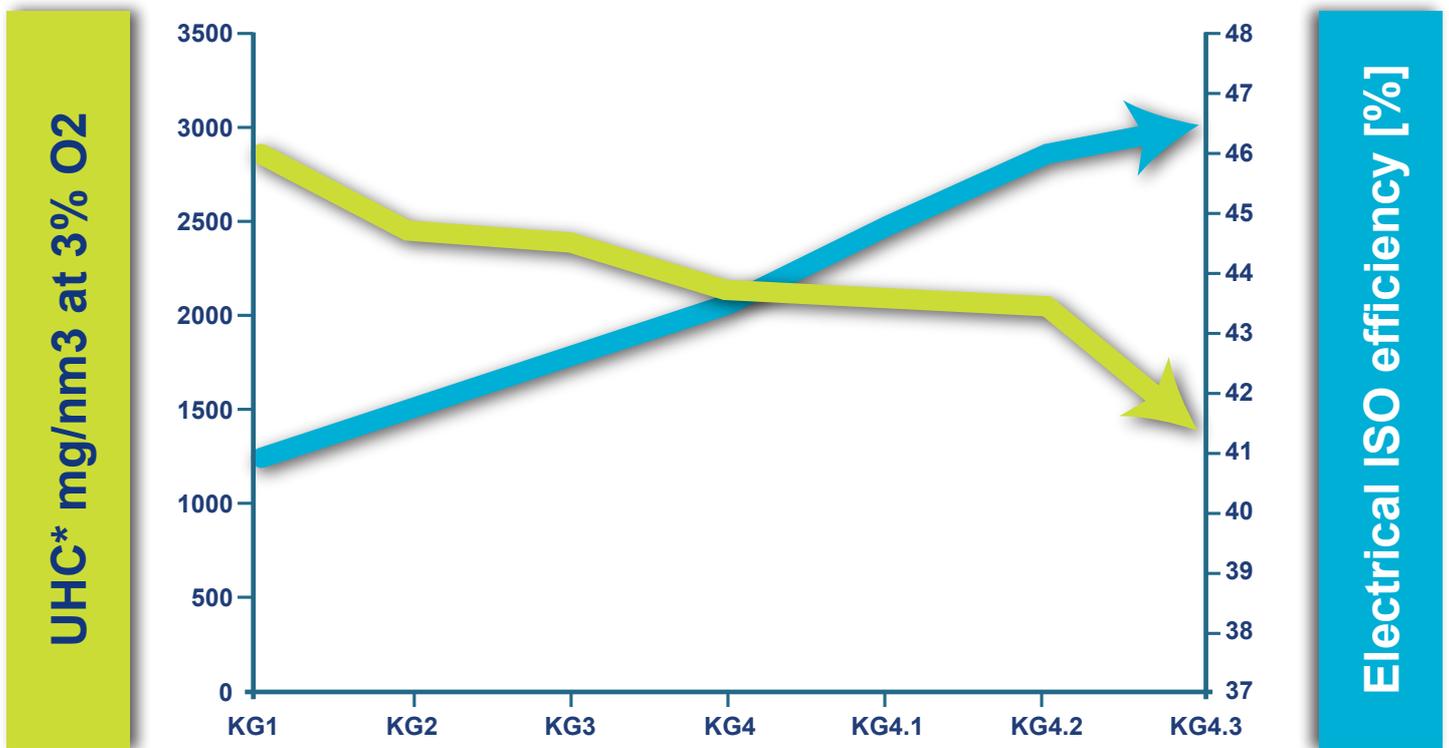


## **Methane slip reduction**

Reduced emissions and increased efficiency





\*Unburned Hydrocarbons

**Protect the environment**

**Revitalise your equipment**

Rolls-Royce medium speed engines are built to deliver decades of reliable power. For proof, look no further than the dependable K gas engine. With hundreds having already surpassed 10-25 years of reliable operation across the globe, these pioneering engines still have plenty of life left. And thanks to our latest methane slip reduction upgrade, they can deliver improved efficiency and full compliance with modern emissions standards as well.

Rolls-Royce is continuously working to decrease emissions and increase fuel efficiency by reducing methane slip and optimizing fuel combustion.

On land and at sea, as exhaust emissions become increasingly stringent, natural gas engines remain one of the most environmentally friendly options available thanks to their low NOx, sulphur oxide and particulate emissions. But even natural gas engines can emit greenhouse gases if natural gas escapes into the atmosphere due to incomplete combustion (methane slip).

The K-engine upgrade package builds upon the same cutting edge technologies used in modern Rolls-Royce medium speed engines. These technologies have helped set Rolls-Royce medium speed engines apart in terms of emissions and efficiency, earning them a reputation as the preferred power system in the world's most stringent emissions controlled marine areas.

So if you're thinking about decommissioning your trusted K-engine in order to keep your business moving forward, think again. You don't have to invest in a new engine to become emissions compliant and cost effective. With a methane slip reduction upgrade you'll get all the benefits of the latest Rolls-Royce research and development at a fraction of the price of new equipment, and you'll avoid the hassle of

**Improve return on investment**

**Prepare for a greener future**

## Reset your engine at its next scheduled service

redesigning your power plant's auxiliary system. Plus, your K-engine will achieve performance levels competitive with current engines available on the market, and its lifetime will be significantly extended.

In fact, by upgrading to the latest technology, your K-engine will achieve unburned hydrocarbon (UHC) reductions up to 30% and up to 3% improvements in overall efficiency. Together, that means fuel consumption reductions up to 7%, depending on your current engine configuration.

Your engine's expected performance increase depends on its general condition and current configuration at the time of the upgrade, which can vary due to the wide range of K-engine configurations that have been produced throughout the years. For that same reason, the replacement parts needed to complete the upgrade will vary based on the original engine configuration.

Typical replacement parts include piston rings, carbon cutting rings, cylinder liners (improved cooling), pistons, connecting rods (for higher peak pressure), camshaft (to reduce valve overlap), cylinder heads, turbocharger and gas admission valves.

So, what's in it for you?

- Reduced methane emissions
- Reduced greenhouse gas (GHG) footprint
- Increased efficiency
- Reduced fuel consumption
- Reduced OPEX

Given your engine's long service history, many of the parts that require upgrading are likely due for replacement anyway. By performing the upgrade during your next service event, your total incremental investment may be only slightly higher than the cost of the services that were already scheduled.

Although it is not required to reduce methane slip, we also recommend installing continuous cylinder pressure monitoring (CPM) for optimal engine performance and continuous self-tuning and combustion control, as well as splash oil.

## Consider the potential savings....

### Upgrade of typical KV18 G3

Estimated el. efficiency improvement	3%
Assumed gas reduction	6.6%
Gas consumption before upgrade	800 nm <sup>3</sup> /h
Gas consumption after upgrade	747 nm <sup>3</sup> /h
Assumed gas price	€ 0.29/nm <sup>3</sup>
Yearly running hours	7.000
Fuel costs before upgrade	€ 1.392.000
Fuel costs after upgrade	€ 1.299.780

= yearly fuel savings

**€ 107.590**

per engine



**Rolls-Royce**

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