Fuel economy, environment vital in govt. regulation

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reached the spark plug is fired and the mixture ignited. The expanding gases push the piston down again, and then are discharged into the exhaust system by the next stroke.

For highest fuel efficiency, the engine is tuned to fire early, as the piston nears the top of the stroke. Most of the burn takes place while the piston is high in the chamber, maximizing the energy released by the expanding gases.

This causes less complete combustion and results in higher emissions.

The first step auto makers generally took to comply with emission control requirements was to tune the carburetor to produce a "lean" mixture of fuel and air — one with more air than actually was needed for complete burning. This generally improved fuel economy and also reduced emissions.

To comply with increasingly tougher emission standards, most of the manufacturers used a system called "spark retard." The engine is tuned to fire after the piston reaches the top of the stroke. This causes the exhaust gases to be hotter, so after leaving the engine they continue to burn all the way through the exhaust system. This results in a loss of fuel economy, which is why fuel economy figures reached their lowest point in 1974.

The simultaneous arrival of the energy crisis and even tougher emission standards brought about the general use of the catalytic converter in use today.

However, the standards for 1980 and beyond still have to be met. Although it still is uncertain how this will be done, the evidence indicates that neither environmental nor fuel economy considerations will take a back seat.

In addition to the emission standards, cars in the next decade will have minimum mileage requirements to satisfy, based on an average of all models sold by the company.

Ford Motor Co. cars, for example, must average 18 miles per gallon in 1978. The standard moves progressively to a minimum 27.5 miles per gallon average by 1985, according to Ford spokesman Chuck Gumushian.

"We have two laws to meet — and we'll be there," Gumushian said.

He said it would be much easier for his company to design cars with either one of the two concerns in mind, but the two could be made compatible.

Former EPA Administrator Russell E. Train was more confident that emissions could be lowered further with no adverse effects on fuel economy when he handed down his decision to postpone the 1977 emissions standards to 1980.

He said that at the time the alternative to using spark retard and reducing economy was to change the system design of the engine itself so that its basic emissions would be lower.

"There is no inherent reason to believe that such adjustments will be bad for fuel economy, and in the past many such adjustments have been good for fuel economy," he said.

A National Academy of Sciences report agreed, stating: "The reduction of emissions insures neither a reduction nor an increase in engine efficiency with the citing of examples of both cases possible."

Further, a report released jointly by the EPA and the Department of Transportation in 1974 stated that a 20 per cent average fuel economy improvement in 1980 cars over 1974 models was possible that would satisfy that year's emission standards for carbon monoxide and hydrocarbons, but not oxides of nitrogen. On the average, the cars would cost 10 per cent more, which would be offset by lower operating and maintenance costs, according to the report.

The final solution to the problem of emissions and economy may be a radical departure from the conventional internal combustion engine, but all parties agree that is at least 10 years away.

Although alternative power sources for automobiles may offer some advantages, the retooling of Detroit's massive manufacturing plants to produce a different type of engine would take years to complete, at a staggering cost.

For example, diesel-powered automobiles would have substantially greater fuel economy than any alternative forseeable in the next 10 years, and their emissions are so low that meeting the 1977 standards is no trouble at all, according to an academy report.

However, another academy report, prepared in 1975, states: "If the decision to convert to diesels were made today, . . . only 12 per cent of American production could be converted to diesels by 1980, and only 17 per cent by 1983."

The report went on to say that conversion to another more radical alternative, the Wankel Rotary Engine, would take even longer.

However, a third alternative power plant, the stratified charge engine, is slightly more feasible.

An example of a stratified charge engine is Honda's CVCC, which conforms to the present emission regulations for carbon monoxide, hydrocarbons and oxides without a converter.

An academy report from 1975 states: "Twenty-seven per cent of domestic production could be converted to the use of stratified charge engines by 1980 if the decision to convert were made today, with the percentage reaching 41 per cent by 1983."

In addition to the retooling problems with alternative power manufacturers cite other problems with alternative power sources that relate to consumer desires for acceleration and performance.

The industry's attitude was summed up by Ford's Gumushian, who said, "I don't know of any engine that can replace the internal combustion engine in the near term — the next 10 to 20 years. We believe it to be the most economical and efficient way to power an automobile."