

FAST & FORWARD

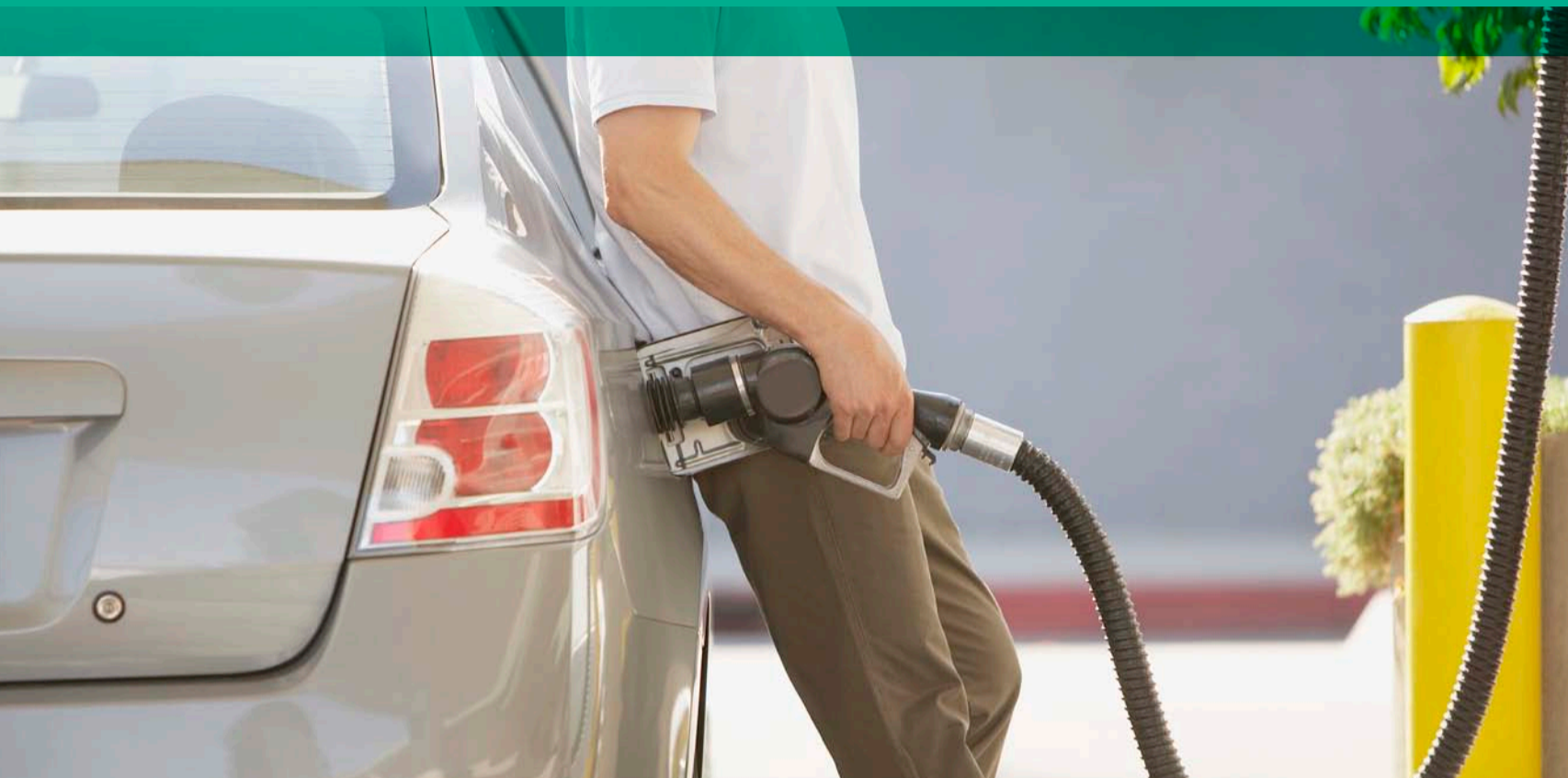
JUNE '13

ISSUE

1

Insights and innovations to help you accelerate performance


LUBE-TECH™
Accelerating Performance



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IN THE SPOTLIGHT

Fuel Economy

Where are the standards going and why?

U.S. approves 54.5 mpg by 2025

As global markets evolve, fuel economy is becoming an increasingly important topic. Today, over 50% of the oil used around the world is for transportation, and over 75% of the energy used in the transportation sector is consumed on the road.

Driven by fears of crippling oil price spikes as well as concerns for the environment, the U.S. government is taking action to reduce consumption by aggressively increasing fuel economy standards. In 2010, the U.S. raised the average fuel economy for new passenger vehicles to 34.1 mpg by 2016. That mandate is increasing to 54.5 mpg in 2025. This shift is expected to reduce carbon intensity by 40% and cut U.S. oil usage by 12 billion barrels.

Fuel loss from unexpected places

While reformulation will help reduce fuel loss, the most significant loss is in the power train – especially from waste heat in the exhaust, coolant and brake pads. In fact, only 1/5 of the energy contained in a gallon of fuel actually propels the vehicle. Engineers are sure to address this with new engine designs and aerodynamic body styles.

Hybrids?

Are hybrids the answer? Yes and no. A typical hybrid delivers 25-30% fuel savings over a conventional ignition, but only in specific situations like congested traffic. Hybrid drive train costs make them prohibitive for many consumers. They are certainly part of the solution, but likely not the answer some experts once expected.

The solution

Expect to see a host of different solutions working together to reach the new mpg standards. Power train improvements will be a focal point, along with body and accessory advancements, vehicle downsizing and some hybridization. While lower fuel usage is good news for our wallets, it could change the way we drive our vehicles and will certainly change vehicle designs and even highway infrastructure. When fuel prices spike, this demand only becomes more real.

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THAT'S A
DRAG

With vehicles, the biggest physical drags on fuel economy are:

- Aerodynamic deficiencies
- Tires
- Air conditioning systems
- Head lamps
- Material substitution
- Engine/truck design
- Drive-train design

And these are the biggest "in-use" drags:

- Vehicle condition
- Average driving speed and congestion
- Road surface
- Driver behavior
- Auxiliary equipment

Evolving Oil Specifications

Get the latest specs, by engine category

With an eye on boosting fuel efficiency and reducing CO₂ in the environment, industry associations across the engineering spectrum are revamping their specification guidelines for oils.



GF-6 for Passenger Cars

GF-6 is the new specification for passenger car motor oils. Developed by the International Lubricants Standardization and Approval Committee (ILSAC), this specification is designed to:

- Increase fuel economy
- Improve wear protection
- Enhance oil robustness
- Reduce engine aeration
- Expand overall fuel efficiency

PC-11 for Heavy Duty Segment

Developed by the Truck and Engine Manufacturers Association (EMA), PC-11 is the new specification for heavy-duty motor oils, replacing CJ-4. Driven by changes in engine technology, the increasing use of renewable fuels and pending medium and heavy duty truck fuel economy standards, the PC-11 specification was designed to generate improved fuel economy and more robust engine durability.

TC-W3® for Two-Stroke Marine Engines

Reducing emissions to meet EPA standards has long been a goal of the two-stroke industry — which means it needs a quality oil that reduces the mixture ratio to fuel while prolonging engine life and reducing warranty claims. The TC-W3 lubricant, an NMMA trademark, has undergone extensive testing and evolved to meet the established performance objectives. And now that two-stroke engines have moved toward higher cylinder temperatures and compressions, TC-W3-certified lubricants also help meet the EPA's emission-reduction levels.

FC-W® for Four-Stroke Marine Engines

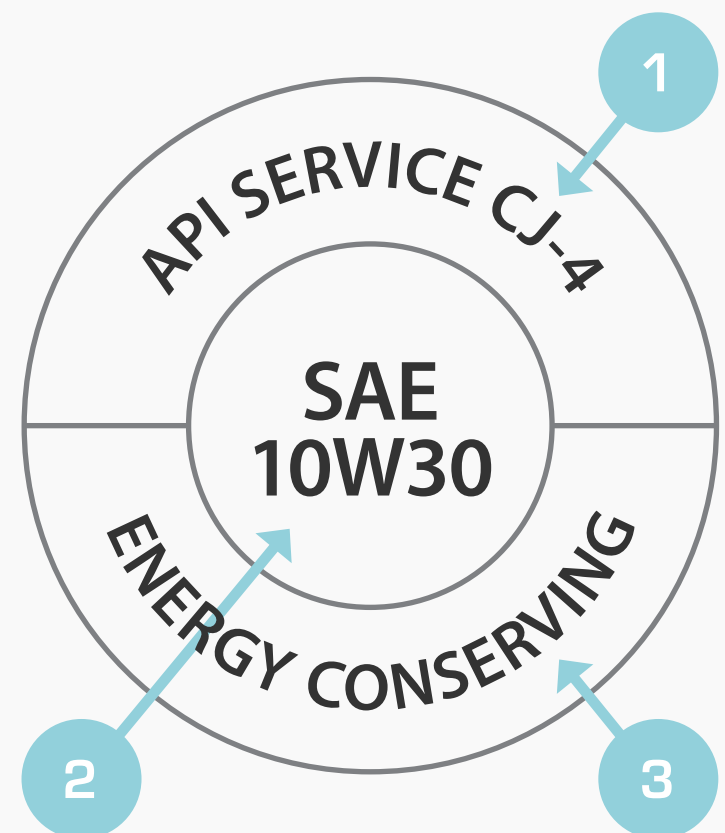
With the widespread introduction of four-stroke outboard engine technology, the NMMA developed the FC-W® oil category specifically for this marine engine. Working with the NMMA, industry leaders in lubrication technology have developed FC-W® testing criteria — with specific metrics for viscosity, corrosion, filter plugging, foaming, aeration and more.

New SAE Grade 16

SAE International has fully approved a new viscosity grade — SAE 16 — that is being introduced this spring in the SAE J300 Standard, as a lighter-weight alternative to SAE 20 and other non-winter engine oil grades. The new grade's kinematic viscosity limits were set at 6.1 mm²/s minimum to <8.2 mm²/s maximum, at 100 degrees C. Its minimum high-temperature high-shear rate viscosity is 2.3 mPa·sec at 150 degrees C.

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HOW TO READ “THE DONUT”



1. The phrase “API Service” is followed by a two-letter abbreviation. The first letter explains what type of engine the oil was formulated for: S-type is gasoline, C-type is diesel. The second letter denotes quality level. The higher the letter, the better the oil. Note: SAE quality levels are always backward compatible, so a higher letter (SM) can always be used, even when your engine manual lists a lower letter (SL). You should never downgrade, however, to a lower-quality oil.
2. Viscosity Grade: This is the measure of thickness, or resistance to flow. Low-viscosity fluids flow easily (like water) while high-viscosity fluids are thick and don't run easily (like honey). Multi-grade oils, which are most commonly used today, show two viscosity ratings – one for winter (“10W”) and the other for normal engine temperature (e.g. “30”). This rating states that a 10W30 engine oil will have a viscosity rating of 10W in cold weather and 30 at normal engine temperatures.
3. Along the bottom of the donut, you will sometimes see the phrase, “Energy Conserving.” Oils with this label have added friction modifiers for improved fuel efficiency. Independent testing is required for any product to meet the “Energy Conserving” seal.

Energy Outlook: A View to 2040

ExxonMobil's report provides an intriguing preview of the future

ExxonMobil recently unveiled a road map to the future of global energy consumption and production. Entitled "The Outlook for Energy: A View to 2040," it highlights the opportunities and challenges ahead as we all seek to manage economic growth while protecting the planet.

Technology will drive new efficiencies

Among other things, the report highlights how technological innovation will help us get more from less. Efficiency will be a key to solving energy challenges, and evolving technologies — such as hybrid vehicles and natural-gas power plants — will help keep energy use flat even as global economic output grows by up to 80%.

Technology also will enable the safe development of once hard-to-produce energy resources, expanding the energy supply. Oil will remain the #1 global fuel, while natural gas will overtake coal as #2. Use of nuclear power and renewable energy will also grow, with coal gradually declining.

Demand will evolve geographically

As the world's population expands from 7 billion to 9 billion people — with the greatest growth in Africa and India — energy demand in developing nations will rise 65% by 2040. Total North American fuel demand will decline through 2040, due to efficiency advances in passenger car vehicles.

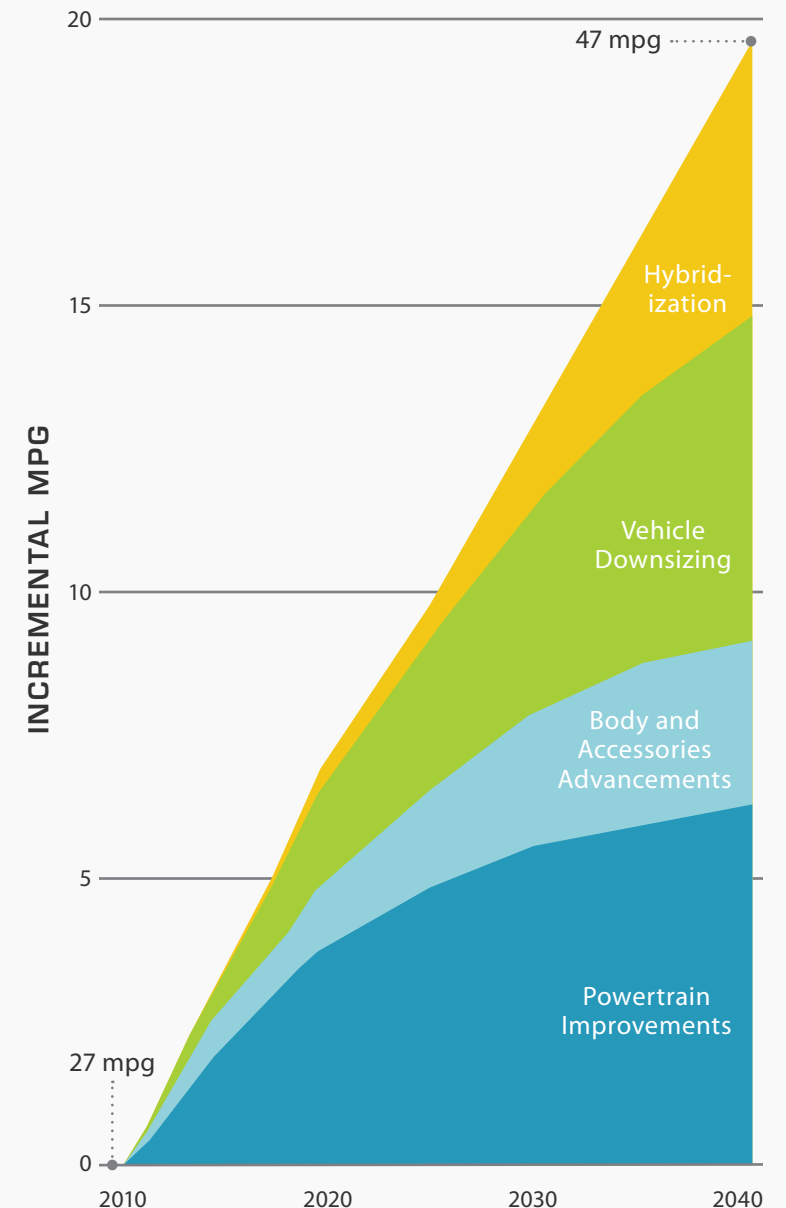
Heavy-duty vehicles will consume a larger energy share

While the number of cars on the road will double by 2040, fuel economy gains will keep global personal transportation energy demand relatively steady. The largest demand will be driven by heavy-duty freight trucks, buses, planes, ships, trains and other commercial vehicles. This segment will grow 65% and account for 40% of total transportation demand.

Finally, look for Liquid Natural Gas (LNG) and Compressed Natural Gas (CNG) to become major factors. By 2040, 20% of new heavy-duty vehicles will use natural gas, which should have a favorable impact — especially along high-traffic corridors and for specific services such as busing, waste management and utilities.

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GAINS IN EFFICIENCY OF NEW LIGHT DUTY VEHICLES





Commodity Market Drivers

Here's your roundup of recent market activity

Base oil volumes have picked up

According to the *Lubes N Grease* Base Oil Report from April 2, though expert opinions vary, "The popular viewpoint is that the U.S. market is solid; demand continues to improve while supply continues to dwindle." Many suppliers are sold out of most grades and others report largely balanced inventories. Overall, market conditions are improving and prices are rising, in contrast to the still-depressed situation in Europe, where base oil prices "remain under downward pressure."

Lubricant prices on the rise

The four big lubricant manufacturers have announced price increases — which could be just the first round of price hikes for 2013. A number of independent lubricant manufacturers followed suit. Most say the price increases are necessary due to a jump in the price of base oils.

Yet many analysts are wondering what the rest of 2013 will bring. Lubricant demand is still soft and significantly more base oil capacity will enter the market when Chevron opens its 25,000-barrels-per-day API Group II base oil plant in Pascagoula, Mississippi later this year. Buckle up — it could be an interesting ride!

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PROJECTED PRICE INCREASES

ExxonMobil:

Up to 4%, effective May 15, 2013

BP/Castrol:

Up to 4% on all passenger car, commercial and ancillary lubricants, as of May 6, 2013

Shell Oil Products U.S.:

Up to 4% on all lubricants, effective April 15

Petro-Canada:

3% increase in white oils and process oils for U.S., effective April 11

Amalie:

24¢ per gallon for oil and chemical products, as of April 2; 3¢ per pound for grease products, effective May 1

Old World:

20¢ per gallon on all bulk and packaged blend lubricants, effective April 15

Source: JobbersWorld, April 4, 2013

Waking Up Your Summer Engines

Use this 5-point checklist before firing them up

When it's time to break out the summer equipment, it's tempting to just fire it up and go. But you may need to do some prep first. Whether it's a motorcycle, boat, ATV, small engine or other gas-powered equipment that's been parked for the winter, follow this checklist to minimize trouble and maximize your summer fun.

- 1. Check your spark plugs** to ensure your engine has a healthy combustion. For a two-stroke engine, a plug that is covered in gum or heavy carbon deposits indicates poor oil performance or that the gas is old. Address this situation with more than just new plugs! Also, inspect and replace any worn plug wires to ensure a strong ignition.
- 2. Take a fuel sample** and check for water contamination. Contaminated fuel should be discarded to avoid engine problems. Also, look for fuel deposits, a sign of oxidation, which can result in gum, varnish and other deposits that clog carburetor jets and filters — leading to starting difficulties, power loss or engine failure. That's why using a quality fuel treatment prior to storage is essential for combatting potential problems.
- 3. Check the oil** — most engine oil should be replaced prior to storage, so the engine's vital internal moving parts have a fresh corrosion prevention treatment prior to the offseason. Consult your owner's manual for the correct changing frequency.
- 4. Make sure your battery holds a full charge** if you have an electric-start engine. Batteries that are suspect should be load tested. If the terminals are coated with corrosion, clean them with a wire brush or steel wool. You want a solid electrical connection, so perform the same routine on the cable connectors and fasteners, too.
- 5. Check the lower-unit gear lube** to ensure outboards and stern drives are properly filled. Changing the lube helps extend equipment life. Replace fuel filters periodically, too. Always follow the manufacturer's guidelines, which are set forth by the engineers who designed the products.

Do a final once-over, cleaning the equipment and using a quality spray lubricant on all moving parts and cables. When you're finished, be sure to record the dates and work performed, so you don't leave these important details to memory.



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COMMON QUESTIONS ABOUT ETHANOL

Is E10 potentially harmful to small engines?

Ethanol is corrosive, degrades quickly and is prone to water contamination — problems that can be highly damaging to outdoor equipment and recreational engines.

How long does E10 last?

Oxidation can cause fuel to break down in as little as 30 days. E10's shelf life is greatly reduced in engines with vented fuel systems such as outdoor power equipment. Marine engines are usually in moist environments and ethanol naturally attracts moisture, increasing the risk of water contamination in your fuel.

Can I use E10 in my small engine?

While non-oxygenated gasoline is preferred, E10 can be used safely in your outdoor power equipment — with proper storage and a fuel treatment. Corrosion, clogging, gumming and other problems are more likely when engines are used less frequently. A quality fuel treatment is the best prevention.

Can I use E15 blended gasoline?

E15 is only approved for 2001 and newer cars and trucks. No small engine manufacturer or motorcycle, snowmobile, ATV or marine engine manufacturer has approved the use of E15.

Poverty and Education

Making a Breakthrough with low-income students

The link between poverty and underperforming students

Nearly 46.2 million Americans live in poverty, and 36% are children — 40% of whom are unprepared for primary school. Underprivileged teenagers are seven times more likely to drop out of high school, and less than 30% enroll in a four-year college. Of those that do, less than half graduate. The gap between poverty and academic excellence is widening. Yet inroads are being made locally by organizations that understand the challenge and are working hard to reverse this disturbing trend.

Breakthrough has a game-changing approach

One organization — Breakthrough, located in St. Paul — has found a way to reach high-potential, under-resourced students by helping them develop an educational plan that takes them through high-school graduation. The secret is accountability.

Each year, Breakthrough opens 55 seats to rising 7th-grade students for application. To be selected, students and families must commit to its intensive, 12-month program for six years, taking at least one honors course each year and earning at least a B- in all core courses. Attendance is mandatory, year round. Students must commit to 1½ hours of homework each evening and participate in at least one extra-curricular activity each year.

Parents held accountable, too

Parents and guardians also have responsibilities. In addition to supporting the student's commitment, they must attend conferences and other events, as well as complete family workshops and monitor student progress.

Hard work pays off in scholarships

Since its inception eight years ago, Breakthrough has now brought two student groups through its six-year program. All of these students are now completing either their freshman or sophomore year of college! And the class of 2013 includes a Dell Scholar, two Gates Millennium Scholars, a Jack Kent Cooke Scholar, a Wallin Scholar and a Questbridge Scholar. Nearly a third of this year's class has full-ride scholarships to schools including Stanford, Williams College and the University of Minnesota's Carlson School of Business!

Expanding with help from Lube-Tech

Building on this success, Breakthrough is expanding its reach to additional communities and families. Lube-Tech began partnering with Breakthrough in 2012 as part of our initiative to support STEM education, which promotes science, technology, engineering and mathematics. We've helped Breakthrough develop a 10-year vision and are awarding a grant to help with their expansion goal — to open five new facilities over the next ten years.

To learn more or offer a donation, please visit the Breakthrough website: www.breakthroughstpaul.org.

Sources: Alliance for Excellent Education, U.S. Census, National Center for Education Statistics, Breakthrough: breakthroughstpaul.org

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To learn more about Lube-Tech, visit lubetech.com.



2013

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 **Breakthrough**
Saint Paul


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