

Effective implementation of fuel-economy labelling for passenger cars: experiences from the USA, Sweden and Republic of Korea

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1. SYNOPSIS

This paper reports on preliminary results of an ongoing survey on fuel economy labelling for passenger cars.

2. ABSTRACT

Recognising the need to curb the growing fuel consumption in the transport sector, the Council of the European Union adopted on 21 December 1998 a legislative proposal requiring all of its member states to introduce fuel economy labels for passenger cars by the year 2000. Whilst the EU Council Directive provides for a standardised EU-wide policy framework, member states are allowed flexibility in their national approaches towards label design and programme implementation.

Against the background of the on-going discussion on national fuel labelling initiatives, this paper examines the experiences of the United States of America, Sweden and the Republic of Korea, where mandatory fuel efficiency information programmes for passenger cars have existed since 1975, 1978 and 1992 respectively. The paper compares the main features of these programmes. Based on findings of consumer research the authors analyse and discuss the presumed impacts of fuel efficiency information on consumer preferences and ultimate car choice or buying decisions.

Fuel economy comparison labels can be an important tool in raising environmental awareness. Label programmes that accompany fuel efficiency standards can have a greater impact. Car labelling programmes can only be expected to be effective if information provided is easily comprehensible and user friendly. Car labelling schemes need to be supported by accompanying public and consumer information programmes.

3. INTRODUCTION

In most OECD countries there is growing recognition of the need for further urgent action to curb the continuing growth of CO₂ and other emissions, particularly those of the transportation sector, if targets such as those envisaged by the 1997 UNFCCC Kyoto Protocol are still to be achieved. OECD countries account for well over three quarters of the world's motor vehicle population of some 700 million cars worldwide that emit an estimated 900 million – 1 billion tons of CO₂ per year (WRI, 2000). About 75 per cent of these emissions originate from the use of passenger cars, mostly driven with low occupancy. Private car ownership is relatively high in OECD countries, at levels ranging between 250 to 750 cars per 1000 persons, and the past trends suggest that these levels will continue to rise.

The improvement of the fuel efficiency of passenger cars is therefore one of the policy options that is being actively pursued, for example by the European Union¹ and Canada which have launched new initiatives and programmes on fuel efficiency information. In some other oil-import dependent OECD countries, including the United States of America, Sweden and the Republic of Korea, programmes on fuel economy labelling for passenger cars have been in existence since 1975, 1978 and 1992 respectively. This paper reviews these historical experiences.

4. THE HISTORY OF FUEL ECONOMY LABELLING: OVERVIEW ON NATIONAL PROGRAMMES

Policies for automobile fuel economy improvements in the United States

In response to the 1973/74 oil price shock the Government of the United States legislated the Energy Policy and Conservation Act (EPCA) in 1975 (P.L. 94-163). EPCA established corporate average fuel economy (CAFE) standards for automobiles and provided the basis for a federal fuel economy information programme, including mandatory fuel economy labels for new motor vehicles and the annual publication of a public information brochure known as the "Gas Mileage Guide".

Corporate average fuel economy (CAFE) standards

The fuel economy regulatory programme broadly defines three classes of vehicles: cars, light trucks and special purpose vehicles. Cars are further classified as sedans, two-seaters or station wagons. Each of these car sub-classifications are further sub-divided according to the vehicle interior volume.

According to D.L. Greene (1998), the average fuel efficiency of light duty vehicles was only 13.1 miles per gallon (mpg)² in 1975. Under the CAFE system, a standard of 18 mpg³ was introduced for model year 1978. The CAFE standards were initially reviewed annually and raised to 27.5 mpg⁴ by model year 1985. For light duty trucks fuel economy standards began at 17.2 mpg in model year 1979, rising to 20.7 mpg⁵ in 1985.

Compliance with CAFE standards is measured by calculating a sales-weighted mean of the fuel economies of a given manufacturer's product line. As originally enacted, the penalty for non-compliance (also known as "Gas Guzzler Tax") was US\$5 for every 0.1 mpg below the standard, multiplied by the number of cars sold.

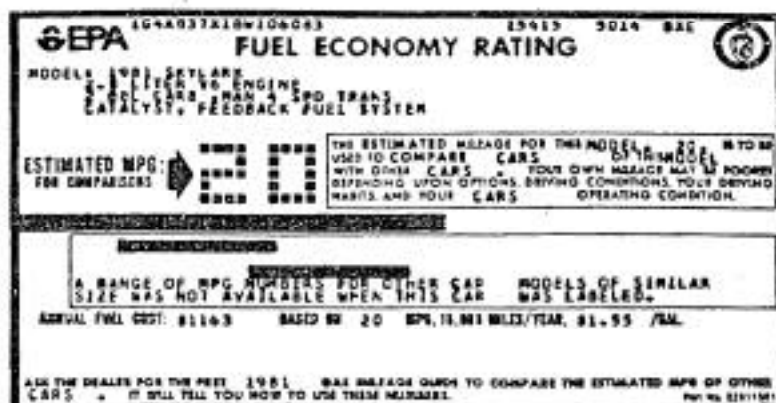
Fuel economy information: labels and gas mileage guides

The concept of fuel economy labelling of motor vehicles was pioneered by the United States Government. A sample of the first ever fuel economy label introduced in the mid 1970s is shown here below.

The Department of Energy (DoE) and the Environmental Protection Agency (EPA) of the Federal US Government collaborated in the design and the initial launch of the programme and in the evaluation of its initial impacts.

Between 1975 and 1985 several comprehensive assessment studies were undertaken or commissioned to market analysts (see Pirkey, McNutt, Hemphill and Dulla, 1982), and in response to their recommendations DoE/EPA have periodically modified the implementation of the fuel efficiency information programme during its first few years.

Figure 1. Original US fuel economy label (Sample)



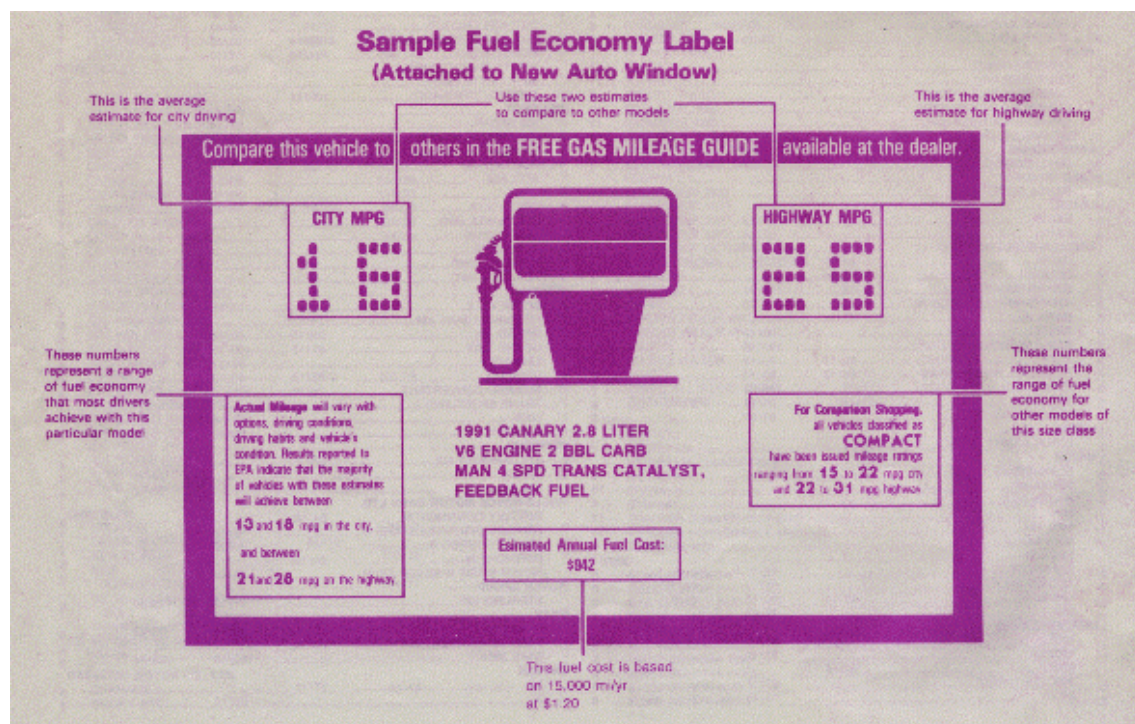
Empirical studies undertaken between 1975 and 1985 have concluded that label recognition was generally high, ranging between 60 and 70 per cent. In comprehensive surveys with more than 10,000 respondents, about half of the interviewees confirmed that they “used the label for fuel economy comparisons before buying”. At least during the initial years of the programme, label recognition was high in the United States. However, the early empirical reviews also found that the initial label contained too much non-essential information, which was not easily understood by consumers. In 1986, the US fuel economy label was redesigned as follows (see also sample in Figure 2 on next page): (a) The simplified symbol of the petrol pump was placed in the label’s center to raise label recognition and comprehension. (b) In order to enable consumers to compare the fuel economy of cars in relation to their own driving needs, the label provided information on two test results, “city-mpg” and “highway-mpg”. (c) The revised label provided information on ranges of city and highway mpg numbers for all other cars in the same class. (d) The label emphasises EPA’s independent role in prescribing standard test procedures. The availability of the “Gas Mileage Guide” was highlighted in the header (as opposed to be given in small print at the bottom of the label). The fuel economy label as shown in Figure 2 is still in use today.

The literature discussing the design and implementation of the US fuel economy labelling programme repeatedly emphasised its intended “passive” nature of *solely providing independently certified fuel efficiency information to the consumer*. In other words, the DoE/EPA programme was *not designed to persuade consumers of the fuel economy issue*.

Between 1978 and 1986 the test procedures for fuel efficiency measurements were repeatedly adjusted to ensure that test results reported on the label are near to actual on-road/in-use fuel consumption. Earlier studies had found that laboratory tests often resulted in “theoretical” fuel efficiency that could not be achieved in real life.

In addition to the fuel economy labels, DoE/EPA issue annual fuel economy market overview reports. These “Gas Mileage Guides” are published once a year and give an overview of the fuel efficiency of all car models in the market, in addition to tips on car maintenance and fuel efficient driving. Gas Mileage Guides are distributed free of charge to the interested public. During the first few years of the programme the Gas Mileage Guide was printed in large numbers (more than 16 million copies per year between 1978 and 1981), but surveys found that distribution of this information to consumers through car dealerships was not effective and needed to be improved. After 1982, the numbers of guidebooks printed was gradually reduced to below 1 million per year. With the emergence of the new electronic media, Gas Mileage Guides are now also regularly published on the Internet (<http://www.epa.gov>).

Figure 2. Revised US fuel economy label (Sample)



Fuel economy information programmes in Sweden

Initially, the fuel efficiency promotion policy in Sweden resembled that of the US, except that voluntary agreements between government and industry were preferred to mandatory fuel economy standards.

In Sweden a mandatory programme of energy use labelling for all new cars has been in force since 01 January 1978. Sweden has pioneered fuel economy information programmes in Europe. The initial fuel economy information programme was reviewed and revised in 1988 (KOVFS, 1988, No.1) and 1996 (KOVFS, 1996, No.12). The consumer protection and information agency (Konsumentverket – KO) is authorised to establish and monitor compliance with consumer information guidelines regarding fuel consumption, carbon dioxide (CO₂) emissions and environmental class of new passenger cars (KOVFS, 1996).

In the Swedish classification system passenger cars are categorised in essentially three environmental categories (environmental classes 1, 2 and 3) in accordance with the Swedish Code of Statutes (SF 1991, No. 1481). Relatively environmentally benign, smaller cars in class 1 are taxed lower than cars in classes 2 and 3. The Swedish fuel economy information programme covers both gasoline and diesel cars. In Sweden, the gauging of fuel consumption relates to mixed values for city and highway driving. Fuel consumption testing is conducted in accordance with Directives 93/116/EC and 70/220/EC and subsequently issued amendments.

With its 1996 revision the Swedish National Fuel Economy Information Programme has been re-defined as an active marketing tool to support greater environmental awareness among car buyers/drivers. The programme prescribed two types of mandatory fuel economy information to be provided at the point-of-sale, (a) a minimum A-4 size fuel economy declaration to be placed onto the windshield or near to the car, providing simple, easily comprehensive information as shown in Figure 3 - A. (b) KOVFS 1996 No.12 also obliges all vendors to display poster-size declarations (minimum 50 cm x 70 cm) providing showroom visitors / prospective car buyers with comparison information on all models available at the respective sales outlet (see sample format in Figure 3 - B)

Figure 3 – A. Sample of Swedish fuel economy declaration (as of 1996) (minimum size A4)

| FUEL CONSUMPTION, CARBON DIOXIDE EMISSION AND ENVIRONMENTAL CLASS | |
|--|-------|
| Carmake | |
| Model variant | |
| Fuel consumption (l/100 km) | |
| Carbon dioxide/CO ₂ , emission (g/km) | |
| Environmental class | |
| Cars in environmental class 1 discharge lower amounts of injurious Gases and therefore have lower tax than cars in environmental class 3. | |
| This declaration is primarily intended to enable you to make a Comparison between different car models. Fuel consumption and emission of carbon dioxide (CO ₂) may be greater or less depending on, among other things, driving technique and driving conditions. | |
| For further information refer to the brochure Fuel Consumption, Carbon dioxide and environmental classification published by the Consumer Agency. | |

**Figure 3 – B. Sample of mandatory consumer information poster providing comparison information
(minimum size 50 cm x 70 cm)**

For xxxx year model of (Name of car maker) Passenger cars.

| Car model | Fuel consumption litre/100 km | Carbon dioxide emission (CO ₂) g/km | Environmental class |
|-----------|----------------------------------|--|---------------------|
| | | | |

Cars in environmental class 1 discharge lower amounts of injurious gases and therefore have lower tax than cars in environmental class 3.
This declaration is primarily intended to enable you to make a comparison between different car models. Fuel consumption and emission of carbon dioxide (CO₂) may be greater or less depending on, among other things, driving technique and driving conditions.
For further information refer to the brochure *Fuel Consumption, carbon dioxide and environmental classification* published by the Consumer Agency.

The Swedish fuel economy information programme has served as a blueprint for the EU umbrella legislation currently being implemented. The EU legislation also requires both A4 size individual car labels and poster-size comparison information on car fuel efficiency for car showroom visitors. In addition to the above, the Swedish regulations call for the inclusion of fuel consumption information in all passenger car marketing materials, in particular printed advertisements, brochures, posters, etc.

Similar to the gas mileage guide in the US, the Swedish Consumer Agency also publishes annual independent fuel efficiency market surveys which provide consumers with all relevant data on all domestic and imported car models available in the national market, free of charge..

Fuel economy labelling in Republic of Korea

The Republic of Korea is the first country in Asia to establish voluntary fuel efficiency targets for the domestic automobile industry and introduce a national mandatory fuel economy car labelling programme. The fuel efficiency promotion programme was established in 1991/92 based on Articles 17, 18 and 19 of the “Rational Energy Utilisation Act” (REUA) and its subsequent subsidiary regulations. The Ministry of Commerce, Industry and Energy (MoCIE) is the responsible policy formulating authority while subsidiary organisations such as the Korea Institute for Energy Research (KIER) and the Korea Energy Management Corporation (KEMCO) share responsibilities in programme implementation and monitoring.

In Korea, the vehicle population has grown very rapidly. In 1980, the total number of cars registered was only 528,000. In 2001, the total number of registered motor vehicles is expected to reach 13.8 million. The overall objective of the fuel efficiency labelling programme was to improve fuel efficiency levels by an average of 5 per cent every five years.

In its initial phase the fuel efficiency information programme was limited to gasoline fueled passenger cars which are distinguished in 8 classes by engine capacity. In 1996, the programme was expanded to include diesel fueled cars and multi-purpose vehicles (Jeeps and small vans). Car importers are also obliged to comply with the fuel efficiency labelling requirements. Tables 1-A and 1-B provide an overview of the fuel efficiency ratings by class of passenger car.

Table 1 – A. Fuel efficiency ratings of Passenger cars (Unit: km/l)

| Engine Capacity (cc) | 1 st grade | 2 nd grade | 3 rd grade | 4 th grade | 5 th grade |
|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Under 800 | Over 23.6 | 23.5 – 20.6 | 20.5 – 17.6 | 17.5 – 14.6 | Under 14.5 |
| 800 – 1100 | Over 20.5 | 20.4 – 17.9 | 17.8 – 15.3 | 15.2 – 12.7 | Under 12.6 |
| 1100 – 1400 | Over 17.4 | 17.3 – 15.2 | 15.1 – 13.0 | 12.9 – 10.8 | Under 10.7 |
| 1400 – 1700 | Over 16.5 | 16.4 – 14.4 | 14.3 – 12.3 | 12.2 – 10.2 | Under 10.1 |
| 1700 – 2000 | Over 14.3 | 14.2 – 12.5 | 12.4 – 10.7 | 10.6 – 8.9 | Under 8.8 |
| 2000 – 2500 | Over 11.2 | 11.1 – 9.8 | 9.7 – 8.4 | 8.3 – 7.0 | Under 6.9 |
| 2500 – 3000 | Over 9.4 | 9.3 – 8.2 | 8.1 – 7.0 | 6.9 – 5.8 | Under 5.7 |
| Over 3000 | Over 8.6 | 8.5 – 7.5 | 7.4 – 6.4 | 6.3 – 5.3 | Under 5.2 |

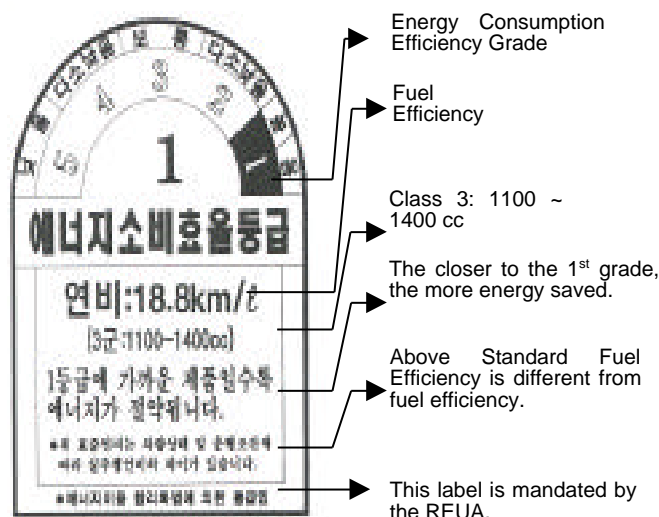
Source: Ministry of Commerce, Industry and Energy

Table 1 – B. Fuel efficiency rating of multi-purpose vehicles (Unit: km/l)

| Engine Capacity (cc) | 1 st grade | 2 nd grade | 3 rd grade | 4 th grade | 5 th grade |
|----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Under 1500 | Over 14.8 | 14.7 – 12.9 | 12.8 – 11.0 | 10.9 – 9.1 | Under 9.0 |
| 1500-2000 | Over 13.3 | 13.2 – 11.6 | 11.5 – 9.9 | 9.8 – 8.2 | Under 8.1 |
| Over 2000 | Over 12.2 | 12.1 – 10.6 | 10.5 – 9.0 | 8.9 – 7.4 | Under 7.3 |

Source: Ministry of Commerce, Industry and Energy

A sample of the fuel economy label in use in the Republic of Korea is presented below. The ratings distinguish different grades, with 1st being the best or highest, and 5th being the lowest grade. The layout of the fuel economy label in Korea corresponds in size and colours (yellow frame and red marked rating) to the layout of the energy efficiency label used for some electrical appliances. The Korean car label is smaller than labels used in other countries. The label in Figure 4 is actual size. While in other countries car labels are placed on the front wind screen, the Korean car label is placed in the window of the rear door. While in other countries the label is expected to be removed when the sold car leaves the dealership, the Korean car label is meant to remain on the car throughout its useable life-span.

Figure 4. Sample of fuel economy label (Republic of Korea)

As a complement to the labelling programme, KEMCO publishes an annual fuel efficiency booklet which, like to US gas mileage guide, provides a market overview and other information for consumers.

5. REVIEW OF NATIONAL EXPERIENCES AND IMPACTS OF LABELLING PROGRAMMES

The Impact of fuel economy labels cannot be “isolated” and are not easy to assess, as many other factors and sources of information also influence behaviour and purchase decisions of consumers / car buyers. The authors have reviewed a variety of published and unpublished market surveys, in addition to selected available official data on vehicle fuel efficiency. In order to supplement these materials in the case of Republic of Korea, one of the authors conducted her own empirical survey.

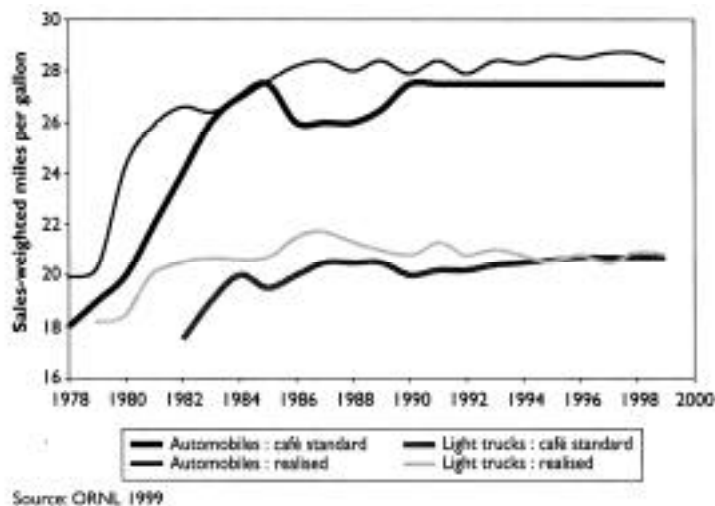
Experiences from the United States

In the United States, fuel efficiency in motor vehicles improved dramatically during the period 1978 to 1985 as shown in Figure 5. Average fuel efficiency of cars rose from 18.7 mpg in 1978 to 26.3 mpg in 1985⁶. For light trucks mpg rose from 17.7 mpg in 1978 to 19.6 mpg in 1985⁷.

Figure 5 shows the dramatic improvements in vehicle fuel efficiency that have been realised between 1978 and 1982-84. D.L. Greene (1998) calculated the positive impact of the US fuel economy promotion policy. For the period between 1975 and 1995, he estimated that the fuel efficiency improvements which have occurred in the late 1970s/early 1980s were equivalent to some 55 billion gallons of fuel and have saved US motorists roughly US\$ 70 billion (1995 US\$). However, apart from the initial success, Figure 5 also shows that no further improvements in vehicle fuel efficiency were realised in the US after 1985-86.

In the United States, fuel economy standards and fuel economy labels were introduced at the same time, and they have had, at least initially, a significant impact. CAFE standards were slightly lowered in 1984, but subsequently readjusted. CAFE standards have remained unchanged since 1989.

Figure 5. Fuel efficiency in motor vehicles in the US (1975-1999)



During recent years, environmentalists have called for a raising of CAFE standards. However, since 1992 influential interest groups opposed to any tightening of CAFE standards have succeeded in effectively blocking all public funding in the United States Congress for further work on CAFE standards or related research. This explains the prevailing scarcity of any empirical research on label impacts in the United States in recent years.

While some US car manufacturers have continued to make significant investments in the development and marketing of fuel efficient car models, the de-facto freeze of CAFE standards over the past 15 years has resulted in a country-wide stagnation of **average fuel efficiencies** as can be seen in Figure 5. Although the federal fuel economy information and labelling programme principally continued throughout this period, it was apparently by itself not able to popularise more fuel efficient models, let alone smaller cars with smaller engines.

Beginning in the latter half of the 1980s, a new fashion trend has popularised a new generation of sports utility vehicles (SUVs) which have since gained considerable market share in the US and in other markets. With fuel efficiencies ranging between 12 and 25 mpg, SUVs have on average a considerably higher fuel consumption than (sub)compact sedan cars. In the US, fuel economy labels are also applicable to SUVs but they do not seem to have had any notable effect on those recent market trends.

Experiences from Sweden

The most comprehensive recent empirical study that has been commissioned in Sweden was conducted in 1996/97 by Karina Ajpe and Evert Vedung for the Swedish Consumer Agency (Konsumentverket – KO). The empirical research was based on in-depth interviews with car purchasers in the communities of Gävle and Jönköping. Selected findings of this study are summarised here below.

Consumer recognition of information carriers: labels, posters and other materials

The study found that among private car buyers/private drivers label recognition was high (exceeding 70 per cent of respondents). Comparison fuel efficiency information posters were recognised/remembered by some 43 per cent of private car buyers. Only few car buyers have consulted or used other information (folders, comparison fuel economy guides). The comparatively large size of the labels in Sweden (minimum A-4 size) obviously played an important role for high label recognition.

Comprehension of fuel economy information

In Sweden, public fuel economy information labels and posters have been intentionally designed in a simple way to ensure and facilitate consumer comprehension. The study results suggest that the simplified label design and the limited/selected information provided was sufficiently well understood by car buyers.

Consumer preference: impacts of fuel efficiency information

The Swedish study found that in spite of the high label and poster recognition and the well communicated information content, the impact of the fuel economy information programme appear to be disappointingly low. In the Swedish market, a considerably large portion of car buyers are employees enjoying company car benefits. Among this group, concern for fuel efficiency was found to be virtually non-existent.

The empirical survey also found that for a majority of car buyers, car purchase has become a “matter of routine”. Without much reflection most buyers faithfully stick to the same brand and same size of car they owned before. For all of these buyers the provision of fuel efficiency information did not result in “more environmentally benign” purchases.

The Swedish researchers observed that only “altered life conditions” (change of jobs, location of residence, employment status, family size) make car buyers switch to other models or brands. Based on their findings, the Swedish researchers advocated a systematic review and revision of the fuel economy information policy with a view to specifically target selected car buyer groups.

Experiences from Republic of Korea

Results from consumer studies

In Korea, the automobile industry is still comparatively young. Published consumer studies on automobiles are also scarce. The authors reviewed the findings of the 1994 study of the Korea Consumer Protection Board (KCPB) and a 1999 report of the Korea Automobile Manufacturers Association (KAMA). In addition, one of the authors conducted an independent preliminary empirical survey in the Seoul area. The survey was based on convenient samples of 2 groups including 74 college students and 105 adult drivers. A summary of the survey results is presented here below:

a) Consumer awareness: label recognition

In Korea, fuel efficiency labels have been on all passenger cars since 1992. It was inquired how many of consumers were actually aware of the label. Shown the label sample, 53 per cent of college students and 87 per cent of adult drivers recognised it as car fuel efficiency label.

Under the KCPB study, adult drivers were also asked if they knew standard fuel efficiency of their cars. 66.3 per cent of respondents knew the standard fuel efficiency of theirs. It may be concluded that label recognition is satisfactory in principle, but options for improvement could still be explored.

b) Consumer knowledge: label comprehension

In order to evaluate consumer understanding of label information, respondents were requested to explain the content of the label: fuel efficiency (km/l), class (engine capacity in cc) and the fuel efficiency grade. In general, respondents understood fuel efficiency the most (65 per cent of college students and 80 per cent of adult drivers). However, it was found that some consumers are not familiar with technical and practical language in relation to automobiles. Terminology such as “fuel efficiency”, “class”, “grade”, “engine capacity”, “highway-mode” vs. “city-mode” on the label are unfamiliar concepts for many consumers. Without adequate introduction or consumer education, sufficient label comprehension cannot be taken for granted.

Some potential miscommunication was found in the inconsistent use of the words “high”, “low” and “more” and “less”. For example, a smaller number (1st grade) is better for “grade”, while for “fuel efficiency” a bigger number is better; thus a fuel efficiency of 20km/l is “higher”/“better” than one of 18km/l, whilst a 1st grade is “higher” than 3rd grade. For enhanced label comprehension by consumers it appears to be unnecessary to include information such as “engine capacity” in the label, which was found likely to confuse inexperienced consumers.

c) Consumer preference: label impact

Asked about the “importance of fuel efficiency information”, more than 70 per cent of the both students and adult drivers rated “fuel efficiency” an important criteria for car choice. Sixty-four per cent of the adult drivers responded that they would opt for a more fuel efficient car the next time they make a purchase.

With regard to potential label impacts, the preliminary survey produced some encouraging results. However, the authors note that survey results related to “declarations of intention” need to be interpreted with some caution because they not always translate into actual behaviour.

d) Consumer acceptance and reliability of label information

A considerable level of distrust has been found among consumers, in particular among experienced drivers, concerning the reliability and accuracy of fuel label information. The current testing method of measuring standard fuel efficiency for the label is based on CVS-75/LA-4 Mode. This method was developed for the Los Angeles City driving cycle and does not adequately reflect Korean road or driving conditions. KCPB (1994) and some other studies have shown that actual on-road fuel consumption may be 5 to 27 per cent higher than the standard fuel efficiency ratings given on the labels. Such high discrepancies raise critical concerns of reliability and validity of the standard fuel efficiency information itself. Some Korean consumer organisations have therefore called for a revision of the test procedures.

e) Other sources of fuel efficiency information

Asked about own sources used for obtaining fuel efficiency information, the respondents mentioned primarily “product brochures” (40 per cent) and “relatives and friends” (26 per cent). Surprisingly few respondents mentioned “TV” (6 per cent), newspapers/ magazines (4 per cent) and public/consumer organisations (7 per cent). It was noted that none of the respondents referred to the label *as main personal source* of fuel efficiency information. This suggests that relying on car labelling alone may not be sufficient to effectively communicate the fuel efficiency information to consumers.

Analysis of market trends in the Republic of Korea

The review of recent data periodically published by MoCIE suggest that the fuel efficiency promotion efforts may not have been as successful as initially envisaged. As can be seen from Table 4, average levels of fuel efficiency have not significantly improved between 1992 and 1998. In addition, it would appear that the relatively smaller and comparatively more fuel efficient cars with smaller engines have slightly lost rather than

gained market shares during the same period (see Table 5 below). It would appear that the average fuel efficiency targets envisaged to be reached by the year 2000 have not been realised. Some market studies indicate that a considerable number of cost-conscious drivers have instead switched to diesel or LPG engines for fuel savings. The market trends suggest that Korea's fuel efficiency programmes need to be reviewed and further developed in order to attain more significant results.

Table 4. Trend of average fuel efficiency of domestic passenger cars (Unit Km/l)

| Year CC: Engine Capacity | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | Target Fuel Efficiency | |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|------------------------|------|
| | | | | | | | | 1996 | 2000 |
| Under 800 | 23.38 | 23.02 | 22.75 | 22.36 | 21.67 | 19.84 | 19.67 | 23.4 | 24.6 |
| 800 – 1100 | - | - | - | - | - | - | - | 20.3 | 21.3 |
| 1100 – 1400 | 16.38 | 16.32 | 16.56 | 16.37 | 16.14 | 16.09 | 16.21 | 17.3 | 18.1 |
| 1400 – 1700 | 14.57 | 14.67 | 14.51 | 14.23 | 14.09 | 14.03 | 14.35 | 15.3 | 16.1 |
| 1700 – 2000 | 10.87 | 11.31 | 11.17 | 11.14 | 11.13 | 11.15 | 11.40 | 11.4 | 12.0 |
| 2000 - 2500 | 9.08 | 9.17 | 8.95 | 8.84 | 8.89 | 8.84 | 10.00 | 9.9 | 10.4 |
| 2500 - 3000 | 8.19 | 8.25 | 8.26 | 8.30 | 8.31 | 8.22 | 8.76 | 8.5 | 8.9 |
| Over 3000 | - | - | 8.44 | 8.37 | 8.21 | 8.22 | 8.48 | NA | NA |

Source: Ministry of Commerce, Industry and Energy

Table 5. Market share of fuel efficiency rating grade (Unit : %)

| Year Grade | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|-----------------|----------|----------|----------|----------|----------|----------|
| 1 st | 8.1 | 5.9 | 7.5 | 6.38 | 9.1 | 5.7 |
| 2 nd | 47.3 | 53.5 | 46.1 | 38.7 | 31.7 | 30.0 |
| 3 rd | 34.2 | 33.4 | 37.9 | 45.5 | 49.3 | 54.7 |
| 4 th | 9.9 | 7.2 | 8.5 | 9.4 | 9.8 | 9.4 |
| 5 th | 0.5 | - | - | 0.02 | 0.1 | 0.2 |
| Total | 100.00 % | 100.00 % | 100.00 % | 100.00 % | 100.00 % | 100.00 % |

Source: Ministry of Commerce, Industry and Energy

6. CONCLUSIONS

Like other industrial sectors, the automobile industry develops and diversifies its products in response to assessed or presumed consumer demands. In the prevailing perception of the majority of consumers new car models are typically expected to offer new and additional features, in addition to more capacity, speed, comfort or other criteria generally attributed to "better products" offering or symbolising "higher status" of the owner. As the experiences from the United States, Sweden and the Republic of Korea show, consumer perception of the relative importance of fuel efficiency versus other car quality criteria may vary not only between consumer groups but also with time and with prevailing or expected fuel price levels. During the second half of the 1980s and the first half of the 1990s fuel efficiency lost some of its previous relative importance in consumer purchase decisions, possibly a reflection of the record low levels of world oil prices.

The review of the historical experience shows that fuel efficiency information programmes and fuel efficiency labels provide consumers with relevant information, but they should not by themselves be expected to significantly alter consumer preferences or change or reverse fundamental market trends. As expressed by Thomas Gross of OTT/DoE in a recent presentation (1998) commenting on interpretation of empirical studies/market surveys: "What you find is that while people tell you that fuel economy is very important, they don't actually react that way." (<http://www.ott.doe.gov/documents/Env98rs/sld009.htm>).

As the experience from the United States shows, with sufficient political consensus - as has existed in the aftermath of the 1973/74 and the 1979/80 global oil price shocks - fuel efficiency levels of passenger cars can be raised in a relatively short period of time in collaboration with industry. However, it would appear that

effectively raising fuel efficiency levels requires more “drastic” regulatory measures, such as mandatory (CAFE) standards, and may not be achieved through information programmes alone.

The authors advocate the introduction of fuel economy labelling for passenger cars as a necessary precondition for improved consumer information and more fuel efficient car purchasing decisions. However, the preceding discussion and the analysis of the historical cases suggests that fuel economy labels alone do not offer a sufficient precondition for achievement of higher levels of fuel efficiency in the transportation sector.

The relative effectiveness and the impacts of car labelling programmes depends on a variety of parameters. For the design and implementation of any future programme, the authors recommend that all concerned stakeholders including consumer organisations and similar interest groups actively participate in the preparatory process of any labelling programme.

The experience has shown that labelling programmes find greater acceptance if fuel consumption is tested under protocols that result in near actual on-road/in-use fuel consumption ratings. Only reliable labels can earn consumers’ trust.

Label designs should be simplified to the maximum extent possible. Pictures or drawings can substitute technical language that may otherwise be confusing consumers. Labels should be placed in a common place for all cars and be easy to recognise. The use of colour in labels is recommended as colour may increase label recognition.

Market surveys have shown that most consumers make preliminary decisions before they visit the car dealer showrooms. Fuel efficiency information must therefore reach potential car buyers early in their decision process through means other than labels.

The Swedish case study suggests that fuel economy information programmes need to be targeted on the needs of specific car buyer groups. The authors would support the idea that fuel consumption information could be compulsorily included in all advertising for model-specific new motor vehicles (as in Sweden).

The impact and success of fuel information and labelling programmes may also be enhanced by complementary educational measures, e.g. the including of fuel efficiency information and consumer education in the curriculum of driving schools. This aspect of car labelling is an area the authors hope to explore further.

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9. ENDNOTES

¹ At the time of the drafting of this paper (November/December 2000) most of the 15 EU member countries were lagging behind in the national implementation of the 1998 Car Labeling Directive. At that time, only 5 of the 15 EU countries (Belgium, Denmark, Finland, Luxemburg, Netherlands) had adopted national laws or had draft national laws under consideration. Whilst decision makers in some countries appeared to be in favour of no-comparison or absolute comparison labels, some other institutes advocated relative comparison fuel economy labels. It should be noted that at the beginning of this year label content and label designs were still undecided in most European countries that have large automobile industries.

² Conversion rates for mpg and kilometer/liter: 1 km = 0.62137 miles ; 1 mile = 1.6093 kilometers
1 l = 0.26417 gallon; 1 gallon = 3.7854 liters ;

Equivalent to 5.569 km/liter

³ Equivalent to 7.653 km/liter

⁴ Equivalent to 11.690 km/liter

⁵ equivalent to 7.312 km/l to 8.800 km/l

⁶ Equivalent to 7.950 km/l to 11.181 km/l

⁷ Equivalent to 7.525 km/l to 8.163 km/l