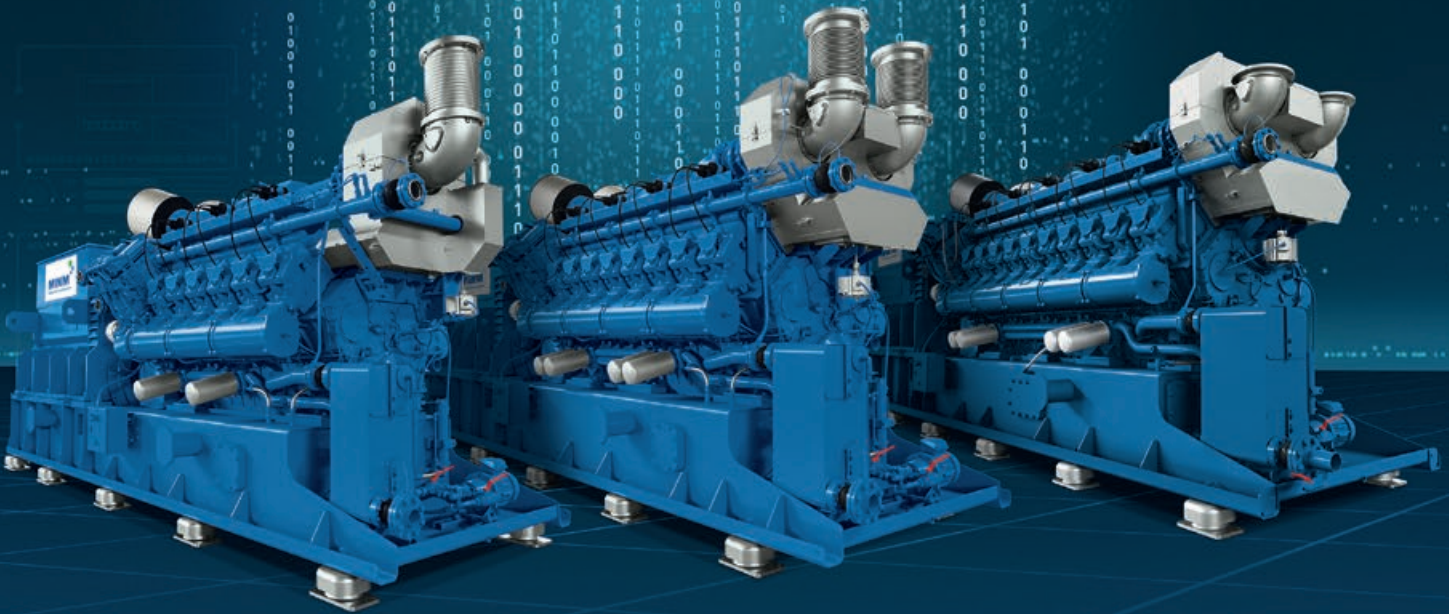


MWM DIGITAL POWER

www.mwm.net

Discover
the new
models



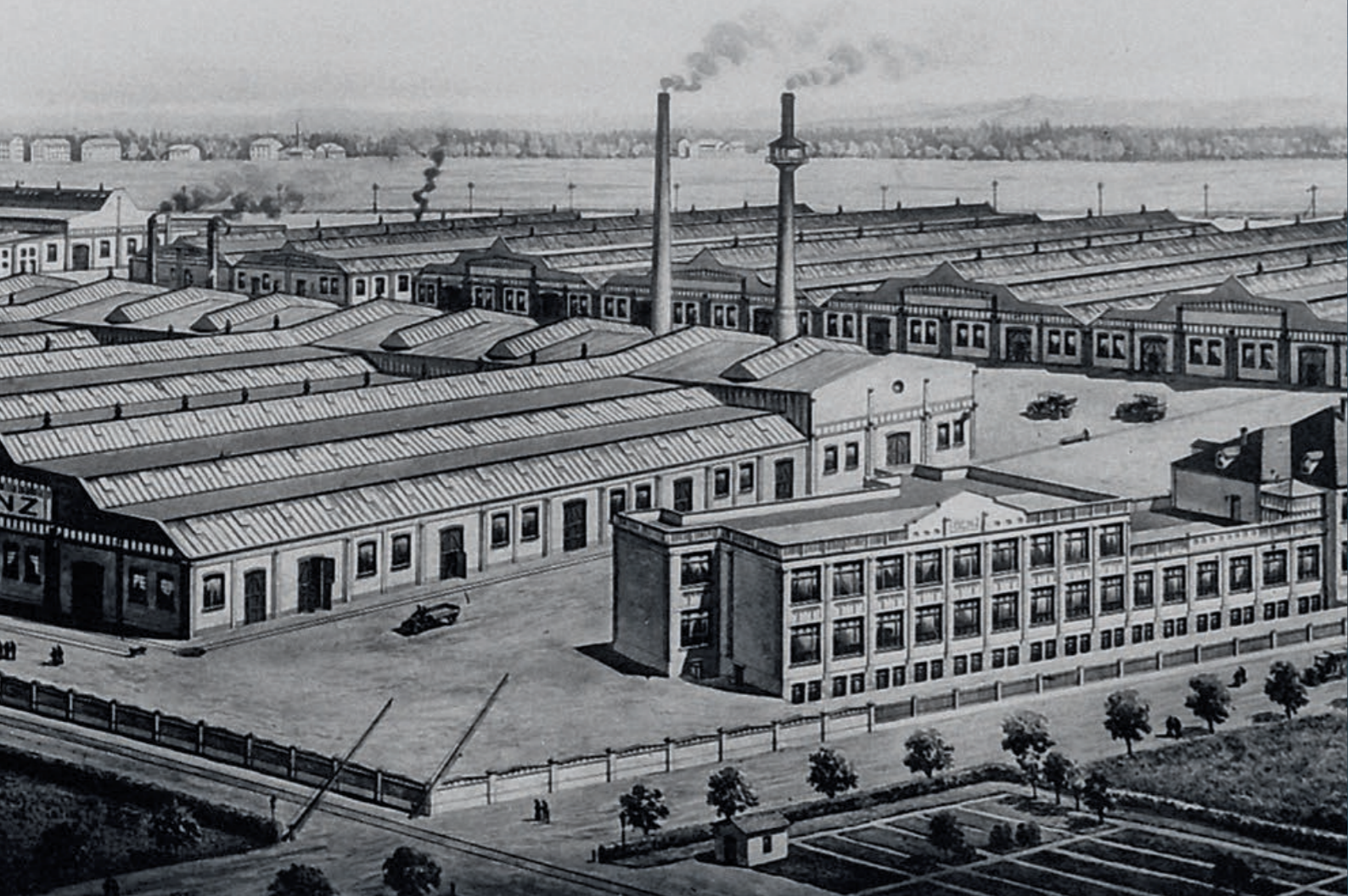
TCG3020

— The all-round talent. —

MWM
Energy. Efficiency. Environment.

150 years of experience for your success.

With MWM, you benefit from 150 years of experience in gas engine technology and energy generation. Since 2011, we have been part of the network of Caterpillar Inc., gaining access to international expertise and resources on the basis of which we can develop individual turnkey solutions for you. Draw on the security and experience of a specialist that has installed thousands of highly efficient and reliable plants around the globe.



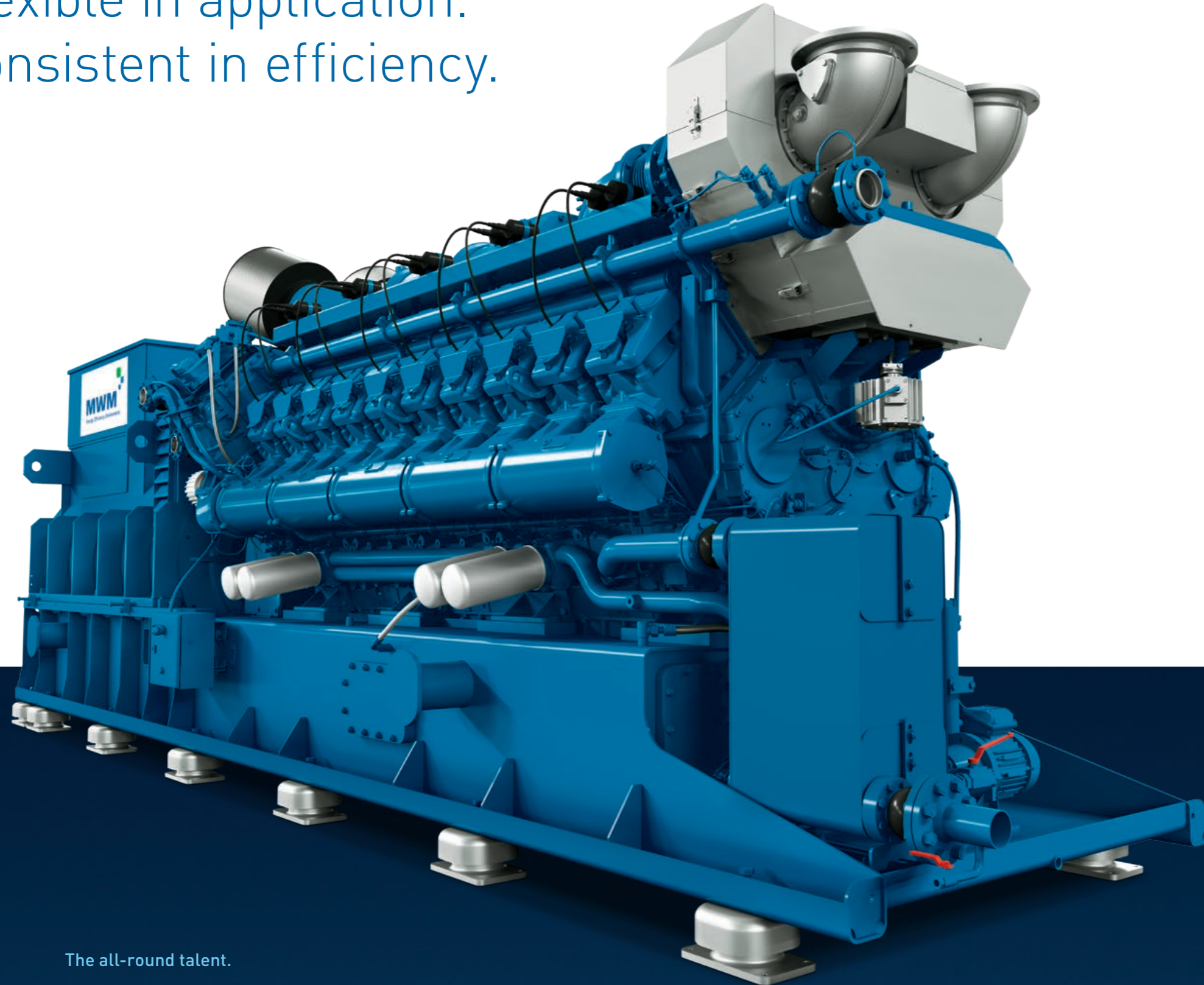
The future of efficiency is digital.

With MWM Digital Power, the energy market enters a new age. State-of-the-art components combined with smart and secure data analysis ensure improved maintenance, efficiency and optimized capacity utilization of your plants.

The MWM TCG 3020 gas engines are more than merely the next iteration of MWM's proven gas gensets. The new gas engines and turnkey solutions represent an entirely new development – perfectly tailored to the challenges of Industry 4.0 and the changed framework conditions of a dynamic energy market in the age of global value chains.



Flexible in application. Consistent in efficiency.



The all-round talent.

State-of-the-art components providing more power: the compact design, a focus on a wide range of applications and high efficiency values make sure of that. Controlled by the smart and secure TPEM (Total Plant & Energy Management), the new TCG 3020 series offers highest profitability and reliability.

MWM DIGITALPOWER

■ High Profitability

- ✓ High efficiency values
- ✓ Low oil consumption 0.15 g/kWh
- ✓ Up to 80,000 oh until major overhaul results in high profitability for the customer

■ High Reliability

- ✓ Reliable and proven core engine
- ✓ Upgraded with state of the art technologies
- ✓ Extended maintenance intervals

■ High Efficiency

- ✓ Increased electrical efficiency – up to 45% (NG) and up to 43.6% (BG)
- ✓ Increased electrical output up to 2,300 kW_{el}
- ✓ Optimal combination of efficiency and reliability

■ Varieties of Gases and Applications

- ✓ Available for different applications like natural gas, biogas, landfill and propane gas operation
- ✓ Optimized variants for high efficiency, flexibility and biogas

■ New Engine and Plant Control System TPEM

- ✓ Hardware and Software for the engine and holistic plant control
- ✓ Enables full power capability of the genset with maximum reliability, availability, performance and usability

■ High Power Density

- ✓ Compact design: The TCG 3020 Series delivers up to 18% more power output at the same size as its predecessor

Benefit from the TCG 3020!

Contact us: www.mwm.net or info@mwm.net

Superior operation and efficiency.



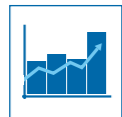
Reduced operating costs

Due to high efficiency, low oil consumption and low service costs



High Reliability

Providing up to 80,000 oh until major overhaul due to improved reliability



Increased performance

More power with higher efficiency



Tailor-made for your application

Optimized variants for all kind of gases and boundary conditions

One genset, various applications

Combined Heat and Power (CHP)



Utilities
District heating
Industrial
Hospitals
Airports
Greenhouses

Electrical Power



Energy services
Independent power producers
Utilities
Industrial

Biogas



Agriculture
Food industry
Sewage
Landfill

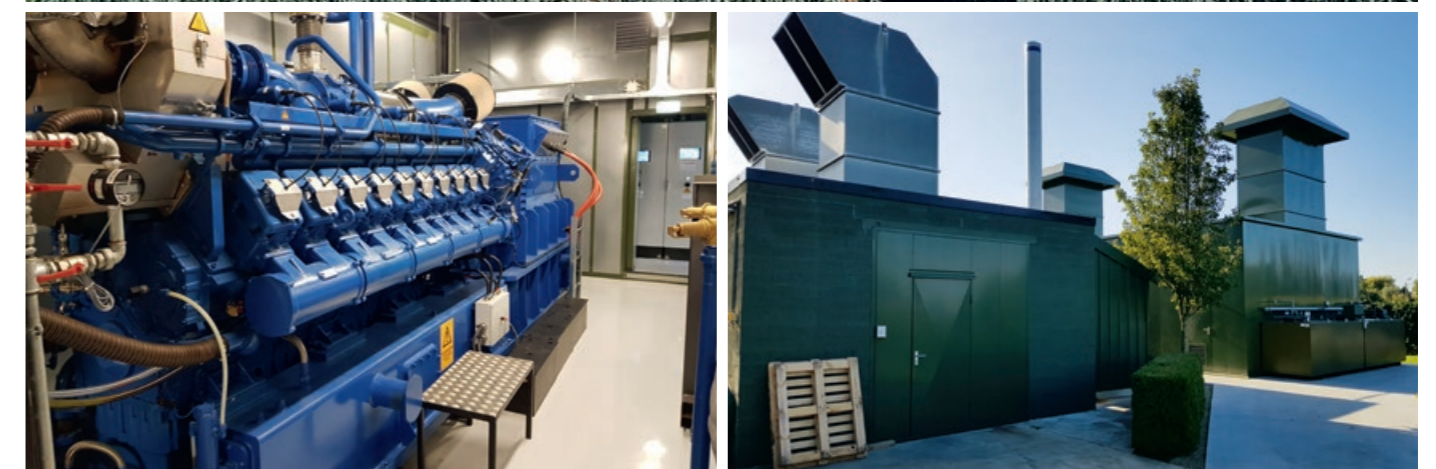
The TCG 3020: Successful deployment.

Krikato BVBA, Belgium

The TCG 3020 V20 is the second MWM genset for tomato producer Krikato BVBA in Belgium. In 2012, they decided to use the MWM brand – at that time, a TCG 2020 V12 – for the construction of a CHP. They once again selected an MWM genset for the extension of their greenhouse. Since June 2020, the two gensets together have been generating 3.5 MW of electrical and 4.2 MW of thermal power and reliably supply the greenhouse, which has been expanded from 1.2 to 1.7 hectares, with electricity and heat.

By using SCR catalysts, the carbon dioxide in the exhaust gas released by the natural gas-powered MWM gas gensets can be used for organic carbon fertilization of the plants after proper treatment, which has a positive effect on growth and yield.

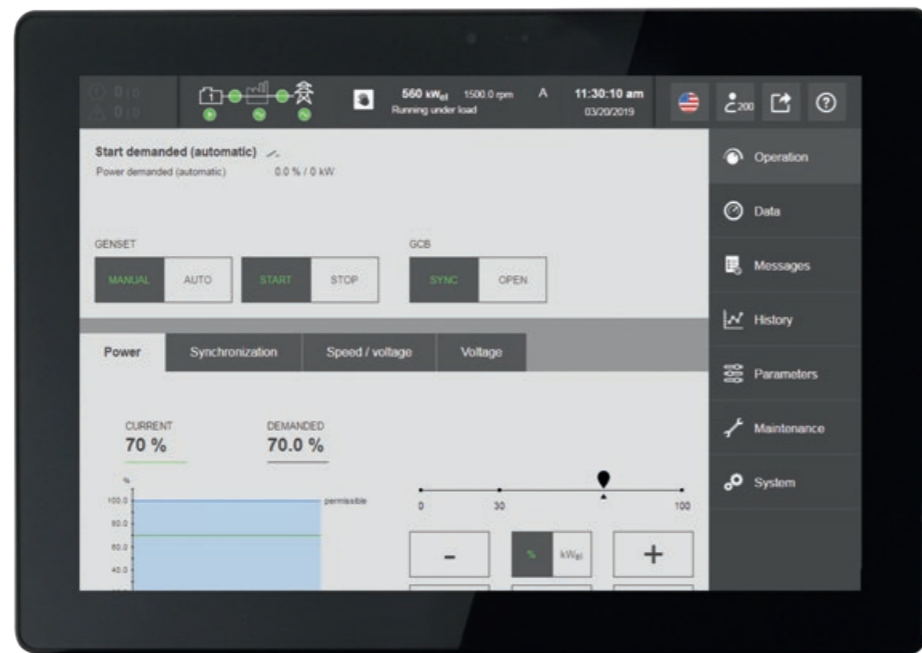
1x MWM TCG 2020 V12, 1x MWM TCG 3020 V20 | Go-live: 2012 and June 2020



TPEM. The door to the digital age.

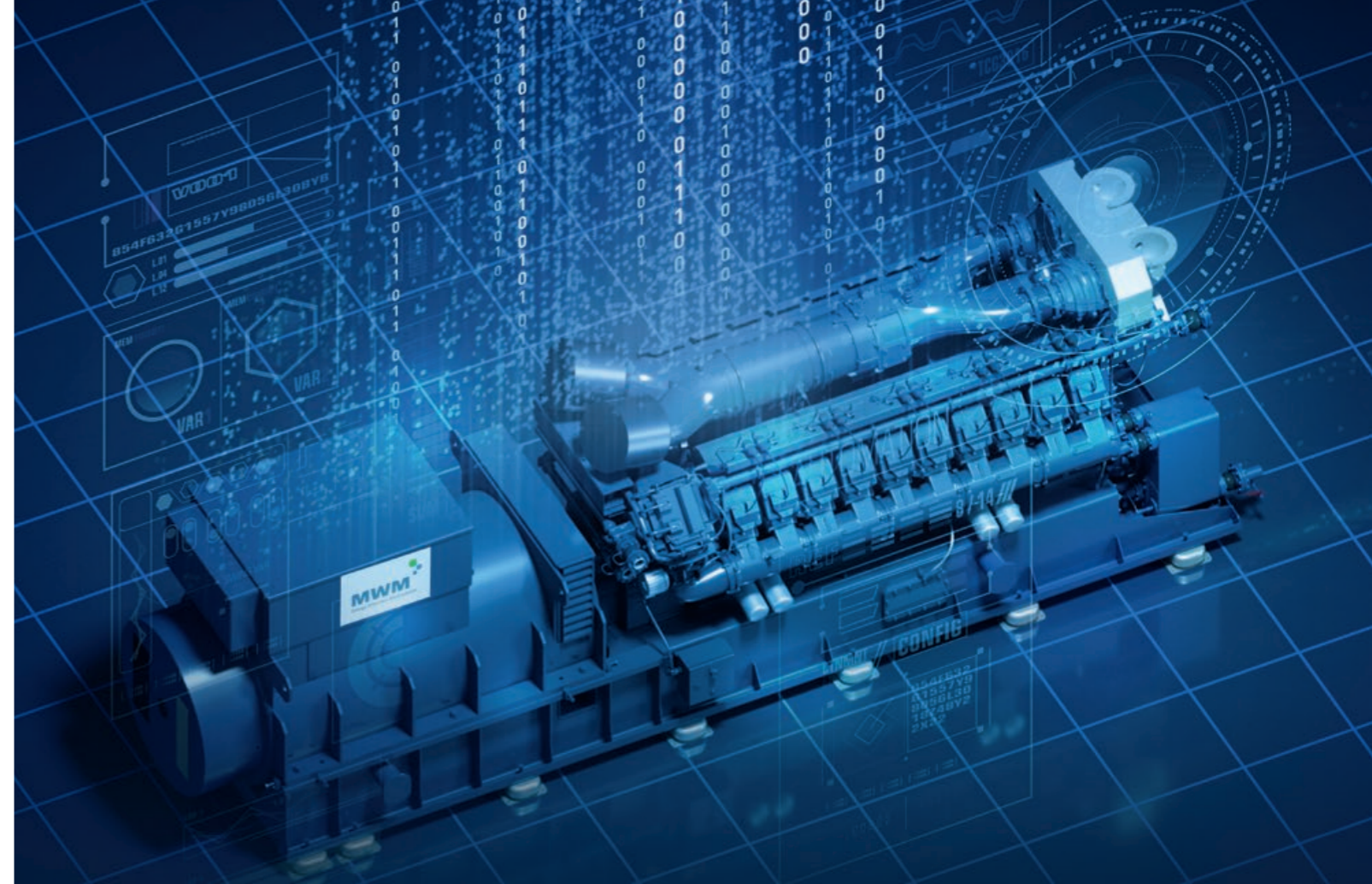
With its comprehensive digital power plant control TPEM (Total Plant & Energy Management), MWM redefines the control standard for energy solutions.

TPEM eliminates the need for additional control systems, as all power plant data for the genset and plant control are combined in one system. The optimum power plant control enables high economic efficiency, provided from a single source.



State-of-the-art system: economical, efficient and complete

- **One user interface**
 - ✓ Complete power plant control and setup
- **Connectivity solutions**
 - ✓ Remote plant control with free "TPEM Remote client" software and extensive monitoring and analytics options with "MWM RAM" subscription
- **Security-oriented technology**
 - ✓ Safety chain for cogeneration plant monitoring (TÜV-certified)



Set up

- ✓ Custom-tailored technical solutions
- ✓ One integrated, flexible control system for all electric power applications
- ✓ Multiple functionalities for individual solutions

Optimize

- ✓ Data management and analysis delivers information for optimizing the system
- ✓ Life cycle history enables access to data over the entire life cycle of the genset and the peripherals

Operate

- ✓ High efficiency through optimal control
- ✓ Enables remote management and monitoring
- ✓ Use the full genset potential with maximum reliability



Technical data 50 Hz $(NO_x \leq 500 \text{ mg/Nm}^3)^{1)}$

Engine type	TCG 3020	V12	V12	V16	V16	V20	V20
Bore/stroke	mm	170/195	170/195	170/195	170/195	170/195	170/195
Displacement	dm ³	53.0	53.0	71.0	71.0	89.0	89.0
Speed	min ⁻¹	1,500	1,500	1,500	1,500	1,500	1,500
Mean piston speed	m/s	9.8	9.8	9.8	9.8	9.8	9.8
Length ²⁾	mm	5,080	5,080	6,100	6,100	6,600	6,600
Width ²⁾	mm	1,710	1,710	1,710	1,710	1,710	1,710
Height ²⁾	mm	2,190	2,190	2,190	2,190	2,190	2,190
Dry weight genset	kg	12,900	12,900	17,400	17,400	21,400	21,400

Natural gas applications

$NO_x \leq 500 \text{ mg/Nm}^3)^{1)}$

Engine type	TCG 3020	V12	V12	V16	V16	V20	V20
Configuration		P ⁵⁾	R ⁶⁾	P ⁵⁾	R ⁶⁾	P ⁵⁾	R ⁶⁾
Electrical power ³⁾	kW	1,380	1,380	1,840	1,840	2,300	2,300
Mean effective pressure	bar	21.5	21.5	21.5	21.5	21.5	21.5
Thermal output ⁴⁾	$\pm 8\%$ kW	1,296	1,369	1,755	1,824	2,164	2,281
Electrical efficiency ³⁾	%	45.0	44.0	44.7	44.0	45.0	44.0
Thermal efficiency ³⁾	%	42.3	43.6	42.6	43.6	42.3	43.6
Total efficiency ³⁾	%	87.3	87.6	87.3	87.6	87.3	87.6

Biogas applications

$NO_x \leq 500 \text{ mg/Nm}^3)^{1)}$

Sewage gas (65% CH₄ / 35% CO₂)

Biogas (50% CH₄ / 50% CO₂)

Landfill gas (50% CH₄ / 27% CO₂, Rest N₂)

Minimum heating value H_U = 5.0 kWh/Nm³

Engine type	TCG 3020	V12	V16	V20
Configuration		X ⁷⁾	X ⁷⁾	X ⁷⁾
Electrical power ³⁾	kW	1,380	1,840	2,300
Mean effective pressure	bar	21.5	21.5	21.5
Thermal output ⁴⁾	$\pm 8\%$ kW	1,351	1,802	2,254
Electrical efficiency ³⁾	%	43.6	43.6	43.6
Thermal efficiency ³⁾	%	42.7	42.7	42.8
Total efficiency ³⁾	%	86.3	86.3	86.4

1) $NO_x \leq 500 \text{ mg/Nm}^3$; exhaust gas dry at 5% O₂.
 2) Transport dimensions for gensets, components set up separately must be taken into consideration.
 3) According to ISO 3046-1 at U = 0.4 kV, cosphi = 1.0 for 50 Hz, a minimum methane number of MN 70 for natural gas and MN 134 (sewage gas) for biogas applications.

4) Exhaust gas cooled to 120 °C for natural gas and 150 °C for biogas.
 5) P = High Efficiency. Optimized for high electrical efficiency.
 6) R = High Response. Optimized for high total efficiency.
 7) X = Biogas. Optimized for operation with biogases.

Data for special gases and dual gas operation on request.
 The values given on these datasheets are for information purposes only and not binding. The information given in the offer is decisive.

Technical data 50 Hz $(NO_x \leq 250 \text{ mg/Nm}^3)^{1)}$

Engine type	TCG 3020	V12	V12	V16	V16	V20	V20	V20
Bore/stroke	mm	170/195	170/195	170/195	170/195	170/195	170/195	170/195
Displacement	dm ³	53.0	53.0	71.0	71.0	89.0	89.0	89.0
Speed	min ⁻¹	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Mean piston speed	m/s	9.8	9.8	9.8	9.8	9.8	9.8	9.8
Length ²⁾	mm	5,080	5,080	6,100	6,100	6,600	6,600	6,500
Width ²⁾	mm	1,710	1,710	1,710	1,710	1,710	1,710	1,710
Height ²⁾	mm	2,190	2,190	2,190	2,190	2,190	2,190	2,190
Dry weight genset	kg	12,900	12,900	17,400	17,400	21,400	21,400	17,980

Natural gas and propane gas applications

$NO_x \leq 250 \text{ mg/Nm}^3)^{1)}$

Engine type	TCG 3020	V12	V12	V16	V16	V20	V20	V20
Configuration		P ⁶⁾	R ⁷⁾	P ⁶⁾	R ⁷⁾	P ⁶⁾	R ⁷⁾	Z ⁸⁾
Electrical power ³⁾	kW	1,380	1,380	1,840	1,840	2,300	2,300	1,880 ⁵⁾
Mean effective pressure	bar	21.5	21.5	21.5	21.5	21.5	21.5	17.7
Thermal output ⁴⁾	$\pm 8\%$ kW	1,359	1,431	1,835	1,910	2,255	2,391	2,063
Electrical efficiency ³⁾	%	43.9	42.9	43.6	42.9	44.0	42.9	41.8
Thermal efficiency ³⁾	%	43.2	44.5	43.5	44.5	43.1	44.6	45.9
Total efficiency ³⁾	%	87.1	87.4	87.1	87.4	87.1	87.5	87.7

Biogas applications

$NO_x \leq 250 \text{ mg/Nm}^3)^{1)}$

Sewage gas (65% CH₄ / 35% CO₂)

Biogas (50% CH₄ / 50% CO₂)

Landfill gas (50% CH₄ / 27% CO₂, Rest N₂)

Minimum heating value H_U = 5.0 kWh/Nm³

Engine type	TCG 3020	V12	V16	V20
Configuration		X ⁹⁾	X ⁹⁾	X ⁹⁾
Electrical power ³⁾	kW	1,380	1,840	2,300
Mean effective pressure	bar	21.5	21.5	21.5
Thermal output ⁴⁾	$\pm 8\%$ kW	1,407	1,878	2,346
Electrical efficiency ³⁾	%	42.6	42.6	42.7
Thermal efficiency ³⁾	%	43.4	43.5	43.5
Total efficiency ³⁾	%	86.0	86.1	86.2

1) $NO_x \leq 250 \text{ mg/Nm}^3$; exhaust gas dry at 5% O₂.
 2) Transport dimensions for gensets, components set up separately must be taken into consideration.
 3) According to ISO 3046-1 at U = 0.48 kV, cosphi = 1.0 for 50 Hz, a minimum methane number of MN 70 for natural gas (P, R), MN 34 for propane (Z) and MN 134 (sewage gas) for biogas applications.

4) Exhaust gas cooled to 120 °C for natural gas and 150 °C for biogas.
 5) 1,880 kW_e is also achieved with natural gas applications.
 6) P = High Efficiency. Optimized for high electrical efficiency.
 7) R = High Response. Optimized for high total efficiency.
 8) Z = Propane. Optimized for operation with propane.
 9) X = Biogas. Optimized for operation with biogases.

Data for special gases and dual gas operation on request.
 The values given on these datasheets are for information purposes only and not binding. The information given in the offer is decisive.

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