

# Time to Tier Up!

*John Deere distributors develop repower kits so that used off-highway equipment can meet emissions regulations*

Owners of used diesel off-highway equipment looking to meet current and anticipated local, state, and federal emissions regulations will face some challenging decisions in the coming years. While some will choose to upgrade their fleets with new equipment, others will opt to retrofit their engines with diesel-emission control strategies, or repower older equipment with newer emission-controlled engine models.

These decisions are coming sooner than later for some folks. The California Air Resources Board (CARB) adopted a regulation in July 2007 to reduce emissions from in-use diesel vehicles used in a variety of off-highway applications in the state. Depending on the size of fleet, those requirements will start taking effect in less than two years. As other non-attainment areas in other parts of the country look to California's lead in this effort, the push to upgrade or replace non-certified engines is only bound to grow and intensify nationwide in the future.

Certainly, engine repowers can pose challenges. Removing an older engine from a used piece of equipment and replacing that engine with a more technologically advanced model doesn't always make for a perfect fit. John Deere and its engine distributors are taking an engineering lead in developing repower kits for older machines to benefit from today's Tier 3/Stage III A and Interim Tier 4 technologies.

Bell Power Systems of Essex, Connecticut, and Western Power Products of Bakersfield, California, recently began working closely with John Deere Construction & Forestry and John Deere Power Systems to develop repower kits for several models of John Deere-brand construction equipment. Whereas initial focus has been on John Deere equipment, these distributors plan to engineer repower kits for John Deere-powered OEM equipment, as well.

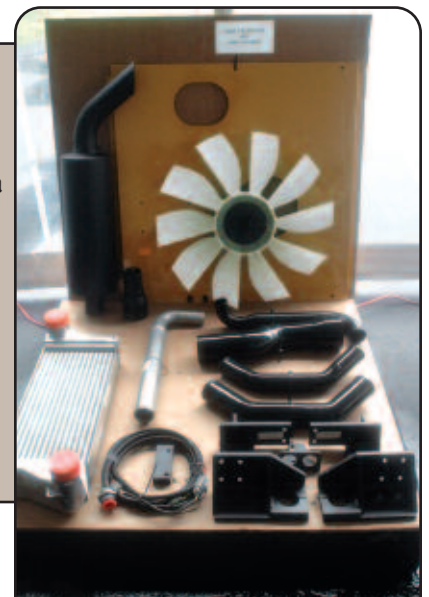
Marty Bell, president of Bell Power, explains that today's repowers are sophisticated, going well beyond just the confines of the engine block. "Repowers require a whole new level of engineering, because they often involve new cooling packages, instrumentation, piping, brackets, as well as modified intake and exhaust configurations," he explains. "We need to design the engine and auxiliary components so that they physically fit a machine and still meet the strict application engineering standards. A poorly designed installation can impact both vehicle performance and the ability of the engine to stay within emissions compliance. These engineered kits are designed to meet or exceed the original equipment performance."

The Tier Up program was launched with the development of a Tier 3/Stage III A repower kit for the John Deere 644G loader. The John Deere-approved package encompasses instructions and a vital supply of hardware, including a fan blade, cooling pipe, fresh-air pipe, charged-air cooler pipes, charged air cooler, exhaust system, CAN-BUS harness, even the front and rear engine mounts and a replacement hood. After application testing, these 644G repower kits are marketed through John Deere construction dealerships that actually perform the repowers.

Dynamometer tests reveal satisfying results after the repowers. Bell Power developed a repower kit for the John Deere 330LC excavator involving the replacement of a PowerTech 6081H engine with a new Tier 3/Stage III A PowerTech Plus 6090H engine. Tests substantiate a 90 percent reduction in carbon monoxide (CO), a 60 percent reduction in particulate matter (PM), and a 43 percent reduction in oxides of nitrogen (NOx). An additional side benefit is a substantial reduction in engine noise with the new 9.0L engine.

Bell Power tests an engine with a dynamometer to ensure a successful repower of an older machine.

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Out with the old, in with the new: Bell Power removed a John Deere PowerTech 8.1L engine (shown) and repowered the John Deere 644H loader with a new PowerTech Plus 6068HF485.

Those figures hold special appeal in California where the CARB rule affects an estimated 180,000 off-highway vehicles. The rule affects those in construction, mining, and other industries, but excludes applications for agricultural or personal use, or for use at ports or intermodal rail yards. According to CARB, engines with a maximum 18.7 kW (25 hp) or greater are subject to the regulation, and deadlines vary according to fleet size. Large fleets, with a combined fleet horsepower of 3,730 kW (5,000 hp) or more must begin complying in 2010. Medium fleets, with 1,866 to 3,730 kW (2,501 to 5,000 hp) have until 2013, while regulations for smaller fleets do not begin until 2015. Some equipment owners will get limited financial support, thanks to the Carl Moyer Program, which offers governmental grants to fund the replacement of polluting diesel engines.

Rules similar to these are starting to appear in many other parts of the country. The Northeast and Mid-Atlantic states and some major cities are considering or have adopted rules that could impact many jobsites.

“With diesel-powered equipment often lasting many years and the cost of new equipment continuing to increase, there are many vehicles operating on jobsites that fall short of the current emissions regulations,” says Marty. “Engineering solutions and providing new power packages that will help bring these machines into compliance is one cost-effective alternative for equipment owners that we will continue to develop and offer to our dealers and the marketplace. Technology and the demands of our world require us to do no less if we want to remain a responsive engine distributor.”

Emissions Cert.	Tier 3/Stage III A	Tier 3/Stage III A
Engine Model	PowerTech E 6068HF285	PowerTech Plus 6090HF485
Displacement	6.8L	9.0L
Rated Power	149 kW (200 hp) @ 2400 rpm	187 kW (250 hp) @ 2200 rpm
Cylinders	6	6
Aspiration	Air-to-air aftercooled	Air-to-air aftercooled
Distributor	Western Power Products, Inc. Bakersfield, California (661) 397-9155 www.westernpowerproducts.net	Bell Power Systems, Inc. Essex, Connecticut (860) 767-7502 www.bellpower.com

## EMISSIONS



# A better match at a lower cost

*A California rental company chooses John Deere engines as an economical repower choice for its rental fleet*

Downs Equipment Rentals of Bakersfield, California, is taking a progressive first step towards repowering its rental fleet of construction equipment with John Deere Tier 3/Stage III A engines.

Currently, the company operates a fleet with a combined power of about 33,570 kW (45,000 hp). For Downs Equipment, 8 percent of that figure — engines totaling 2,686 kW (3,600 hp) — must meet CARB requirements by 2010, according to general manager Brant Ambrose.

A 1995 John Deere 750C crawler is the first machine to be repowered. Western Power Products developed and installed a repower kit using the Tier 3/Stage III A PowerTech E 6068H engine.

Brant says he is planning to repower several pieces of competitive-brand equipment in his fleet with the same John Deere engine. He adds that the PowerTech E 6068H offers a wide range of horsepower, making it possible to precisely match the power requirements of the original machine. “We want the dozer to operate as close to factory performance as possible,” explains Brant. “Traditionally, we would replace the engine with the same make that was originally in the machine. Today, however, using the same engine brand would mean a 10 percent increase in horsepower for a machine that is not designed for that power increase. Fortunately, we are able to program the John Deere engine to match the horsepower and torque curve values of the original engine.”

Brant adds that his company is also pursuing John Deere engines as “a cost-saving measure.” He says Downs Equipment is estimated to save \$10,000 to \$15,000 (U.S.) per repower using John Deere engines, when compared to the cost of using the competitive engine brand. “For us, that could amount to a \$300,000 savings in a 12-month period.”

An older-model John Deere 750C crawler is ready to work — and meet Tier 3/Stage III A emissions regulations — after being repowered with a PowerTech E 6068H engine.



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