

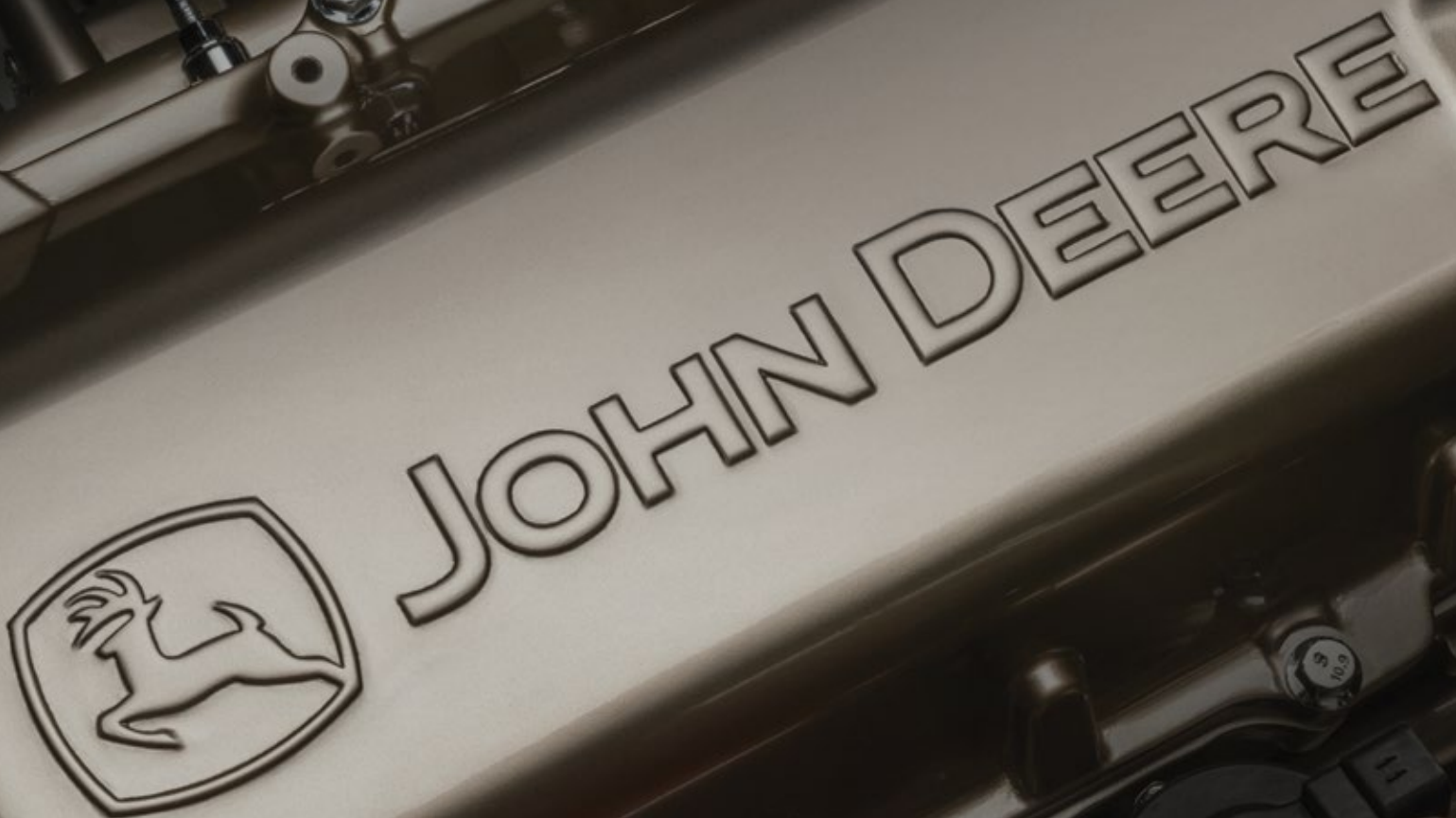
# Off-Highway Diesel Engines

Final Tier 4/Stage IV/Stage V



**JOHN DEERE**

You have the power





# John Deere is the power behind your productivity

## Feel the performance

John Deere power responds to your every command. It gives you low-end torque to attack heavy loads without stalling or lugging the engine. Fast transient response keeps up with your operators and your operations, while our compact engine designs give you maximum power density.

## Run with confidence

John Deere engines start when you need them, work reliably in tough conditions, and help you complete critical jobs on schedule. You also get warranty service wherever you go from a vast John Deere support network that includes more than 4,000 service locations, qualified technicians, and fast delivery of genuine John Deere parts.

You can keep an eye on your machines even when you're not on site. John Deere OEM Technology Solutions integrate OEM engines with the latest monitoring tools to let you remotely track machine location, monitor engine conditions, and perform engine diagnostics.

## Manage your bottom line

With low operating costs and proven efficiency, John Deere engines earn their way into your business. John Deere Final Tier 4/Stage IV engines demonstrate lower total fluid consumption compared to the previous Tier. Longer service intervals save you time and money on maintenance. Plus, John Deere engines are known for their long-lasting durability and extra value when it comes time to sell or trade your equipment.

## Acronyms used in this brochure

AOC	Ammonia oxidation catalyst
DEF	Diesel exhaust fluid
DOC	Diesel oxidation catalyst
DPF	Diesel particulate filter
ECU	Engine control unit
EGR	Exhaust gas recirculation
ETM	Exhaust temperature management
NOx	Nitrogen oxides
OEM	Original equipment manufacturer
PM	Particulate matter
ppm	Parts per million
SCR	Selective catalytic reduction
ULSD	Ultra-low sulfur diesel
VGT	Variable geometry turbocharger
WGT	Wastegate turbocharger

# The benefits of choosing John Deere engines

## Proven off-highway experience

John Deere has millions of hours of field experience with off-highway engine technologies.\*

- Over 500 million operating hours with high-pressure common-rail fuel systems
- Over 425 million hours with exhaust filters
- Over 206 million hours with variable geometry turbocharging and cooled EGR
- Over 137 million operating hours with series turbocharging
- Over 23 million hours with SCR in Final Tier 4/Stage IV machines

\*Data compiled September 2016.

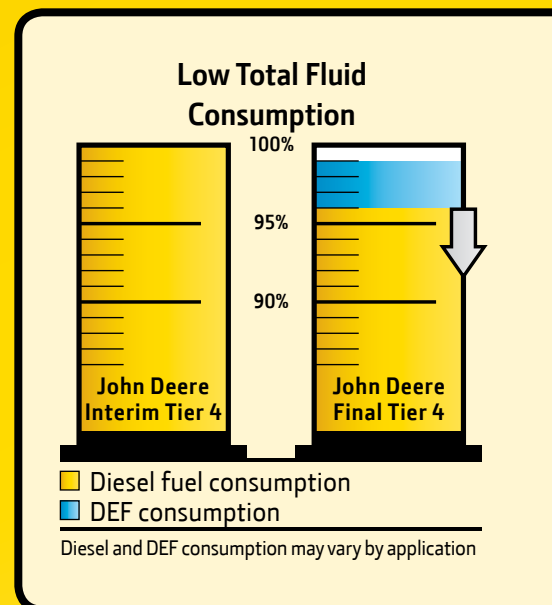
## Machine integration

Experienced engineering teams at both John Deere Power Systems and your John Deere engine distributor work closely with you to make sure our engines and Funk™ drivetrain components can be properly integrated with your equipment. This total machine integration assistance provides a seamless solution from the engine electronics to the drivetrain components.

## Customer support

The proven John Deere dealer network of over 4,000 service locations is prepared to fully support customers and their Final Tier 4/Stage IV engines. Experience the power of a worldwide engine support network only from John Deere.

- Superior engineering
- Qualified technicians
- A warranty you can count on
- Fast parts delivery
- Genuine John Deere parts



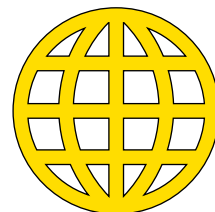
## Experience improved fluid efficiency

If your engine manufacturer isn't talking about diesel exhaust fluid (DEF) consumption, they may not be telling you the total efficiency story. John Deere Final Tier 4/Stage IV engines not only reduce diesel fuel consumption, but they demonstrate exceptionally low DEF consumption as well.

John Deere engines operate efficiently with ultra-low sulfur diesel as well as B5 to B20 blends, providing optimal performance and fuel-choice flexibility.



**4,000+**  
SERVICE LOCATIONS  
WORLDWIDE







Final Tier 4/Stage IV/Stage V engine identification

## PowerTech PSS 6.8L

**Displacement**

**Aftertreatment**

S – Exhaust filter and SCR

L – DOC and SCR

X – Exhaust filter

**Turbocharger**

V – Variable geometry turbocharger (VGT)

S – Series turbochargers

W – Wastegate turbocharger

**Technology**

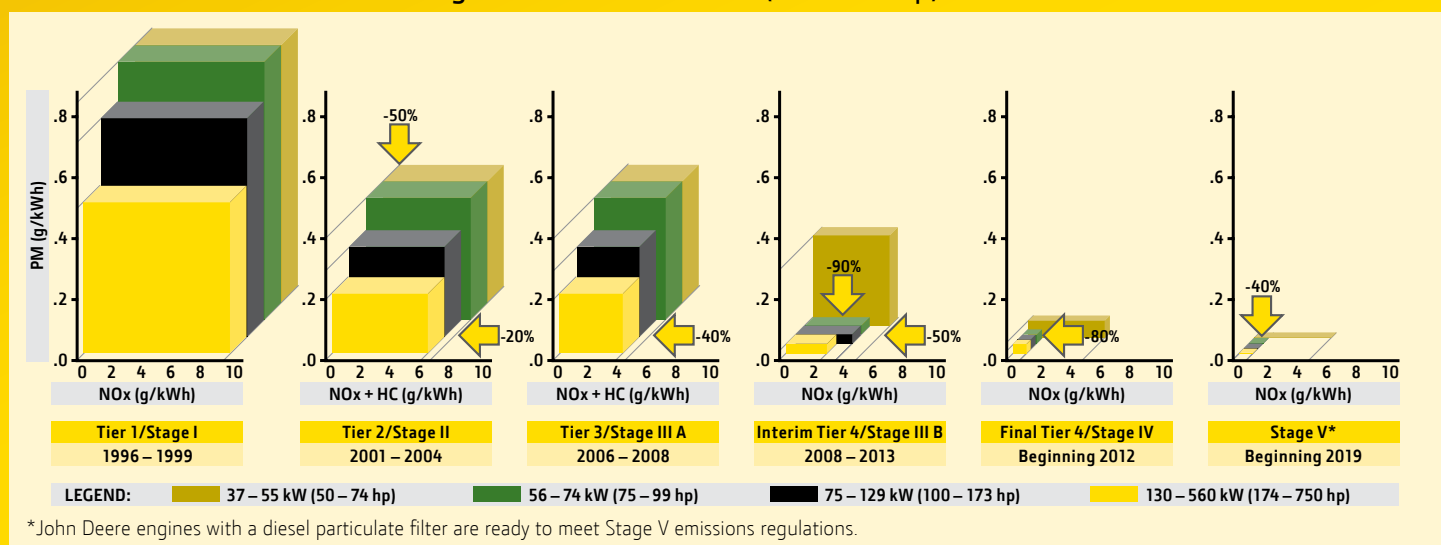
P – PowerTech Plus

E – PowerTech E

## Meeting Final Tier 4/Stage IV/Stage V regulations

John Deere is continuously developing and testing technologies to meet emissions regulations. To meet the additional 80 percent reduction in NO<sub>x</sub> required by Final Tier 4/Stage IV regulations, we added a selective catalytic reduction (SCR) system to our proven PowerTech™ engine platform in engines 56 kW (75 hp) and above. John Deere engines with diesel particulate filter (DPF) technology are ready to meet Stage V emissions regulations. We'll continue to tailor our engine solutions to fit the variety of off-highway applications and customer needs.

### EPA and EU nonroad emissions regulations: 37 – 560 kW (50 – 750 hp)



NO<sub>x</sub> – Nitrogen oxides, which react in the atmosphere with hydrocarbons

HC – Hydrocarbons, a byproduct of combustion

PM – Particulate matter, a non-gaseous product of combustion

## Industrial engine power ratings

Engine	Power ratings	Turbo	Cooled EGR	Aftertreatment	Exhaust filter size	SCR size	Power range
PowerTech EWX 2.9L	36–55 kW (48–74 hp)	WGT	N/A	DOC/DPF	2	N/A	
PowerTech EWX 4.5L	55 kW (74 hp)	WGT	N/A	DOC/DPF	2	N/A	
PowerTech PWL 4.5L	63–104 kW (85–140 hp)	WGT	Yes	DOC/SCR	2	3	
PowerTech PWS 4.5L	63–104 kW (85–140 hp)	WGT	Yes	DOC/DPF/SCR	2	3	
PowerTech PSL 4.5L	93–129 kW (125–173 hp)	Series	Yes	DOC/SCR	3	3	
PowerTech PSS 4.5L	93–104 kW (125–140 hp)	Series	Yes	DOC/DPF/SCR	3	3	
PowerTech PSS 4.5L	116–129 kW (155–173 hp)	Series	Yes	DOC/DPF/SCR	4	4	
PowerTech PVS 6.8L	104–129 kW (140–173 hp)	VGT	Yes	DOC/DPF/SCR	3	3	
PowerTech PVS 6.8L	138–187 kW (185–250 hp)	VGT	Yes	DOC/DPF/SCR	4	4	
PowerTech PSS 6.8L	168 kW (225 hp)	Series	Yes	DOC/DPF/SCR	4	4	
PowerTech PSS 6.8L	187 kW (250 hp)	Series	Yes	DOC/DPF/SCR	4	4	
PowerTech PSS 6.8L	187–224 kW (250–300 hp)	Series	Yes	DOC/DPF/SCR	5	5	
PowerTech PSS 9.0L	187–242 kW (250–325 hp)	Series	Yes	DOC/DPF/SCR	5	5	
PowerTech PSS 9.0L	261–317 kW (350–425 hp)	Series	Yes	DOC/DPF/SCR	6	6	
PowerTech PSS 13.5L	309–448 kW (414–600 hp)	Series	Yes	DOC/DPF/SCR	7	7	

kW 0 37 75 112 149 186 224 261 298 336 373 410 448  
hp 0 50 100 150 200 250 300 350 400 450 500 550 600



# Integrated Emissions Control system

To meet increasingly stringent emissions regulations, John Deere has followed a carefully planned approach. We have systematically adopted new technologies and integrated them with our field-proven solutions to meet each regulatory tier.



Cooled EGR system

## NOx reduction through cooled EGR

John Deere was the first engine manufacturer to widely commercialize cooled EGR and variable geometry turbocharger technologies in off-highway applications, introducing them with the start of Tier 3/Stage III A regulations. This process reroutes cooled exhaust gas back into the intake manifold, which reduces oxygen levels, lowers exhaust temperatures, and reduces levels of NOx.

## PM reduction through exhaust filters

To achieve Interim Tier 4/Stage III B emissions requirements, we added an exhaust filter that contains a diesel oxidation catalyst (DOC) and a diesel particulate filter (DPF). The DOC reacts with exhaust gases to reduce carbon monoxide, hydrocarbons, and some particulate matter (PM). The downstream DPF traps and holds the remaining PM. During normal operating conditions, the engine's natural heat breaks down the PM and cleans the exhaust filter.

## Final NOx reduction through SCR

We use selective catalytic reduction (SCR) combined with our proven engine platform to achieve Final Tier 4/Stage IV emissions compliance. This technology utilizes a urea-based additive, sometimes referred to as diesel exhaust fluid (DEF) to reduce NOx — converting it to nitrogen and water vapor.

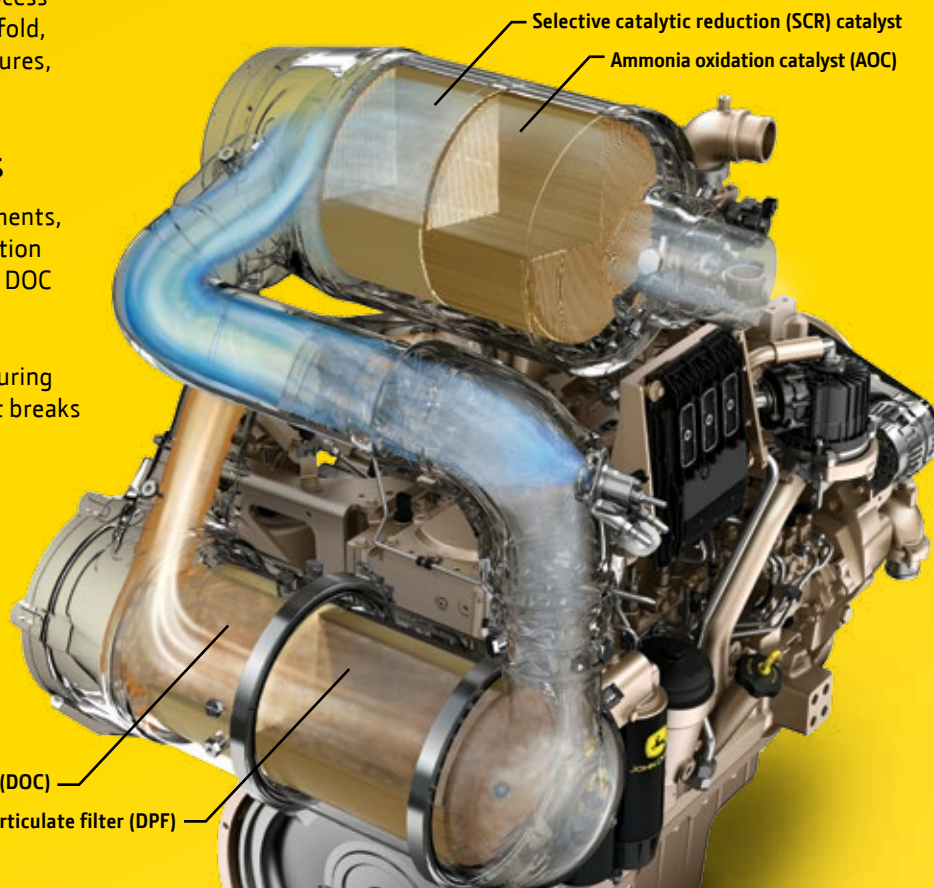
## Ready for Stage V

John Deere is ready to work, ready to generate, and ready to run with engines meeting EU Stage V emissions regulations.



This means OEM customers currently using a John Deere engine with a diesel particulate filter (DPF) won't have to re-engineer their machines to meet the requirements of Stage V regulations. John Deere has been using DPF technology since Interim Tier 4/Stage III B, and is well positioned to help customers transition to the EU's Stage V standard. We have extensive experience with the development and integration of DPFs in both John Deere and OEM equipment, with more than 425 million DPF hours in the field.\*

\*Data compiled September 2016.



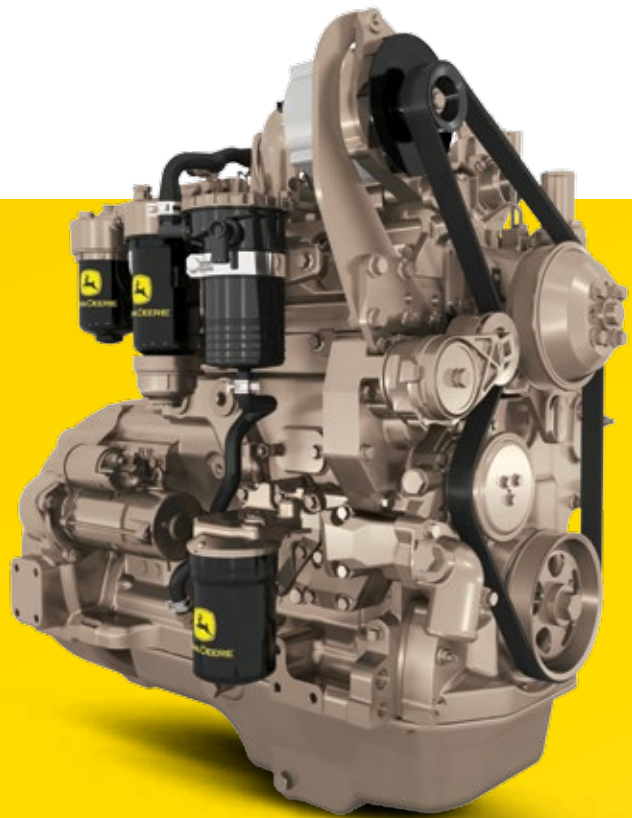
# PowerTech EWX



## Compact, powerful, and cost-effective

Our straightforward PowerTech EWX 2.9L and 4.5L engines have 2-valve cylinder heads, high-pressure common-rail fuel systems, and full authority electronic controls. They use simple wastegate turbocharging to maintain transient response and peak torque in all operating conditions.

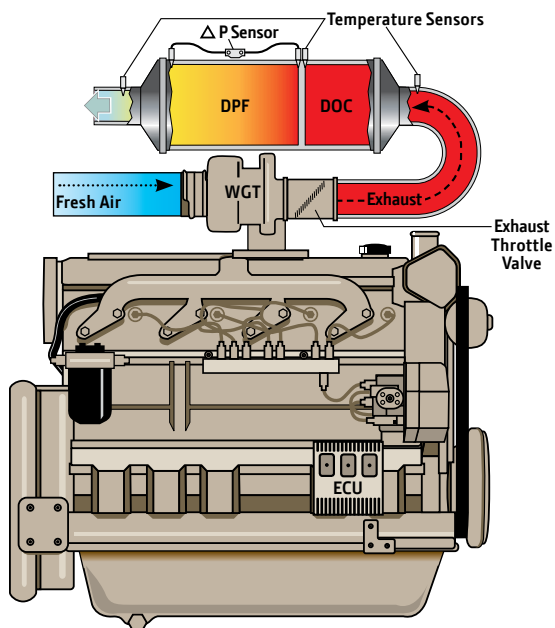
**Stage V ready.** EWX engines use proven DOC/DPF exhaust filters. These compact, cost-effective engines don't require cooled EGR or SCR.



### PowerTech EWX Engines

PowerTech EWX 2.9L	36 – 55 kW (48 – 74 hp)
PowerTech EWX 4.5L	55 kW (74 hp)

## PowerTech EWX technology



PowerTech EWX 4.5L engine configuration shown.

## Wastegate turbocharger

Wastegate turbochargers are designed to develop more airflow at lower engine speeds to improve low-speed torque. The wastegate control device bleeds off a portion of the exhaust flow at higher engine speeds.

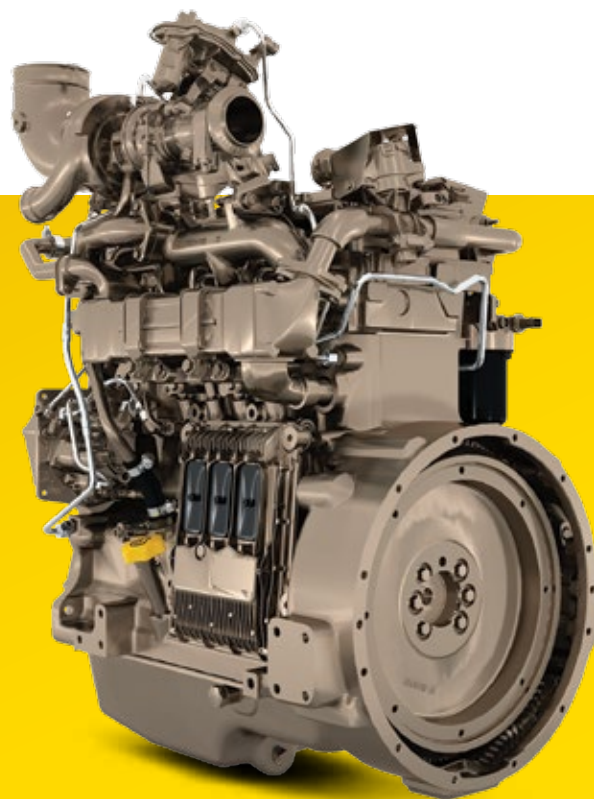
Wastegate turbos deliver improved transient response and higher peak torque without compromising engine envelope size.

## PowerTech PWL

### Efficiency, performance, and simplicity

PowerTech PWL 4.5L engines combine advanced combustion technologies, enhanced engine calibration, and simple wastegate turbocharging.

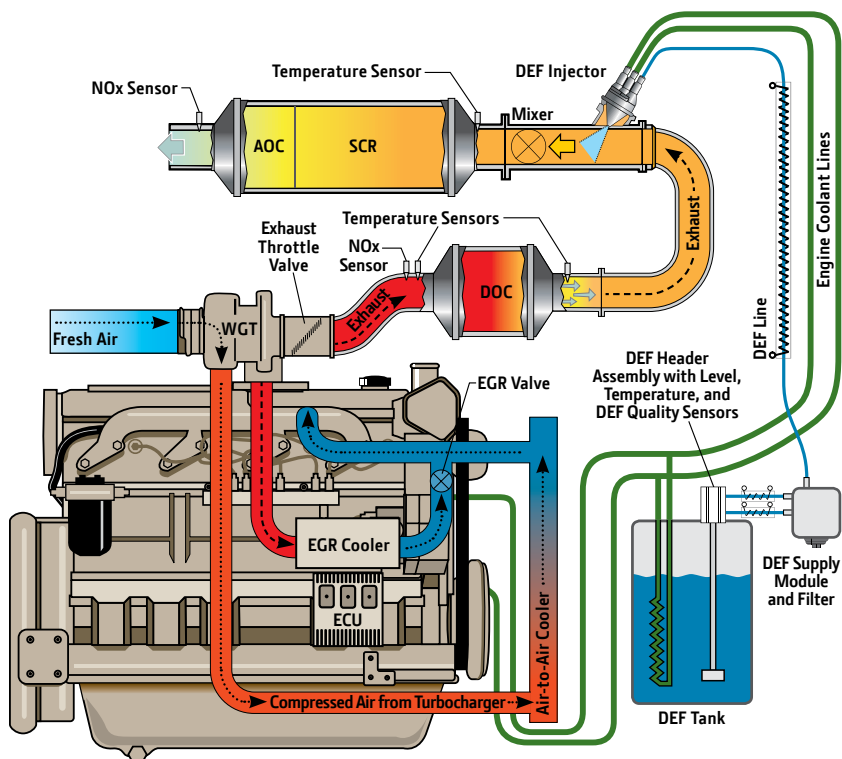
Our PWL engines pair our proven PowerTech Plus technology with a DOC and optimized SCR system to produce near-zero levels of PM without a DPF.



#### PowerTech PWL Engines

PowerTech PWL 4.5L      63 – 104 kW (85 – 140 hp)

### PowerTech PWL technology





# PowerTech PWS



## Power that works wherever you need to go

PowerTech PWS 4.5L engines combine advanced combustion technologies, enhanced engine calibration, and simple wastegate turbocharging.

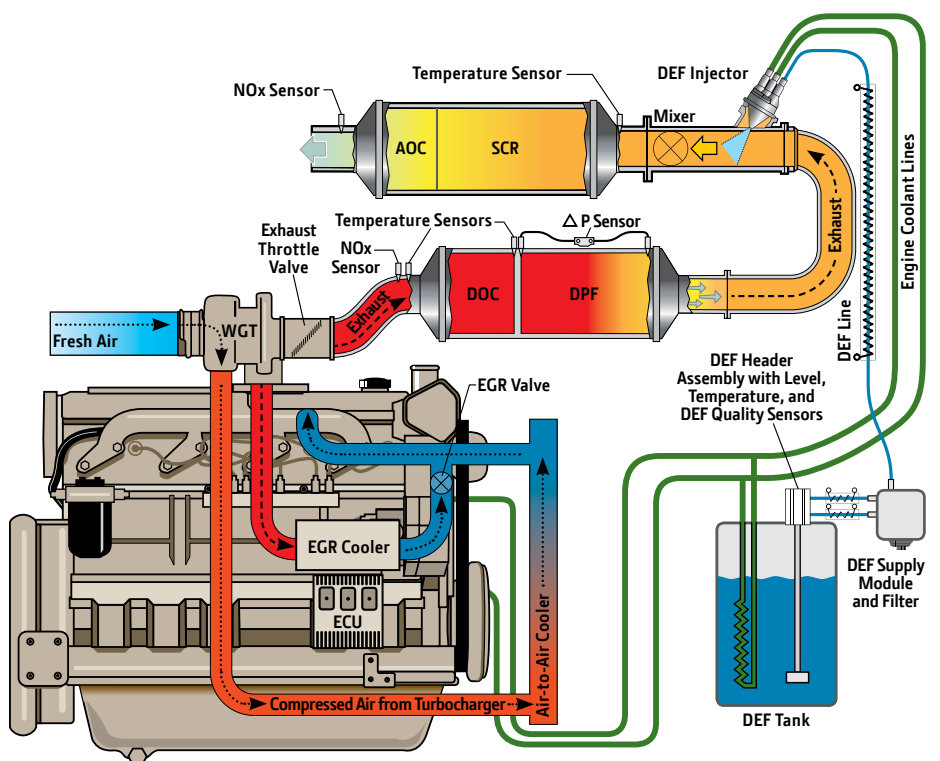
**Stage V ready.** PWS engines include a proven DPF system to meet the current emissions regulations mandated by the EPA, EU, CARB, many air-quality districts, and most nonattainment zones.



### PowerTech PWS Engines

PowerTech PWS 4.5L      63 – 104 kW (85 – 140 hp)

## PowerTech PWS technology



## PowerTech PSL

### More power in a compact package

Our PowerTech PSL 4.5L engines feature an optimized engine calibration, a 4-valve cylinder head, a new higher-pressure fuel system, full authority electronic controls, and series turbocharging consisting of a fixed geometry and wastegate turbocharger.

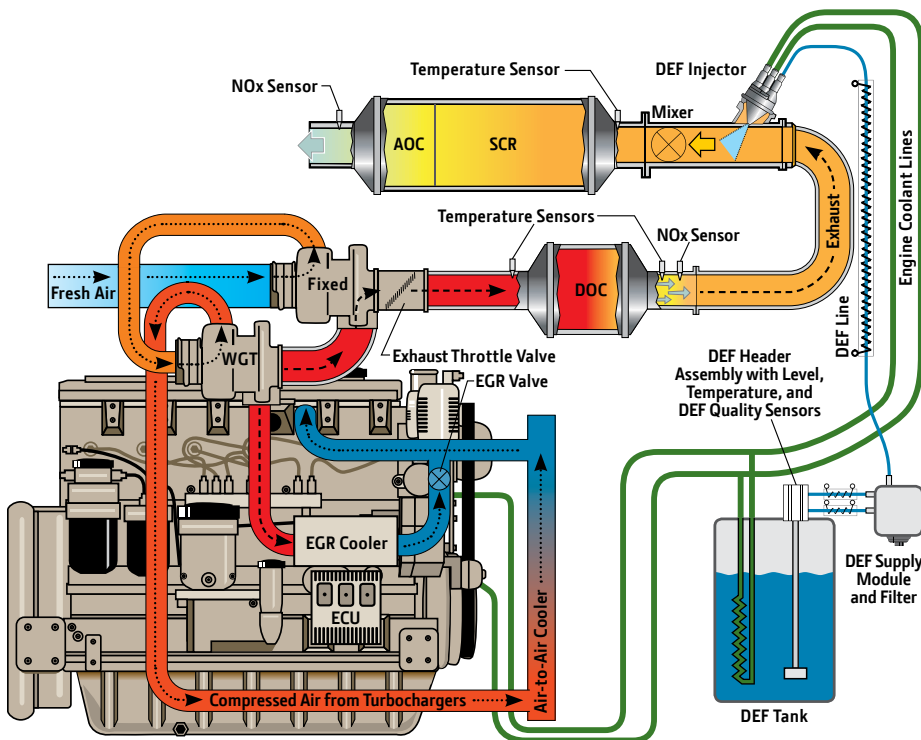
Combining proven PowerTech Plus technology with a DOC and SCR system delivers excellent performance and fluid efficiency without the need for a DPF.



#### PowerTech PSL Engines

PowerTech PSL 4.5L	93 – 129 kW (125 – 173 hp)
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### PowerTech PSL technology



### Series turbochargers

By splitting the compression of the charge air between two turbochargers, both can operate at peak efficiency and at slower rotating speeds. This lowers stress on turbocharger components and improves durability.

Series turbocharging delivers higher power density, improved low-speed torque, and improved high-altitude operation.

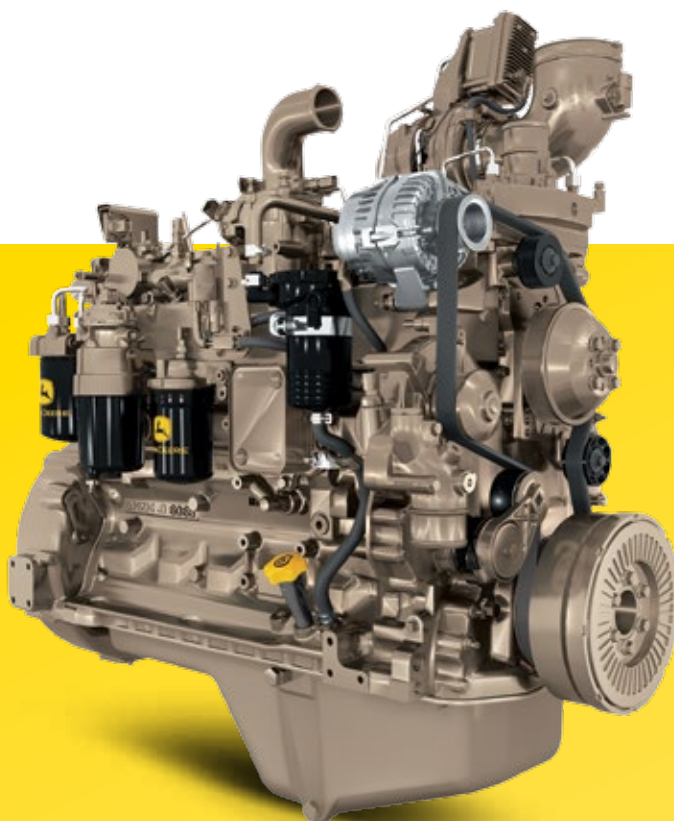
# PowerTech PVS



## More power, torque, and fluid economy

PowerTech PVS 6.8L engines provide reliable power for a wide range of applications.

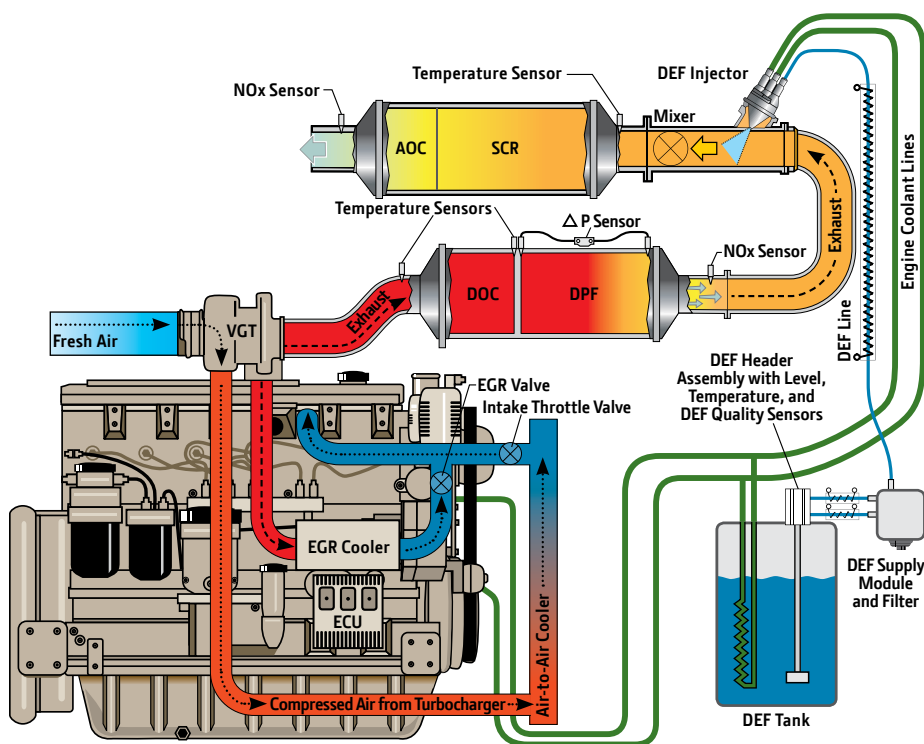
**Stage V ready.** PVS engines utilize our proven PowerTech Plus technology with variable geometry turbocharging (VGT), a DOC/DPF, and an SCR system to improve combustion efficiency, reduce emissions, enhance performance, and improve fluid economy.



### PowerTech PVS Engines

PowerTech PVS 6.8L 104 – 187 kW (140 – 250 hp)

## PowerTech PVS technology



## Variable geometry turbocharger

VGT optimizes airflow to generate more boost while maximizing low-speed torque, accelerated response, peak torque, and fluid economy. Precise electronic controls open or close the variable vanes in the turbocharger depending on engine load and speed.



VGT delivers power and efficiency



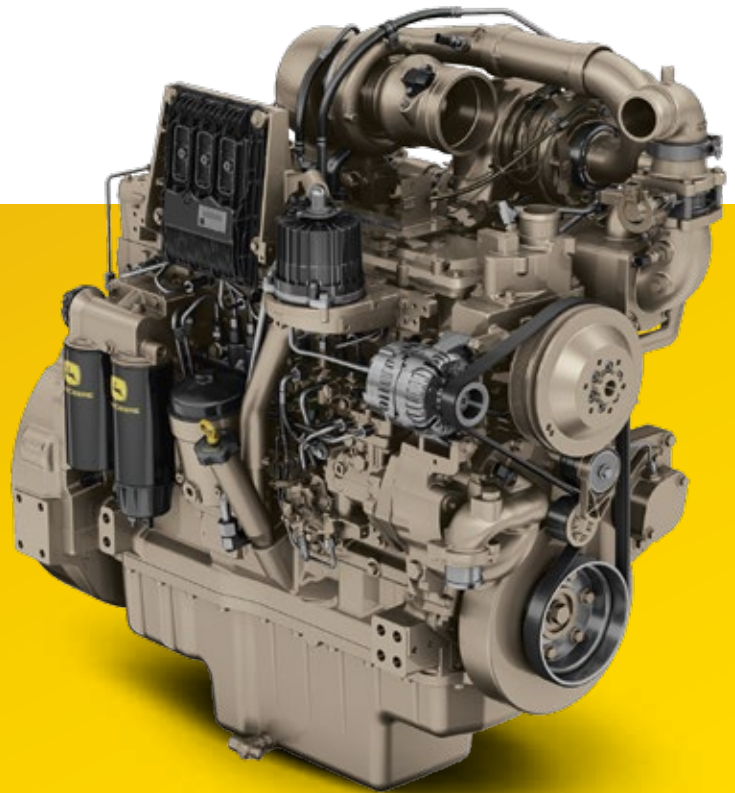
## PowerTech PSS



### Best power density, performance, and fluid efficiency

For ultimate performance in off-highway applications, PowerTech PSS 4.5L, 6.8L, 9.0L, and 13.5L engines can handle almost any job. All displacements feature series turbochargers that improve performance and responsiveness.

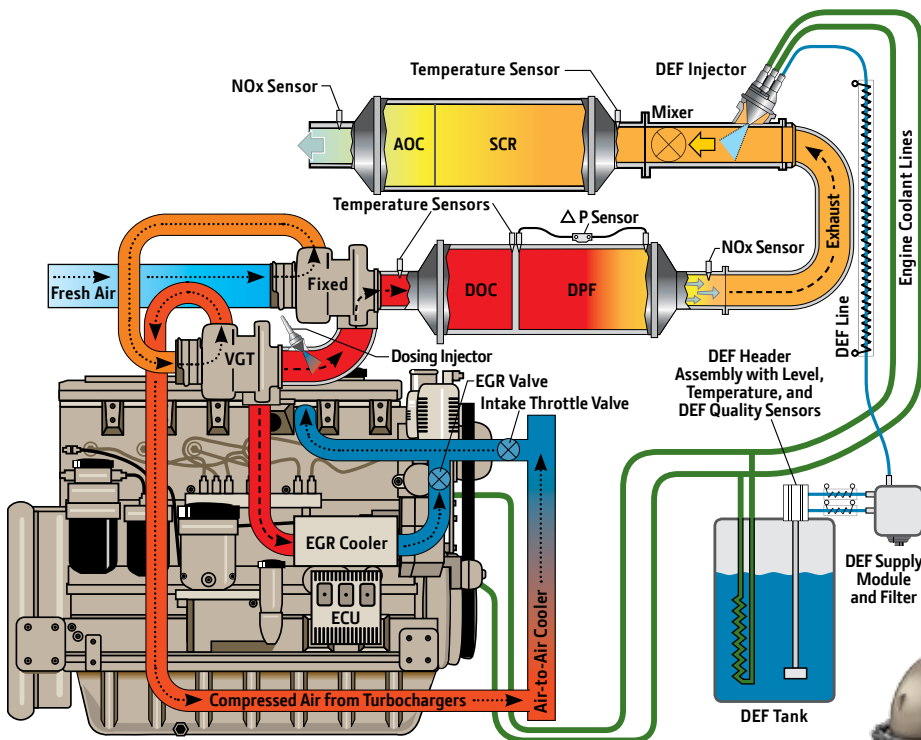
**Stage V ready.** PSS engines feature proven PowerTech Plus technology that includes a DOC/DPF and an SCR system designed specifically for off-highway applications.



#### PowerTech PSS Engines

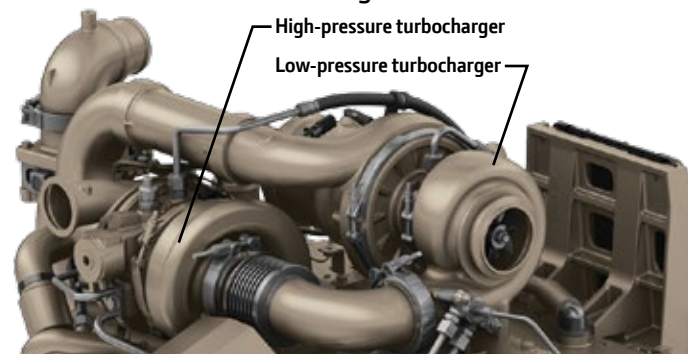
PowerTech PSS 4.5L	93 – 129 kW (125 – 173 hp)
PowerTech PSS 6.8L	168 – 224 kW (225 – 300 hp)
PowerTech PSS 9.0L	187 – 317 kW (250 – 425 hp)
PowerTech PSS 13.5L	309 – 448 kW (414 – 600 hp)

### PowerTech PSS 4 technology



PowerTech PSS 9.0L and 13.5L engine configuration shown.

#### Series turbochargers



# Aftertreatment operation and maintenance

## Exhaust filter cleaning

The John Deere exhaust filter is integrated into the engine design and electronics to provide a seamless operator experience. The engine control unit (ECU) and exhaust temperature management (ETM) system work together to regenerate, or clean, the exhaust filter. In most cases, filter cleaning does not impact machine operation or require operator involvement.

## Diesel fuel

The use of exhaust filters on engines requires the use of diesel fuel with a sulfur content of less than 15 ppm (ultra-low sulfur diesel or ULSD). Using diesel fuel with sulfur content higher than 15 ppm will contaminate the filter, causing faulty operation of the engine.

## Extended ash service interval

Ash, which is a byproduct of inorganic solids found in engine oils and fuel additives, will eventually accumulate in the DPF and reduce filter performance. Field experience has shown that John Deere DPFs in many applications can run as long as 15,000 hours before needing ash service. That's more than three times the minimum — meaning less hassle, less maintenance costs, and more uptime. If or when you eventually need ash service, there are several options for ash removal. See your John Deere engine distributor or dealer for details.

## Engine oil

The type of engine oil used can have a significant impact on the proper functioning and ash service life of exhaust filters. Ash will collect in the exhaust filter over time as a result of the combustion process. The use of oils meeting API CJ-4 and ACEA E9 standards, both with reduced trace metals content, are required in order to reduce ash accumulation and increase exhaust filter service life. John Deere has developed engine oils that are formulated to ensure optimum running performance and longevity. John Deere engine oils are 100 percent backward compatible and suitable for engines with and without emissions control devices. It is important to always follow the manufacturer's oil-type and service-interval recommendations.

## Diesel exhaust fluid (DEF)

DEF is used in SCR systems to remove NOx from engine exhaust. Our SCR system has been optimized for efficient operation in off-highway applications. It requires lower dosing rates of DEF, which means smaller tanks and easier integration into equipment for OEMs, and lower operating costs and fewer fill-ups for operators. A reliable way to ensure you are getting high-quality DEF is to purchase DEF through your John Deere dealer. DEF quality depends on storage and handling procedures. Be sure to follow recommended storage and usage guidelines.



Packaging will vary worldwide.

## Customer support

### A worldwide support network

The proven John Deere dealer network of over 4,000 service locations is prepared to fully support you and your engines. From around the globe, John Deere engine distributors and service dealers are your best source for engine service, knowledge, and parts. Our dealers keep John Deere maintenance and repair parts in stock to get you back to work quickly. Also, the John Deere worldwide parts distribution system has overnight delivery in most areas of the world.

To find the nearest John Deere engine distributor or service dealer, visit **JohnDeere.com/Dealer**.

### Genuine John Deere parts

There's a reason John Deere engine parts have such a strong reputation — quality. Look-alike parts may appear the same, but do they perform or last the same as genuine John Deere parts? It's just not worth the risk. Rely on the quality and support of genuine John Deere parts and service to keep your engine running like new.

With just a few clicks, get the parts you need through **JDParts.com**. Order from anywhere at any time using your phone, tablet, or laptop.

- Order online through your local dealer, 24/7/365
- Ship to your dealer or to your home as early as next day
- Search parts by model number, part number, or keyword
- Take advantage of local John Deere dealer pricing and inventory
- Get access to parts catalogs with product images

Fast. Convenient. Online.  
**JDParts.com**



### Qualified John Deere technicians

Only John Deere service technicians have the expertise to ensure top performance of your John Deere engine. Our technicians continuously participate in specialized training on John Deere engine technology, diagnostic tools, and service techniques. Trust your John Deere engine technician to have repairs completed quickly and accurately.

### Warranty you can count on

At John Deere, we stand behind every engine we build. That's why our warranty covers your John Deere engine for an unlimited number of hours during the first 12 months of use, or up to 2,000 hours in the first 24 months. Our warranty plans also protect genuine John Deere engine parts and accessories. Contact your John Deere engine distributor or service dealer for standard coverage details and extended warranty options.

Be sure to register your John Deere OEM engine at **JohnDeere.com/EngineWarranty** to take full advantage of the John Deere service and support network. Registering your engine not only prepares us to support your warranty needs but also allows us to keep you informed on new products, services, and money-saving offers from John Deere.





Uncompromising performance,  
when you need it most



## Questions about emissions technology?

Our Frequently Asked Questions page is a great place to start. For even more detailed information, contact your John Deere engine distributor or dealer.

[JohnDeere.com/Tier4FAQ](http://JohnDeere.com/Tier4FAQ)

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