

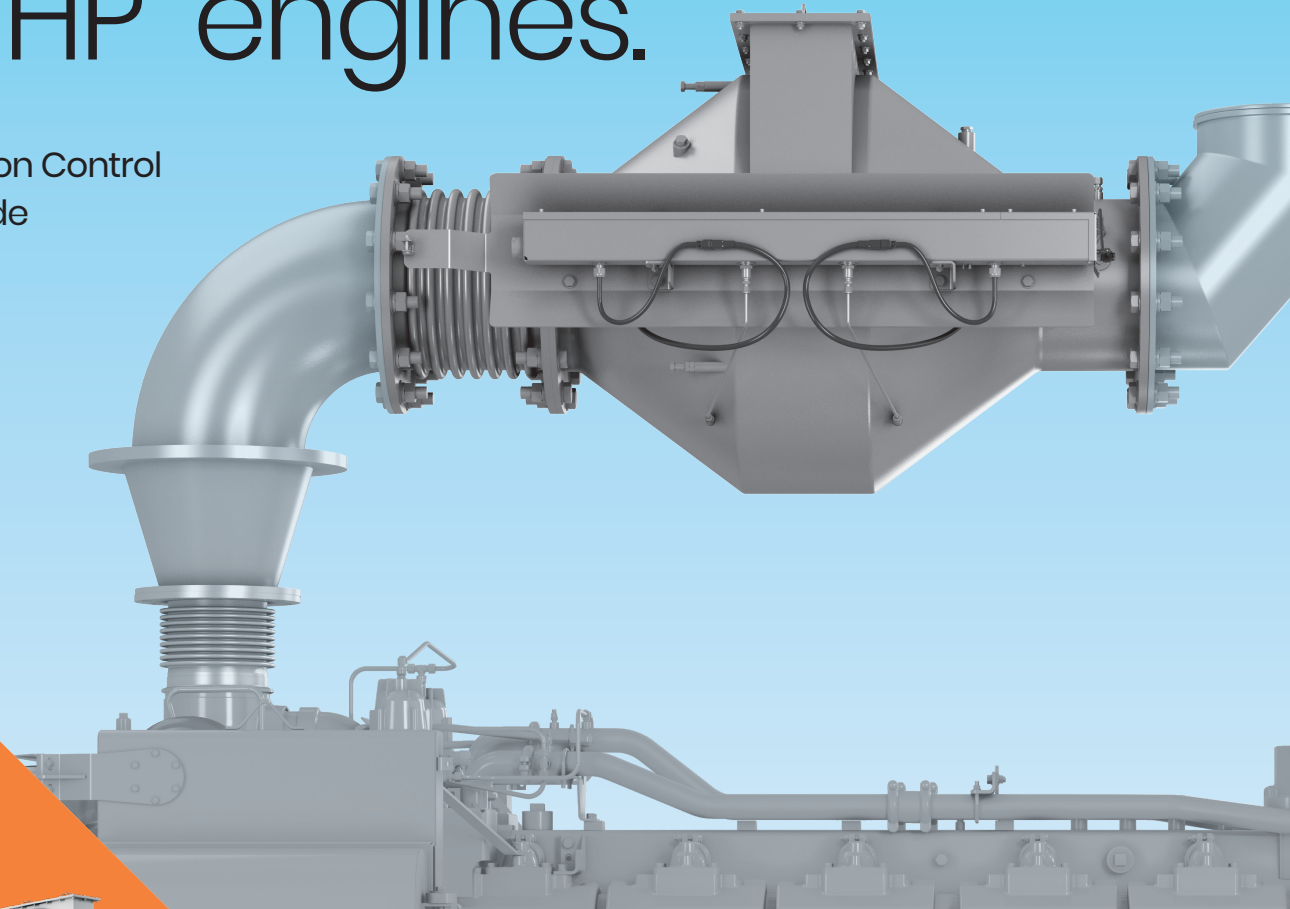
*Waukesha*



# The proven emissions upgrade solution for VHP\* engines.

emPact Emission Control System Upgrade

UPGRADE SOLUTIONS



W A U K E S H A



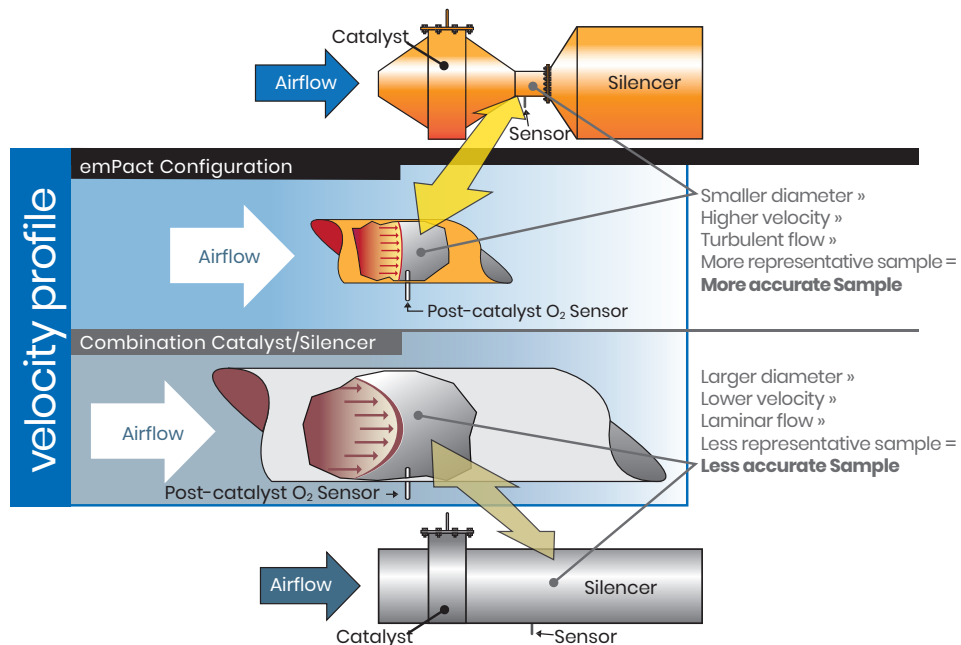
# emPact

## A single-source, retrofit solution to achieve and maintain lower emissions.

With the emPact emission control upgrade for Waukesha\* VHP\* gas engines, all the emissions-related components of an engine are combined into one comprehensive control system that can keep your emissions in compliance. The system uses a special oxygen (O<sub>2</sub>) sensor specifically designed for natural gas operation and is factory-designed, tested, and calibrated to optimize the interaction between components, resulting in excellent system performance.

The emPact system is comprised of an ESM\*2 controlled Waukesha VHP engine, 3-way catalyst and air/fuel ratio control. O<sub>2</sub> sensors read pre- and post-catalyst exhaust composition to automatically adjust the engine's air/fuel ratio, keeping the catalyst operating efficiently even as speed, load and ambient conditions change. The emPact emission control upgrade can be added to a majority of existing VHP 12 cylinder engines.

The simple, intuitive interface on the emPact display panel provides real-time engine operating parameters including faults, alarms and shutdowns. With just one button press on the HMI color display panel, the system can be adjusted richer or leaner to help ensure emissions remain in compliance even as the engine and catalyst age. The system also logs important data during operation, including catalyst temperature and pressure differential for simplified emissions reporting.



### Key Components

- 1 Stainless steel catalyst housing
- 2 Catalyst access door
- 3 Catalyst wiring harness
- 4 Heat shield
- 5 Full authority fuel valve
- 6 Post-catalyst oxygen sensor
- 7 Pre-catalyst pressure sensors
- 8 Post-catalyst pressure sensors
- 9 Pre-catalyst temperature sensor (behind heat shield)
- 10 Post-catalyst temperature sensor (behind heat shield)
- 11 HMI color display panel

The smaller cross section of emPact's separate catalyst and silencer design allows for more accurate post-catalyst O<sub>2</sub> measurement and quicker changes when needed.

# emPact means advantages

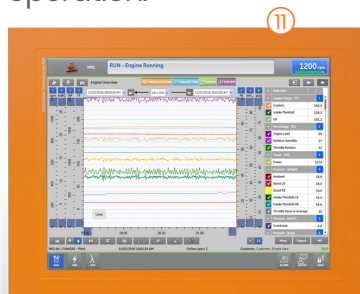
## Benefits

- Automatically adjusts to achieve and maintain emissions compliance
- Lower catalyst-out emissions mean more allowable hp per site without triggering tons-per-year limits such as Title V
- Standard configuration:  
0.15 g/bhp-hr NOx and 0.30 g/bhp-hr CO
- Differential pressure and temperature sensors monitor the catalyst to decrease potential for damage and increase catalyst life

## Time and labor savings

Setup after installation takes less than an hour. The HMI color display panel takes operators through a step-by-step startup process, and the default settings loaded at the factory generally do not need to be changed on-site.

No speed/load set points are needed during setup, as the system adjusts itself automatically during operation.



## Compliance across a wide range

While default settings are programmed in from the factory, users have the ability to adjust richer or leaner with the buttons on the emPact display panel, helping to maintain compliance as the engine ages. This capability helps to ensure optimal interaction between the engine, air/fuel ratio control, and 3-way catalyst across the following range, not just at a single operating point:

emission  
compliance  
range

Speed: 900–1200 RPM

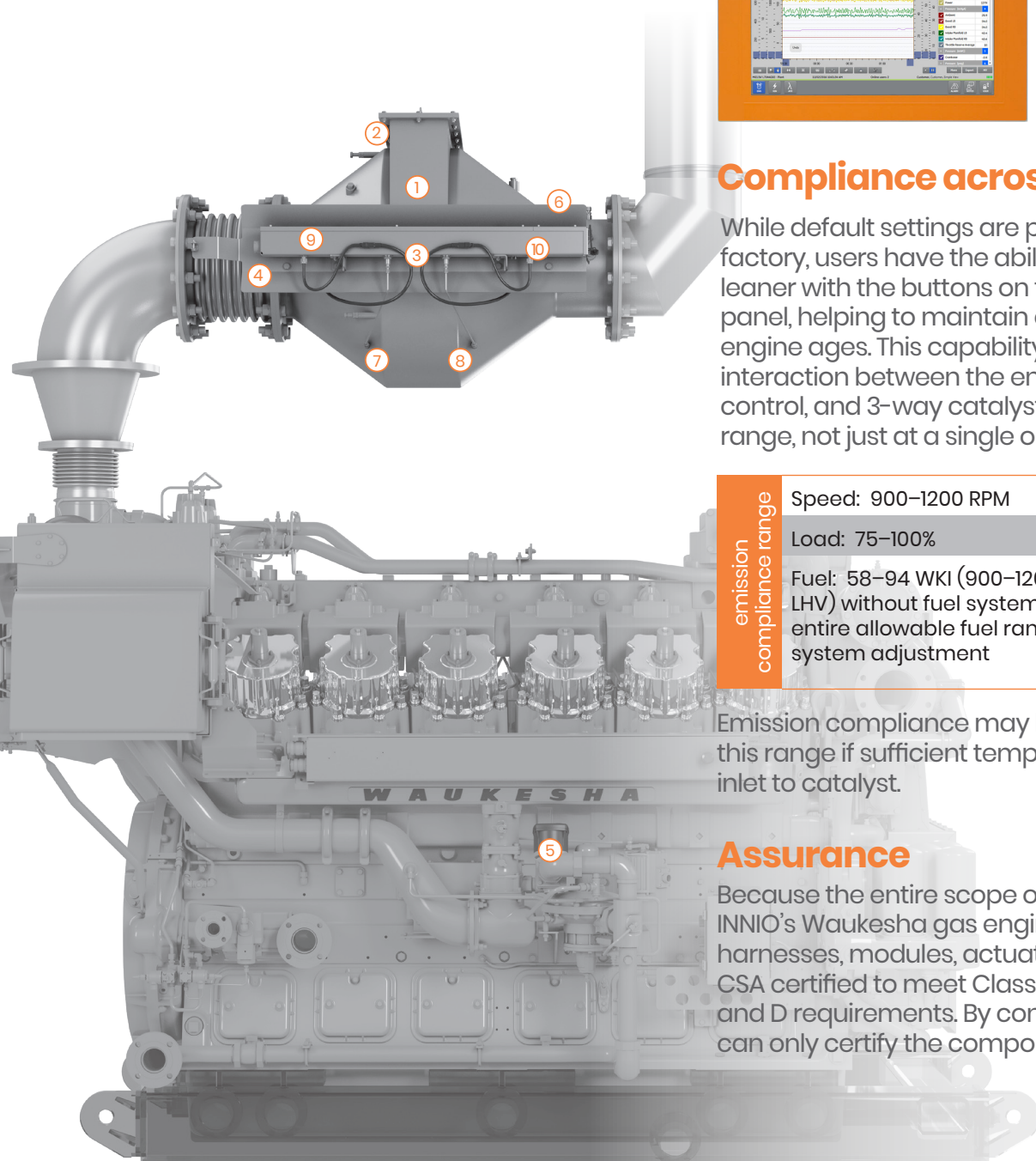
Load: 75–100%

Fuel: 58–94 WKI (900–1200 Btu/ft<sup>3</sup> LHV) without fuel system adjustment; entire allowable fuel range with fuel system adjustment

Emission compliance may be available outside this range if sufficient temperature is present at inlet to catalyst.

## Assurance

Because the entire scope of supply comes from INNIO's Waukesha gas engines, the wiring, harnesses, modules, actuators and fuel valve are CSA certified to meet Class 1, Division 2, Group A, B, C and D requirements. By contrast, non-OEM suppliers can only certify the components they provide.



## Applicable Units

### Stages

I II III

#### L7044GSI, L7042GSI S4, L5794GSI

engines with ESM2	X		
engines without ESM2		X	

#### L5794LT, L5774LT, L5790G/GL/GSI, F2895G/GL/GSI and F3521G/GL/GSI

engines with ESM			X
engines without ESM			X

## Scope of Upgrade Offerings:

### Stage I – emPact

- emPact catalyst stainless steel housing and replaceable 3 year elements
- post catalyst O<sub>2</sub> sensor, pre/post temperature and pressure sensors
- 25 foot (7.6 M) catalyst sensor harness
- 1 stainless steel flexible connection (bellow)
- Inlet and outlet exhaust gaskets and flange bolt hardware

### Stage II – emPact, ESM2

all components in Stage I, plus:

- Fuel control valves and (if applicable) regulators
- Regulators
- Upgraded ESM2 harnesses with serviceable harness connectors

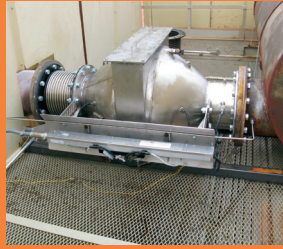
### Stage III – emPact, AFR2, ESM, GSI or S4 upgrade

all components in Stage II, plus:

- Series 4 GSI SPARC cylinder heads (or S4 GSI rebuild kits)
- Series 4 oil header (if needed)
- Piston, Ring, Liner (PRL) kit
- Turbocharger, wastegate, intercooler, intake manifold

*Note: Each stage includes comprehensive scope, each engine may or may not need specified components*

# emPact in action

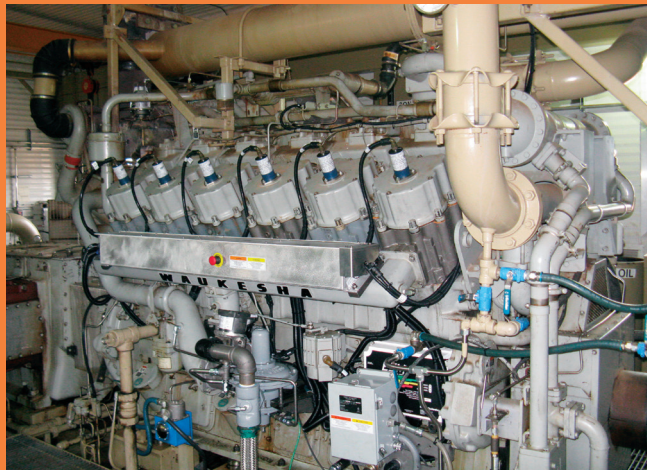


INNIO installed emPact on one of WBI Energy's Waukesha L7044GSI engines at the Baker Booster station in Montana. Performance has exceeded expectations. Seven weeks after emPact was operational, it was still maintaining emissions below 0.10 g/bhp-hr for both NO<sub>x</sub> and CO—without manual adjustment—even as site conditions changed.

Quarterly source testing performed ten weeks after installation showed no change in emission levels.

Says WBI Maintenance Supervisor David Wedel, "emPact uses an O<sub>2</sub> sensor that is specifically set up for natural gas. That is a huge strength. It helps us get the right mixture to the catalyst to help it convert. It requires less babysitting to meet emissions and holds the engine on-target better, which is an obvious need in meeting your air/fuel emission standards. emPact adjusts through varying conditions—both load and ambient—so it's certainly much better than what we've had in the past."

The emPact emission control system is one trusted solution, from one trusted source.



*The emPact Emission Control Upgrade installed in the field at WBI Energy's Baker Booster Station in Montana.*

INNIO\* is a leading solutions provider of gas engines, power equipment, a digital platform and related services for power generation and gas compression at or near the point of use. With our Jenbacher\* and Waukesha\* product brands, INNIO pushes beyond the possible and looks boldly toward tomorrow. Our diverse portfolio of reliable, economical and sustainable industrial gas engines generates 200 kW to 10 MW of power for numerous industries globally. We can provide life cycle support to the more than 48,000 delivered gas engines worldwide. And, backed by our service network in more than 100 countries, INNIO connects with you locally for rapid response to your service needs. Headquartered in Jenbach, Austria, the business also has primary operations in Welland, Ontario, Canada, and Waukesha, Wisconsin, US.

Find your local support online: [www.innio.com/en/company/providers](http://www.innio.com/en/company/providers)

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