologies considered for improving fuel economy are those that are currently used in mass production somewhere and pay for themselves at fuel prices of $5 to $10/gallon (no time frame given).

The committee based its estimates for technically achievable fuel economy levels on the results of the projections and "its collective knowledge and judgement." These results are summarized in Table 8-2 (PG. 153). Note that the MY 1996 new car fleet estimates are only 0.7 mpg above the EPA average for MY 1991. This reflects the committee's view that manufacturers should not be pushed to modify the fuel economy of vehicles before My 1995.

Practically Achievable

The committee chooses to avoid the responsibility of choosing practical targets. They do however engage in a qualitative discussion regarding the cost and benefits of higher fuel economy. Table 8-3 (PG. 158) provides a good summary of the expected fuel costs saving for each size class. The 12 year, 10% discount rate projected fuel costs savings seem to fall somewhere in between the high and low estimates for increased vehicle price. The central argument in any of the cost/benefit analysis is whether the consumer will recognize and value the reduction in pollution.

Methods of Achieving Targets (PGS. 165-187)

NRC has already incorporated the VAFE recommendations throughout its report, and indeed suggests that CAFE be restructured to set targets according to vehicle size. The report does point out that VAFE provides increased protection to full-line manufacturers, but would not provide any incentive to build small cars.

NRC does not recommend the use of uniform percentage increases (S. 279).

Other suggestions include: increasing the price of fuel, a system of fees and rebates to encourage the acquisition of fuel efficient vehicles, improved road design and traffic management, establishing a minimum of 10 years for implementation of new standards, establishing trading of CAFE credits, and eliminating the distinction between domestic and foreign fleets. NRC also suggests the removal of the characterization of noncompliance with a CAFE limit as "unlawful conduct" and increasing the penalty to a

level which approximates the social cost of non-compliance. This would give manufacturers more flexibility to make fuel economy decisions in an economically efficient manner.

Safety –

↓ weight ↑ human impacts

↑ small ⇒ ↑ rollover

not sure whether it is size or weight which directly affect safety.

NHTSA should start a comprehensive safety analysis to determine the consequences of downsizing.

Committee believes there will be a safety cost from ~~downsizing~~ downweighting but safety impacts may be small since the (recent) trend no more than a 10% downweight on average in any size class.

Light trucks comprise 1/3 of new market & warrants careful scrutiny.

However concern for safety should not be allowed to paralyze the debate to enhance fuel economy of the light duty fleet. Rollover & crash both caused, as predicted increased fatality & injury.

CHARGE TO THE COMMITTEE: ①

~~INVESTIGATE~~ ESTIMATE "practically achievable" fuel economy levels for various size classes of new passenger cars & light trucks using gasoline & diesel fuel MY 1996 - MY 2006

"Technically achievable" is circumscribed by 3 assumptions

1) all new vehicles will need to comply with Tier I emissions standards

2) interior volume or acceleration performance will remain essentially unchanged.

3) technologies considered for improving fuel economy are those that are currently used in mass production & sig in fleets at price of $5 to $10 per gallon.

Re auto industry (5)

In a downturn, jobs can't be lost could be aggravated by standards which sig significantly increase prices ~~in new purchases~~ ⇒ contribute to a shift towards greater purchase of vehicles from outside the U.S.

new rgs should not require premature retirement of plant and equipment such that industry can't recover sunk costs.

(10-15 yrs for models, types, timeframes to be charged & depreciated

equipment written off.)

Environmental Issues (7)

w/o a technological breakthrough, it will be difficult to use lean burn & advanced diesel engines. Improved emission controls are needed for widespread use of two Stroke engines.

It will be difficult for automakers to comply with Tier II of California standards of 0.2 grams per mile of NO_x must control pollution from all sources

1) service station controls should be examined by EPA
2) further reduction of sulfur in gasoline should be considered by EPA.
3) surveillance & enforcement of emissions standards in existing fleets may be an attractive alternative to increasingly stringent controls on new vehicles.

Re Consumer.

doesn't care about purchasing cars on the high fuel economy. If sales from i.e. are obtained by ~~scaling~~ scrapping amenities, consumers may tend to retain current vehicles longer

Shift to light trucks aggravates the ~~scenario~~ scenario. Consumer trends need to be countered by cash rebates, higher fuel prices, or both.

Policies for improving fuel economy ⑧

① CAFE system gave a competitive advantage to Japanese imports & even now is biased against full-line manufacturers.

② % increases
1) limits ~~[illegible]~~ high tech ~~[illegible]~~ manufacturers -
2) limits competition in the large car classes by impeding the ability of the Japanese to increase market share

③ Systems tailored to interior space look good but do not allow for a given overall fleet fuel economy level.

④ ↑ fuel prices → but don't know enough
⑤ fees & rebates should be considered
⑥ If CAFE system is kept, ① fuel economy requirements of light trucks should be brought into conformance with autos
② domestic content & credit provisions should be reexamined.
③ non-compliance with CAFE should not be ~~[illegible]~~ should unlawful conduct

x — must should better
reflect societal costs

Other methods other than fuel prices?
CAFE system

(1) improving transportation infrastructure
(2) developing intelligent vehicle-highway systems
(3) improving public transit
(4) reduce speed limits
(5) encourage car-pooling

Promote energy technologies
lean burn, two-cycle, diesel engines ②
Cutyes Re style, outside source for
expertise analysis + asks that a
program be reestablished to formulate national
policy.

Potential Fuel Economy Technologies for Automobiles & Light Trucks. D-41

use of the energy technologies shows promise for widespread application over the next decade

Read on

Environment

Important Point on trend
Regulations is NO it is a directive to manufacturers to develop intermediate technologies which will be obsolete
Compliance with standards will make it difficult to introduce more fuel efficient vehicles

Reducing emissions further will not improve fuel economy further.

Fuel economy trends

B 737-2T. so the worse. not expected to improve over the next several years. The greater demand for travel & increased performance adversely affects fuel economy The next few years will also see new requirements for additional safety equipment & emissions control, which will add weight.

In the absence of a supply interruption or some intervention significant reductions in fuel consumption are unlikely

Sen Bryan (S.279) calls for a 20% improvement in each company's new car fleet average from 1988-1996 & 40% by 2001 → 34 & 40 mpg

leaves open the question of whether a new fuel economy is necessary what increase in fuel economy is technically & economically feasible

Trends in Fuel Economy Use

we've plateaued

market is not pressing for fuel economy 1→8 place improvement

↑ light trucks

↑ acceleration

↑ options (a.c., power, 4.D.)

new emissions & safety standards will have an adverse effect on fuel economy

↑ congestion → ↓ road efficiency

present conditions → 1995 - 29 mpg max

2001 → 33 mpg max

highway use has risen at 3%/yr, projected will be 2%/yr

↑ fuel efficiency → ↑ driving so 10 to 20% of fuel savings would be reduced

How can automobile fuel economy be improved

1) loads created by use (inertial load - accel. & climbing, air resistance, rolling resistance of the tires)
2) efficiency with which it transforms fuel into work
3) decrease size - utility is affected

fuel economy strategies that rely on D/G consumer preferences for size & power or limiting choices run into consumer disappointment

783-0857

A

no scenario hits the extreme
we could get up to 10 mpg by 2001 with existing technologies if consumers were willing to pay more for improvements than they will

Which type of standard is best.

① standard uniform would be lower because it favors the incentive to small purchasers.
② go from baseline: "anti competitive"
③ have company standards or ~~fleet~~ VMT - negatives - any increase in market share of luxury cars would cause a reduction in the overall fleet fuel economy target
- Some, needs, ~~criteria~~ stress performance + consider adjust.

④ pure technology standard

Time horizons imply that 1996 is very early to demand significant improvements in fuel economy beyond already built into product plans. A second 2001 will allow for major adjustments to be made in early for standard that would seek wholesale redesign unless carmakers wants to accelerate retirement or scrap model lines (Phase system timeline 1998 - interim fuel economy adjustment legislation
2004-2005 → full redesign of all model lines

US energy supply – oil imports will exceed 50% of total oil consumption soon
automobile & light trucks are the largest available targets

two points of view:

1) CAFE regs reduced total fleet fuel economy

B) the efficiency improvements resulted from market demand driven by rising oil prices

2) proof that CAFE helped was the different actions of automakers who were constrained or unconstrained

The report does not resolve this view. However does ask that a balance be struck

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3 ways to reduce fuel consumption

1) weight reduction – 10% weight reduction → 6.6% ↓ in fuel
w/o downsizing → 4.2% ↓ fuel.

materials subst. can reduce weight 9% under 1987 by 2001

2) drag reduction: 18-25% by 2010
0.375 now, 0.335 95-96, 2001 0.30

front wheel drive – moderate additional gains
Overhead Cam Engines – 3% over modern OHV engine
6% over older OHV engine

[illegible] 5500 Friendship [illegible] 1623 [illegible]

[redacted]

what is the F.E. potential of the US new car fleet.

Differences are not always based on technical judgement
but – 1) timeframe, lead time
2) nature of regulations to accomplish the change
3) future shifts in the size mix of the fleet
4) D's in acceleration & performance capabilities
5) mass passage of new safety & emission regulations
6) time required to perfect & bring to market new technologies
7) acceptable levels of economic disruption
8) judgements about consumer response to changes in vehicle costs & capabilities.

views sampled have
two extremes from small to 45 by 2000
EEA has BA basis for decision making – may be conservative b/c they don't consider potential technologies entering the market, nor the potential for diesels to overcome their negative market perceptions

may be optimistic b/c assumes that vehicle performance, use of luxury equipment & size will not increase undiminished but level off after 1995

realistic target for 1996 should be 30 mpg assuming no significant Δ in current trends in vehicle size & performance (Repeated at 27)

35 for 2001, 37 with max tech.

key point - PBO method to achieve 1995

turnover is a key point

light trucks - VMTS can be integrated into VMFE calculations for cars

Utility vehicles can be put in with VMFE if they are given a mileage credit for more terrain capability -15-20%

pickup trucks and vans

VMFE but use square foot x two rather than cubic feet of space

Structure, standards

① current = 27.5 mpg

① criticized b/c small manufacturers have more flexibility
new standard would not be as high as one which fixed
improved fuel economy for everyone.

~~②~~

② criticized b/c of separation of import + export fleets
US jobs → overseas

② Sp.g 1989 → Sen Bryan ~~S 2166~~ → now reintroduced in 1991 as S.279.
plan = 20% by 1995 } over base model year 1988
90% by 2001
"uniform percentage increase."

③ VOLPE - standard based on formula relating required fuel
economy to vehicle interior volume.
Alternatively each vehicle class could be given a
fuel economy value + target. The disadvantage is
upward creep.
Sales weighted average
leaves each model to vehicle as long as fleet subscribes
VOLPE formula based on recent distribution sales data.

(2)

→ ~~Sale~~ 52.79 ~~sales~~ min-max of 27.5 & going in 1996
33 & 45 in 2001
helps to mitigate reward to companies with low sales volume

Bryan's does not allow for differences in the degree to which automakers have applied economy technology. This makes it difficult for companies to switch towards ~~smaller~~ larger vehicles. So may be viewed as anti-competitive.

UAFE allows for sale flexibility strategy. However it is size neutral, so small cars are not favored.
UAFE doesn't set specific fleet fuel economy targets

However UPI doesn't receive minimum size market share credit. As a result, neither ~~Bryan~~ proposal can insure a minimum fleet fuel economy like Dan minimum for one component. UPI → target for least efficient company
UAFE → target for last vehicle

(4) Merc, BMW, Porsche B. Fey based on curb weight, torque, interior space

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recommends EPA's analysis over both the conservationist's & industry's
EPA's product plan is 29.2 in 1995. OTA believes it should be higher. 30.0 for fleet

OTA uses ~$2.00/gallon price & 10 year recovery in fuel savings to select technologies. Unlike the max tech scenario, it respects the normal life cycle requirements of auto-mobile components & allows companies to function the way they always have.

(13)

Notes

over 150,000/yr "mainstream"

design lead time 4 to 5 years - 7-8 year lifecycle
10 year lifecycle

"niche" 30-100,000/yr

60% of all model lines can be redesigned without adding the product lifecycle ~~board~~ of design int. b/w 92-96

engine ~~transmission~~ 70% to 4 valve by 2001 10 year engine lifecycle

5S

Transmission 5 speeds will dominate 30%.

I WHAT ARE THE STRATEGIES DISCUSSED
II WHICH ONE & LEVEL DO THEY SUGGEST
III WHY / RESULTS
IV AFFECT ON SAFETY
V? LIGHT TRUCK MARKET

I WHAT ARE THE STRATEGIES DISCUSSED?

DONE

II WHICH ONE OR MORE DO THEY SUGGEST?

1995 - 30 mpg fleet

1) Capacity includes notional potential ↑ could be raised to 37 can only be obtained by full technological potential applied cost-effectively happen under CAFE some manufacturers have a lower potential

2001 → 35.5 mpg

normal product plan - 31.65 > Domestic

Voluntary pursue - 34.07

criteria

1) $200 payback 10% discount rate
2) some allowance for the inclusion of new technologies
3) Size & performance of 2001 fleet is rolled back to 1990 levels.
4) penetration rates for technologies are constrained to normal model redesign schedules, so costs are held down.

LARRY WALLACE
New # 703 641-4340

5084
LAH ~~appmt~~ 314

Room 130
In Mine

~~Council Econ Advisor~~ 213-259-~~2234~~ 2734

~~50~~84 at

new fuel economy safety & standards

DOT believes absolute safety levels will not decrease. if ample time & not ~~too~~ requirements are not too stringent

also, automakers can significantly improve fleet fuel economy without downsizing if they have enough time.

safety problems will only exist if automakers opt for downsizing over technological implementation

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Fuel Saving from S.279

need to pay more attention to trucks.

+80

729

Kathy Sullivan
NOAA 482-2977

U.S. Forest Service Office on International Forestry.
~~Jan 21/67/World Bank "Pilot Program to Conserve the Brazilian Rain Forest."~~

USDA/ Forest Service International Institute of Tropical Forestry (P.R.)
Global Environmental Family.

~~OTA~~ Trop For. 90-91 — 202-334-2000
KAS
OTA

CARE standards

Jane

Key reading points 1) mass [illegible] 1995

3 types of projections: historical trend
"best in class" - [illegible] average & today's best
technology-penetration - locates limits of possibility

assumptions - amenities: ① air conditioning, automatic transmissions, high-grade quality, acceleration will continue at current levels
save MY 88/c

② radical breakthroughs will not occur. "normal" rate of technological progress
③ means used to improve fuel economy will be consistent with Tier I emissions standards of the 1990 amendments.
4 — There will be an overall economy penalty of 1% due to the added weights of emissions control equipment
3 — Also will comply with future safety standards w/ penalty of 2%

④ no shifts in consumer preferences among the size classes or from automobiles to light trucks. EPA classification system.

Central Theme: any strategy will impose costs + benefits
quantitatively attempts to determine
determination of the appropriate balance extends beyond the competence
of the committee (C. to OTA)

Scope is 2006
Did not consider alt fuel alt vehicles

Divides into CAFE (6 classes of passenger cars & light trucks using gasoline & diesel fuel)

p. 44.5?
I Technologies | use TABLE 2-2 | lean burn & 2 stroke offer big term promise but little in the next decade — diff. in limits NOx emissions
II Safety
III Impacts of meeting targets
IV Trends
VI Relevant consumer trends
VII Projections of "technically feasible" (3 methods)
VIII estimates
IX the current system & improvements/alternatives

VA - Point Royale
Skyline Drive > 1½ hours
Charlottesville