

Re: Gasoline grade BTUs per gallon?

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- *From:* bwardREMOVE@xxxxxxxxxxxxxx (Bill Ward)
 - *Date:* Fri, 26 May 2006 21:54:24 GMT
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On Fri, 26 May 2006 13:48:08 -0400, "K. Jones"
<shadetree1999@xxxxxxxxxxxxxxxxxxxx> wrote:

"Bill Ward" <bwardREMOVE@xxxxxxxxxxxxxx> wrote in message
news:445d50c8.5748823@xxxxxxxxxxxxxx

On 6 May 2006 17:15:40 -0700, "BobG" <bobgardner@xxxxxxx>
wrote:

BW:

Higher grade gasoline has about the same energy content, it just allows a bit more efficiency from the engine.

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Can you quantify this somehow? To me efficiency is power out/power in.

If the power in is the same, how does it increase the power out?

Engine efficiency is a function of compression ratio (peak temperature). Advancing the spark to ignite the fuel earlier before top dead center raises the effective compression ratio, but is limited by octane rating.

Lower octane fuel "pings" or detonates instead of burning smoothly. The engine control unit detects the pinging and retards the spark, preventing detonation, slightly reducing the effective compression ratio and efficiency, but greatly prolonging engine life.

When you use higher octane fuel, the engine has slightly greater efficiency, because the effective compression ratio is higher. The trade off is fuel cost. It's usually about a wash in \$/mile, but you do get higher peak performance (max power) with higher octane, if that's important.

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Bill, would it be more accurate to say an engines can "*be built* with slightly greater efficiency by utilizing a higher effective compression ratio"?

AFAIK, on a typical, un-modified, car engine, as delivered by the factory, built to use say, 87 octane gasoline, you will see no "preformance improvement" by using "premium" (say 91 octane).....more likely less performance. It's only on engines that have a higher effective compression ratio, that performance gains will be found.

I was using "effective compression ratio" to include the effect of spark timing. The earlier the mixture is ignited (to a point), the higher the eventual flame temperature, and thus Carnot efficiency. If the octane is higher, _and_ the ECU advances the spark, then you should in theory get a bit more efficiency and peak HP.

I must admit I have never actually tested this theory myself, but it seems plausible and is accepted by many e.g.:

<http://www.jandssafeguard.com/tech.html>

If my engine is designed for "regular" gasoline, I'll get slightly more miles/gallon, and a higher "max power" from regular gasoline, than I will from premium.

The following link agrees with you:

<http://www.automedia.com/High/Octane/Fuel/ccr20050501ok/1>

It says:

"Unless you're driving one of the very small percentages of performance vehicles with an engine designed specifically to utilize the properties of higher-octane premium gasoline, there is no performance gain in using premium."

I drive a little 2000 Civic Si, which says in the operators manual:

"Use a premium unleaded gasoline with a pump octane rating of 91 or higher.

If you are unable to find premium unleaded gasoline, you may substitute an unleaded regular gasoline. The engine will compensate for the lower octane, but you may notice a slight decrease in power as a result."

Being cheap, I've used 87 octane only, with no problems at all, but I never thought of the engine as "high performance"

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per the above link.

So I guess it all depends on how you look at it – designed for 91 octane with a degradation on 87, or designed for 87 with a boost on 91.

Thanks for the comments – I learn a lot in this NG.

Regards,

Bill Ward