



**BUILT TO**  
**SUSTAIN**

**BAUDOQUIN GREEN SOLUTIONS**





# Introduction

As a leading provider of power solutions, we understand our responsibility to the environment and future generations.

## Meeting strict emission standards

To achieve sustainability, we comply with Stage V NRMM and 44th BImSchV emission regulations.

Our engines meet the strictest/stringent regulatory standards, ensuring that emissions are reduced without sacrificing performance, helping us set new standards for environmental responsibility in our business.

## Biogas and LPG compatibility: alternative fuels for Gas Engines

Biogas and Liquefied Petroleum Gas (LPG) provide alternatives to gas engines, expanding our sustainable energy portfolio. Using biodegradable garbage and organic materials, we can create clean-burning fuels that contribute to a circular economy.

Our biogas and LPG-powered gas engines provide dependable energy solutions while minimizing our environmental impact.

## HVO compliance for cleaner diesel engine

Hydrotreated Vegetable Oil (HVO) is at the heart of our commitment to sustainable energy. HVO, a renewable diesel substitute, significantly reduces greenhouse gas emissions and air pollution. By leveraging the potential of organic materials, we are not only promoting cleaner energy but also lowering our dependency on traditional fossil fuels.

## Mastering New Energy: fuel cells for a cleaner future

Fuel cells enable effective energy conversion, while ESS offers flexible, energy savings and supply security. We are dedicated to a sustainable energy landscape where these technologies drive progress, and we are using our skills to shape a greener tomorrow.

# BAUDOQUIN GREEN SOLUTIONS





## Meeting strict emission standards

**We are firmly committed to achieving the highest emissions reduction certifications.**

We meet and exceed standards such as STAGE IIIA, Stage V NRMM, and the 44<sup>th</sup> BImSchV, all without compromising performance, fuel efficiency, and design innovation.

Our relentless pursuit of excellence ensures that our products not only meet environmental requirements but also deliver optimum performance and cost efficiency throughout their lifecycle.

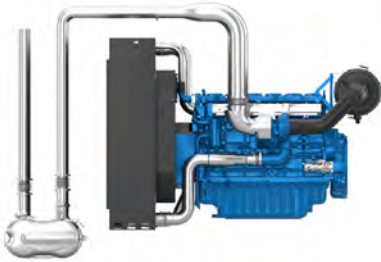
# 6M33 & 12M33

## Our First Step Towards Stage V Compliance

Baudouin is engaged to meet Stage V requirements.

Innovative technologies, including exhaust after-treatment systems (EATS) with selective catalytic reduction (SCR) & dioxide catalyst (DOC), ensure compliance across a wide power range.

Tailored for rental and mobile applications, **the 6M33 and 12M33 engines deliver optimal performance** from 500 kW<sub>e</sub> to 1MWe, making them ideal for high-usage scenarios. These engines are compliant with Stage V NRMM regulations.



### 6M33

Diesel Engine  
Stage V NRMM  
500 kW<sub>e</sub>

91% NO<sub>x</sub> reduction

78% PM reduction

98% CO reduction



### 12M33

Diesel Engine  
Stage V NRMM  
1 MWe

92% NO<sub>x</sub> reduction

76% PM reduction

99% CO reduction

Thanks to their aftertreatment solutions system, including a Selective Catalytic Reduction (SCR) system and Diesel Oxidation Catalyst (DOC), engines spanning from 500 kW<sub>e</sub> to 1 MWe, **6M33 and 12M33 achieve remarkable reductions in emissions.**

## 4M12: Industrial Stage V

Introducing our Stage V Industrial Engines. Built to meet the rigorous Stage V emissions standards, our industrial engines are designed to deliver superior performance, efficiency, and reliability.



4M12 is our new high-end light engine able to cover a wide spectrum of industrial.

Available in suitable Stage V thanks to its aftertreatment system:  
SCR+DOC+DPF  
Reducing up to 90% emissions



# 5 Advantages of Baudouin's Stage V NRMM Engines

In addition to emission reduction, these engines offer several benefits, enhancing operational efficiency and minimizing costs.



## Reliability

Baudouin's Stage V engines are engineered to minimize downtime, a critical factor in off-road applications. By employing advanced technology, such as efficient DOC & SCR, Baudouin reduces the need for active regeneration, ensuring continuous operation of your machinery.



## Increased Fuel Efficiency

Our Stage V engine range boasts up to a 5% reduction in fuel consumption compared to previous models, significantly impacting the total cost of ownership. Not only does this translate to cost savings for operators, but it also aligns with environmental sustainability goals by reducing CO2 emissions.



## Seamless Integration

Baudouin ensures a hassle-free transition by designing Stage V engines to fit seamlessly into existing machinery footprints. With our after-treatment system, installation becomes straightforward and flexible, eliminating the need for extensive redesigns.



## Tailored Solutions for Diverse Applications

Recognizing the varied needs of different industries, Baudouin offers a range of engines optimized for specific segments and environments. Whether it's rental, forestry, agriculture, mining, material handling, or construction, our engines can be customized to meet the unique demands of each application.



## Simplified Maintenance

We always prioritize reliability and uptime by implementing enhanced predictive maintenance strategies and extended service intervals.

For instance, our Stage V engines feature doubled oil change service intervals, from 500 to 1,000 hours, streamlining maintenance routines and minimizing operational disruptions.



## Stage IIIA & 44<sup>th</sup> BlmSchV Compliance

At Baudouin, environmental sustainability is a continuous process.

We are dedicated to continually improving our green initiatives. Our most recent focus has been on making sure the 4M12, 6M12 and 6M21 engines fulfill the strict requirements needed to obtain Stage IIIA certification and 44<sup>th</sup> BlmSchV emission regulation: TA Luft regulation.

This highlights the remarkable engineering and design skills of our engines, which reach low emissions levels by creative engineering instead of depending on extra emission-reducing technologies.



**4M12**



**6M12**



**6M21**

Our engines have successfully undergone rigorous testing in accordance with the 44<sup>th</sup> BlmSchV compliance standards, yielding positive results.



## HVO Compatibility

# Enhancing Engine Performance & Sustainability

All of our M series engines are compatible with Hydrotreated Vegetable Oil (HVO), a renewable fuel source. **HVO offers several advantages for both engine performance and environmental impact.**

In all HVO projects, please contact Baudouin applications team to evaluate the specific HVO to be used in each project as there is a possibility for some engines power derate due to low fuel density.

### 3 advantages of HVO:



#### Meeting Rigorous Emissions Standards

In order to guarantee optimal performance compatibility with HVO, we have subjected our engines to comprehensive testing within our factory.

Our steadfast commitment to testing ensures that our engines seamlessly integrate with HVO, all the while upholding peak performance and reliability.



#### Lower CO2 Emissions

Due to the HVO production process, the utilization of HVO has the potential to slash the CO2 carbon footprint by as much as 90%, encompassing the entire

production cycle, as outlined in REDII calculations. This presents a sustainable remedy, actively aiding in the efforts to alleviate the impacts of climate change.



#### A Sustainable Force Across Diverse Applications

HVO compatibility with Baudouin engines reverberates across various sectors, reinforcing sustainability in each application.



## Agriculture

### Nurturing Sustainability on Farms

In agriculture, where engines power irrigation systems and machinery, HVO-compatible Baudouin engines present a sustainable solution. Reduced NO<sub>x</sub> and CO<sub>2</sub> emissions promote cleaner air, while the extended engine life ensures that farming equipment remains efficient and dependable for years to come.

## Power Generation

### Reliability Meets Environmental Responsibility

Baudouin engines have long been synonymous with reliability in the power generation industry. Now, with HVO compatibility, they exemplify environmental responsibility too. Power plants, especially those in remote areas, can confidently rely on HVO as a renewable fuel source, reducing their carbon footprint without compromising on energy supply.



## Data Centers

### Sustaining the Digital Age

As data centers become increasingly vital, the demand for reliable power sources soars. HVO-compatible Baudouin engines emerge as ideal choices for data center applications. They offer energy efficiency, emissions reduction, and unwavering reliability, ensuring data centers remain operational during grid outages while actively contributing to sustainability targets.



## Gas engines: **Biogas & LPG**

**Our Powerkit gas engines offer several advantages:  
clean, cost-effective, and readily available fuel.**

Our engine mechanical efficiency is impressive, up to 38% for the low kVA range and between 41-43% for the HHP 16M33 and 12M55 engines.

Our lean burn technology gives lower NOx emissions too (up to 4 times less than a diesel engine), an important factor in today's environmentally conscious world.

PSI rich burn technology allows LPG compatibility enabling our customers to warrant their supply security.

Furthermore, our engines can reuse gas created by industrial or agricultural processes. Building on these eco-friendly benefits, our gas engines (Baudouin & PSI) enable LPG and biogas use.

These fuels offer vital cleaner and greener alternatives to traditional fossil fuels, meeting the market's demand for sustainable solutions.

By doing this, we ensure compliance with legal requirements and satisfy the growing demand for environmentally friendly power generation solutions.

**In addition, all the natural gas engines have been designed for robust performance, even when drawing from fuel sources of variable quality.** Our full gas engines range is available on our website.

Onshore oil and gas, co-generation projects (industrial greenhouses and waste treatment plants) and bottling plants, are just some of the applications ideally suited to the PowerKit Gas range.

As fuel storage is not always required onsite, they are also the ideal solution for applications such as supermarkets and industrial plants that can connect directly to a mains gas supply. All are an excellent partner of renewable energy infrastructure, as their operating reliability can balance the intermittency of these sources of power generation.

## Gas engines : a sustainable answer to back up Data Center generators

### Rich Burn Gas technology VS Diesel



Comparable CAPEX



Continuous operation as long as NG is available



Dual Fuel Capability Ng & LPG



LPG price stability



Lower CO2 -NOx-SOx emissions



Equivalent Fast start time  
NFPA 110 Regulation



Homologous load acceptance response



Compatible with new sustainable fuels



## ESS Pack & fuel cells, Energy Solutions for Tomorrow

Being part of Weichai group grants us access to cutting-edge technologies that shape the future of power generation.



### Energy Storage Systems (ESS)

**ESS offer a multitude of practical applications, enhancing efficiency and reliability across various sectors:**

#### Peak Shaving

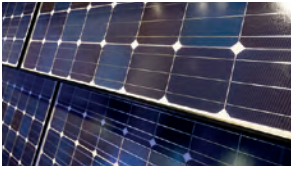
With ESS, users can strategically manage their electricity consumption by drawing power from batteries during high-cost daytime hours and recharging during low-cost nighttime periods. This practice, known as peak shaving, optimizes energy usage and minimizes electricity expenses.

#### Load Leveling

ESS plays a crucial role in stabilizing the electrical grid by smoothing out fluctuations in demand. By charging during periods of low demand and discharging during peak demand times, ESS helps to maintain a consistent and reliable power supply, alleviating stress on power generation facilities.

#### Renewables Integration

ESS seamlessly integrates with renewable energy sources such as solar panels and wind turbines, addressing the intermittent nature of these technologies. By storing excess energy generated during peak production periods, ESS ensures uninterrupted power supply even when renewable sources are not actively generating electricity.



## Fuel Cells

**Fuel cells are transforming power generation engines with their efficient and ecologically beneficial technology.**

Unlike traditional combustion engines, fuel cells generate energy via electrochemical reactions, producing only water vapor and heat as byproducts. This makes them appropriate for a wide range of applications, such as large-scale power facilities.

Fuel cells outperform traditional engines in terms of energy efficiency and pollution, pointing to a more sustainable energy future. With continued developments, fuel cells are positioned to play an important part in meeting the world's energy demands.

## Bipolar Plate

Our precision-engineered bipolar plates, weighing only 50 grams and sized at 422\*102 (8) flat, enhance conductivity and durability, ensuring optimal performance and longevity.

## Membrane Electrode

Designed for efficiency and reliability, the membrane electrode weighs a mere 10 grams and measures 422\*102 (4), facilitating efficient ion transport for enhanced fuel cell operation.

## Performance Metrics

### Overall Efficiency

Fuel cell technology delivers exceptional overall efficiency, maximizing energy conversion and minimizing waste for sustainable power generation.

### Reliability

Built to withstand rigorous operating conditions, our fuel cell technology ensures consistent performance and reliability, guaranteeing an uninterrupted power supply.



Our vision for the company's future  
goes beyond our legacy.  
We are committed to providing  
a diverse portfolio of clean, efficient,  
innovative power solutions.  
The future is now, and we are ready.

**Fabrizio Mozzi**  
President