

June 2014

## InFocus

### **JAMA: Towards upgrading regular gasoline to 95 RON**

In this issue of “In Focus” we are pleased to share with our readers an important report by the Japan Automobile Manufacturers Association (JAMA) regarding the positive effects of upgrading regular gasoline to higher octane grades of 95 RON and above for better fuel economy performance. “Octane rating”, or octane number, is a standard measure of the performance of motor or aviation fuel. The most common type of octane rating worldwide is the Research Octane Number (RON).

This is a follow-up to our earlier report, “Need for higher fuel standards in Asia”, from March 2014.

The conclusions of the report can certainly be applied to other countries in the Asian community and will lead to similar results.

#### **Measures undertaken to tackle the energy/environmental problem**

During this time of increasing concerns about global warming, rising energy prices and the demand surge in developing countries for automobiles and petroleum products, Japan has taken the following political and legislative measures to mitigate and solve these issues:

- Introduction of CO<sub>2</sub> reduction targets and emission counter measurements, ensuring energy supply security, development of alternative energy programs, energy conservation programs and incentives

The petroleum and automobile industry have responded with:

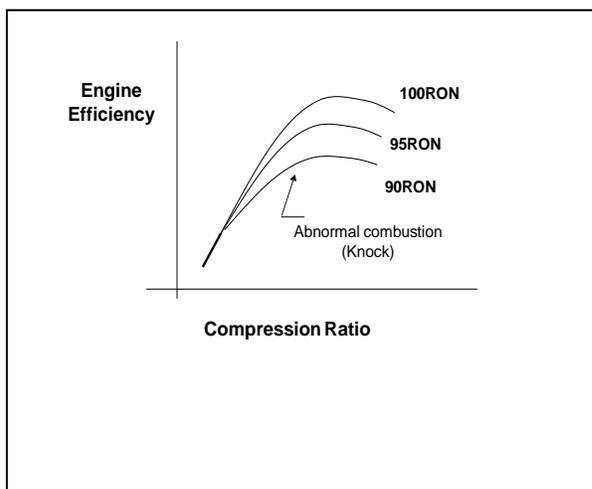
- Reducing CO2 emission from refining processes (stationary sources), introduction of biofuels, capital investment in energy efficiency enhancements, launch of next-generation automobiles with a significant improvement in fuel economy and emission control measurements

One of the frequently discussed and recommended measurements derived from the above mentioned initiatives is to improve transportation fuel efficiency by upgrading regular gasoline to 95 RON and above.

### The study highlights the following findings:

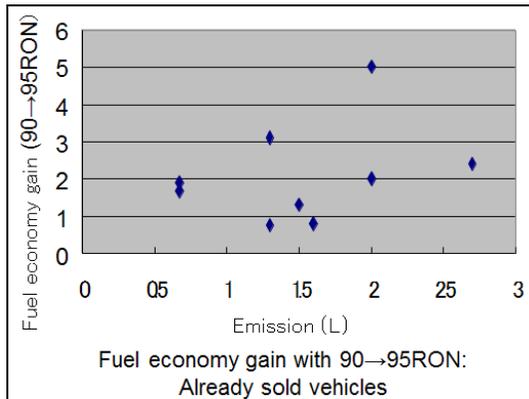
- Fuel efficiency improvements

The chart below shows how the octane boost will enhance the compression ratio of an engine, which leads to fuel economy improvements. (Source: JAMA)



In 2012 the market share in Japan for regular gasoline (90 RON) was 84.5% and for premium gasoline (100 RON) was 15.5%. In Europe the gasoline market was divided into 91 RON: 8%, 95 RON: 87.6% and 98 RON: 4.4%, making the average gasoline RON in Japan 91.6 RON and in Europe 94.8 RON, a difference of 3.2 percentage points.

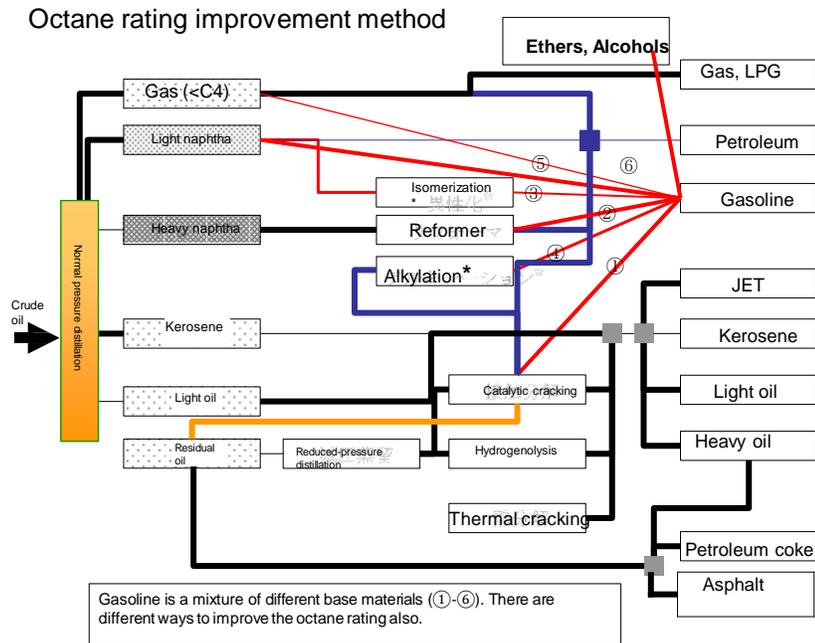
According to the study, fuel efficiency will improve by 2-8% by upgrading regular gasoline to 95 RON premium gasoline with up to 8% for supercharged engines and 2-4% for conventional engines (due to compression ratio increase, ignition time optimization and CVT shift point optimization). The share of turbo engine cars in Japan was 11.5% in 2013 and is expected to gradually increase to 32% by 2019.



Fuel economy gained for octane upgrade from 90 to 95 RON for in-use vehicles.

With the higher market penetration of turbo engines, which is part of the boosted downsizing initiative, the study predicts that the country's gasoline consumption can be reduced from 44 million metric tons per year (MT/y) to approximately 36 million MT/y or 18%.

The next chart is a simplified refinery flow chart that shows the different sources of gasoline and octane. Octane can come from different sources. Sources of non-refinery octane are widely available and can be blended into the pool.



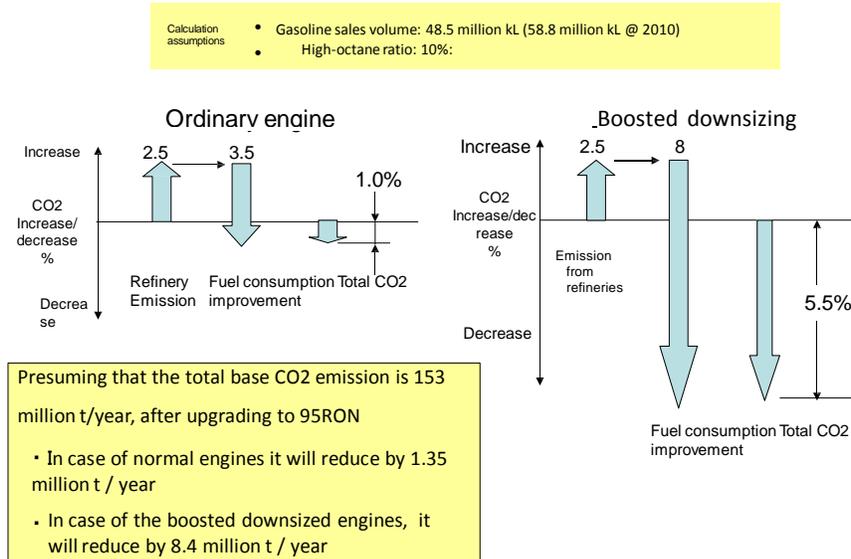
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## - Reduction in CO2 Emission

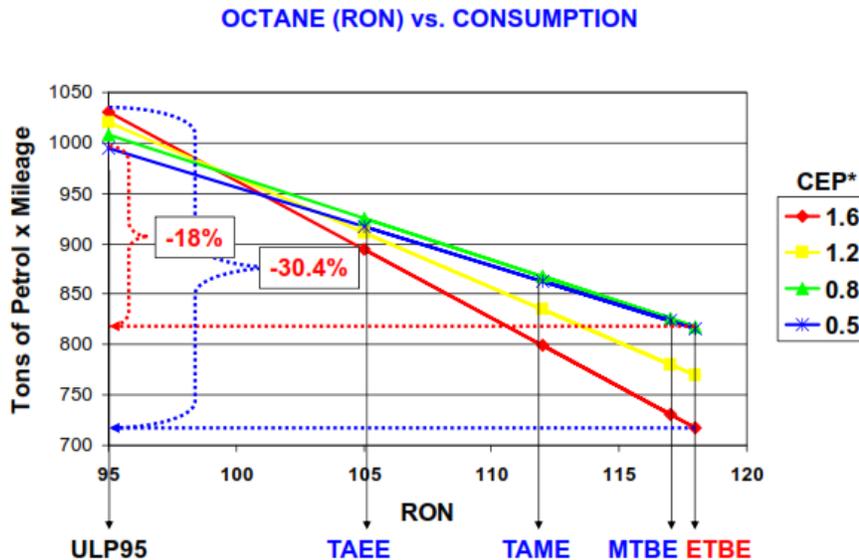
The study conducted by the Institute of Energy Economics confirms a net CO2 emission reduction for 2020 of 1% for conventional engines and a 5.5% reduction for boosted downsized engines.

© Calculation of Projected total CO2 emission in FY 2020 (by The Institute of Energy Economics 2012)

### Total calculation of fluctuation in CO2 on upgrading to 95RON



To complement the above illustration, the chart below shows the direct impact of octane increase versus fuel consumption.



\*CEP = Energy Efficiency / Fuel Consumption Ratio

Source: Walter Mirabella: Elaboration from Data of CONCAWE's "RUFIT" report N° 6/78 (Dec 1978)

## Conclusion

The JAMA report concludes by requesting the stakeholders, administration, oil industry and automotive industry to reconvene the study group as a first step to move towards upgrading regular gasoline to 95 RON.

This request is based on the findings that confirm that the upgrading program will potentially lead to reductions in energy consumption and CO2 emissions. The agency refers to Europe, the US and China as examples where the boosted engine car market share is also expected to expand and measures to introduce higher octane grades have been introduced.

The Japanese findings can be applied to other Asian countries as well. If there is a proven savings on actual fuel consumption and improved vehicle emission, the public will most certainly accept this move.