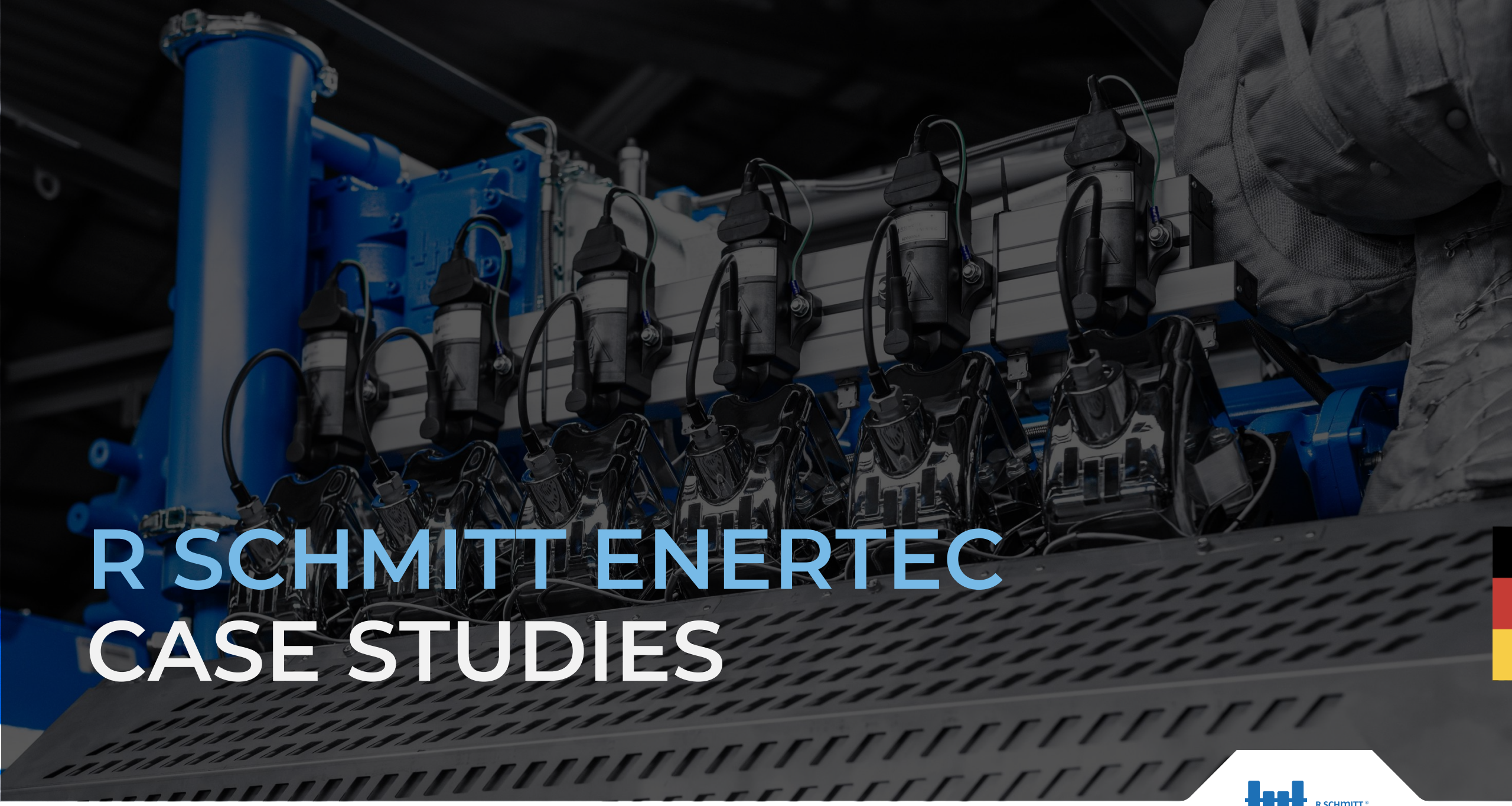

# R SCHMITT ENERTEC
# CASE STUDIES

# GAS-ENGINES MANUFACTURER
# BORN IN GERMANY

- Focused expertise in the development of gas engines for stationary applications
- Gas engines, power generators & CHP – full technology provider
- In-house production with all related technologies and manufacturing
- Maximum flexibility with full product responsibility

**140+**

layouts available

**1,400+**

gas engines, power generation and cogeneration units installed worldwide

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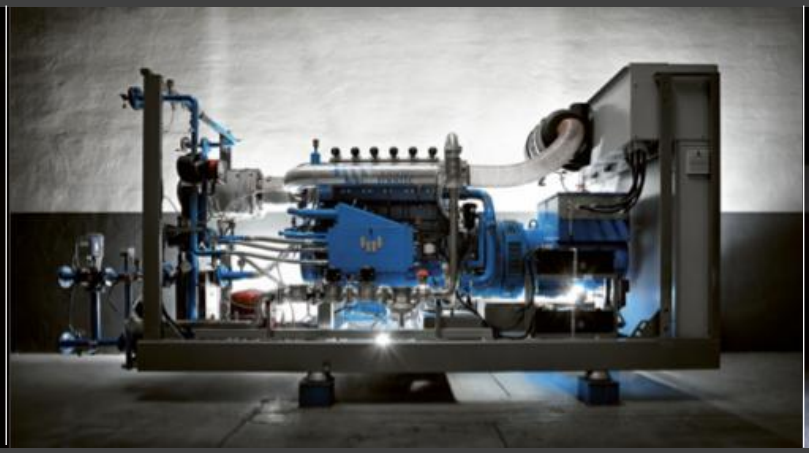
# POWER THROUGH ANY GAS



## GAS ENGINES

- 6-, 8- and 12-cylinder V-engines
- 11,3 / 15,1 / 22,6 dm3 displacement
- Turbocharged lean burn engines
- 7,4-18,5 bar BMEP

## GENERATOR SETS

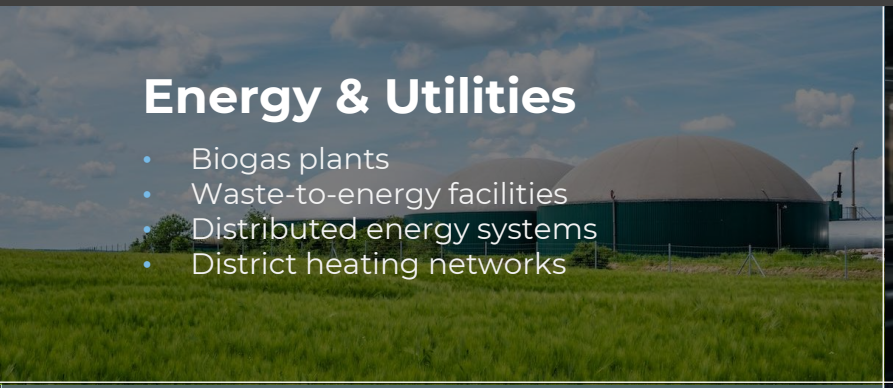
- Electric power range of 115-500 kW
- Electrical efficiency of up to 42.7%
- Remote radiator

## COGENERATORS

- Electric power range of 115-500 kW
- Thermal power range of 165-657 kW
- Electrical efficiency of up to 42.7%
- Overall efficiency of up to 91.6%
- Compact design
- Low noise of <70 dB(A)

# WORLDWIDE RECOGNITION, DIVERSE APPLICATIONS

ENERGIN units are operated in 40+ countries. Proven in highly industrial areas like Japan as well as under harsh conditions of developing countries like India.



## Energy & Utilities

- Biogas plants
- Waste-to-energy facilities
- Distributed energy systems
- District heating networks

## Industry & Manufacturing

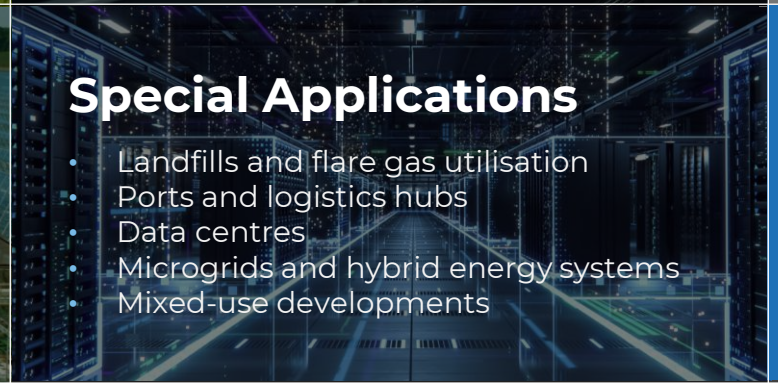
- Production and processing facilities
- Food, chemical and metal industries
- Automotive and heavy industries

## Buildings & Infrastructure

- Hospitals and healthcare facilities
- Hotels and resorts
- Residential complexes
- Schools and public buildings
- Sports and wellness facilities

## Agriculture & Rural Energy

- Farms and agricultural operations
- Greenhouses
- Off-grid and remote locations



## Special Applications

- Landfills and flare gas utilisation
- Ports and logistics hubs
- Data centres
- Microgrids and hybrid energy systems
- Mixed-use developments

## Flexible Fuel Options

natural gas, LNG, biogas, wood gas, LPG, syngas, flare gas, green methanol

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# OLYMPIC PARK AUSTRALIA

## Facility
Sydney Olympic Park Aquatic Centre

## Challenge
High and continuous energy demand
in a large-scale aquatic facility

## Solution
2 × CHP systems operating on natural gas:
ENERGIN M08 CHP G260 (Today: **ENERGIN M12 CHP B350**)

## Key Specifications
- Electrical output: **260 kW (each)**
- Thermal output: **332 kW (each)**
- Fuel input: **688 kW**
- Engine: **ENERGIN M08 GT2D22**
- Displacement: **15.1 L**
- Speed: **1,500 rpm**
- Additional equipment: **Chiller for emergency operation**

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# OLYMPIC PARK PROJECT DETAILS

## 6,183 MWh annually

One of the largest energy-consuming facilities within Sydney Olympic Park

### Cogeneration Principle

- On-site generation of electricity and heat
- Efficient use of natural gas

### Energy Distribution

- Water filtration
- Pool heating
- Space heating
- Lighting

### Operational Advantage

- Covers the majority of energy demand
- Independent from the grid during normal operation


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# OLYMPIC PARK
# PROJECT DETAILS

Key Result

RELIABLE, EFFICIENT ENERGY SUPPLY FOR LARGE-SCALE PUBLIC INFRASTRUCTURE

**1,8 million kWh**
Annual energy savings

**300,000 USD**
Annual cost savings

**–1,250 tonnes $CO_2$**
Emissions reduced per year (equivalent to **removing 6,280 cars** from the streets)

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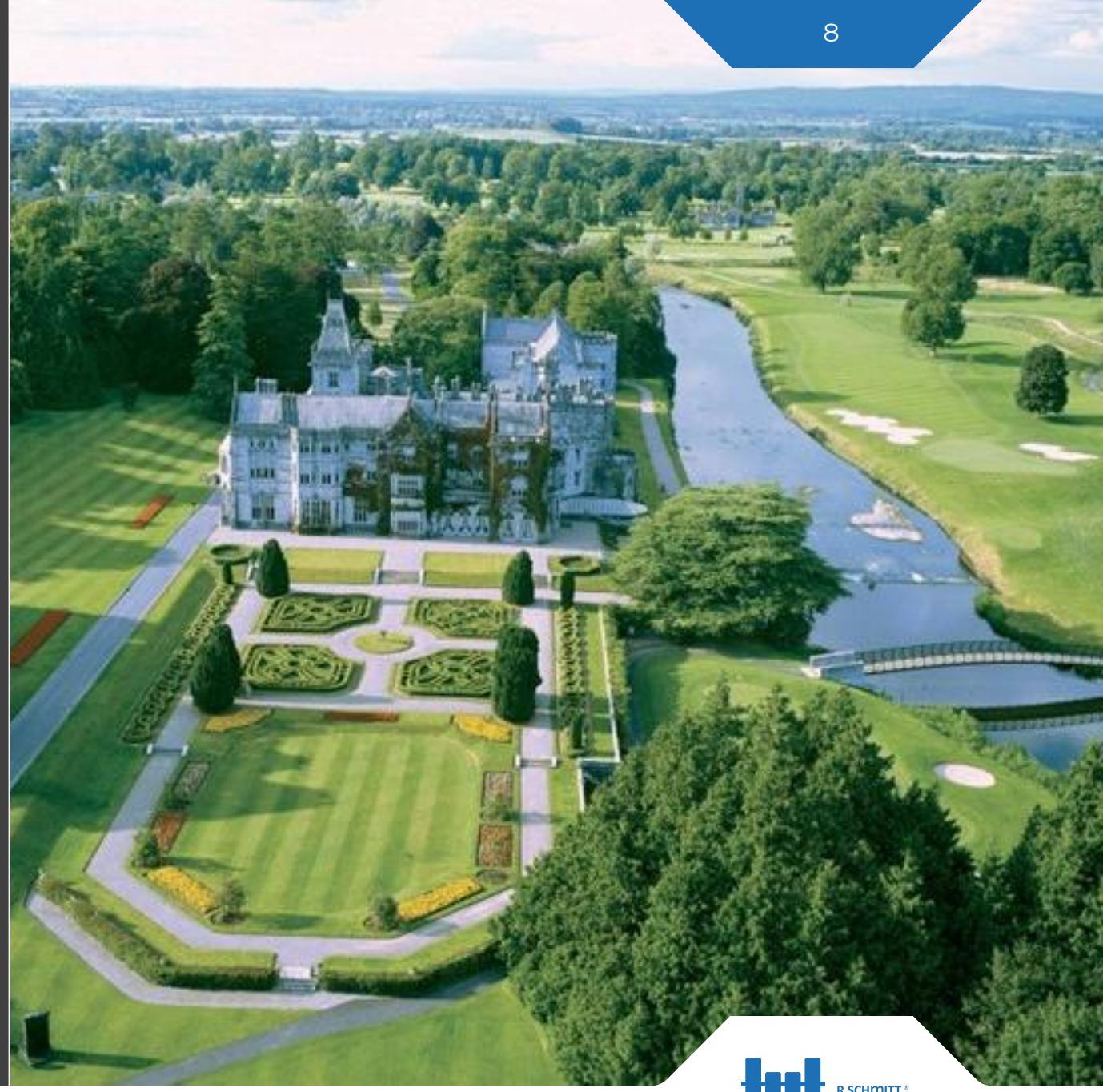
# HOTEL & GOLF RESORT IRELAND

## Facility
Adare Manor Hotel & Golf Resort, Ireland

## Challenge
High and continuous energy demand
of a luxury hotel and golf resort

## Solution
Containerised CHP system on natural gas:
ENERGIN M12 CHP G350

## Key Specifications
- Electrical output: **350 kW**
- Thermal output: **458 kW**
- Fuel input: **919 kW**
- Engine: **ENERGIN M12 GT2W22**
- Displacement: **22.6 L**
- Speed: **1,500 rpm**
- Additional equipment: **Containerised unit**



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# BIOGAS PLANT
# GERMANY

## Facility
Biogas Plant Scholzehof, Lutzerath, Germany

## Challenge
Efficient use of biogas for power generation and district heating of local infrastructure, with electricity fed into the grid based on demand and market conditions

## Solution
3 × biogas CHP systems:
ENERGIN M12 CHP B350 /
ENERGIN M06 CHP B190 /
ENERGIN M12 CHP B400

## Key Specifications
- Electrical output: **350 / 190 / 400 kW**
- Thermal output: **474 / 260 / 418 kW**
- Fuel input: **919 / 491 / 995 kW**
- Additional equipment: **Emergency cooler, gas cleaning system**

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# BIOGAS PLANT
# PROJECT DETAILS

## System Setup

- CHP units installed in concrete buildings
- Cooling systems located on the roof and beside the buildings
- Emergency cooling used when power demand exceeds heat demand

## Gas Quality Challenge

Biogas contains components harmful to CHP operation:

- High humidity causes corrosion and condensate
- Siloxanes form abrasive deposits in the engine
- Sulfur compounds (including hydrogen sulfide) cause corrosion and engine wear

## Gas Cleaning Solution

- Multi-stage gas cleaning system
- Cooling and moisture removal
- Reheating via heat exchanger
- Filtration through activated carbon

**RELIABLE OPERATION**

ENGINE PROTECTION

LONG-TERM PERFORMANCE

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# SEWAGE PLANT GERMANY

## Facility
Waste Water Treatment
Sewage Plant Monheim, Germany

## Challenge
Efficient use of sewage gas for on-site power generation and heat supply for wastewater treatment processes and buildings

## Solution
2 × sewage gas CHP systems:
ENERGIN M12 CHP B350 (2 units)

## Key Specifications
- Electrical output: **350 kW (each)**
- Thermal output: **421 kW (each)**
- Fuel input: **900 kW**
- Additional equipment: **Gas cleaning system**

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# SEWAGE PLANT
# PROJECT DETAILS

## System Setup

- CHP units installed in an engine room
- Inlet air filtered and directed into the room
- Fresh air drawn through the bottom of the enclosure

## Air Management

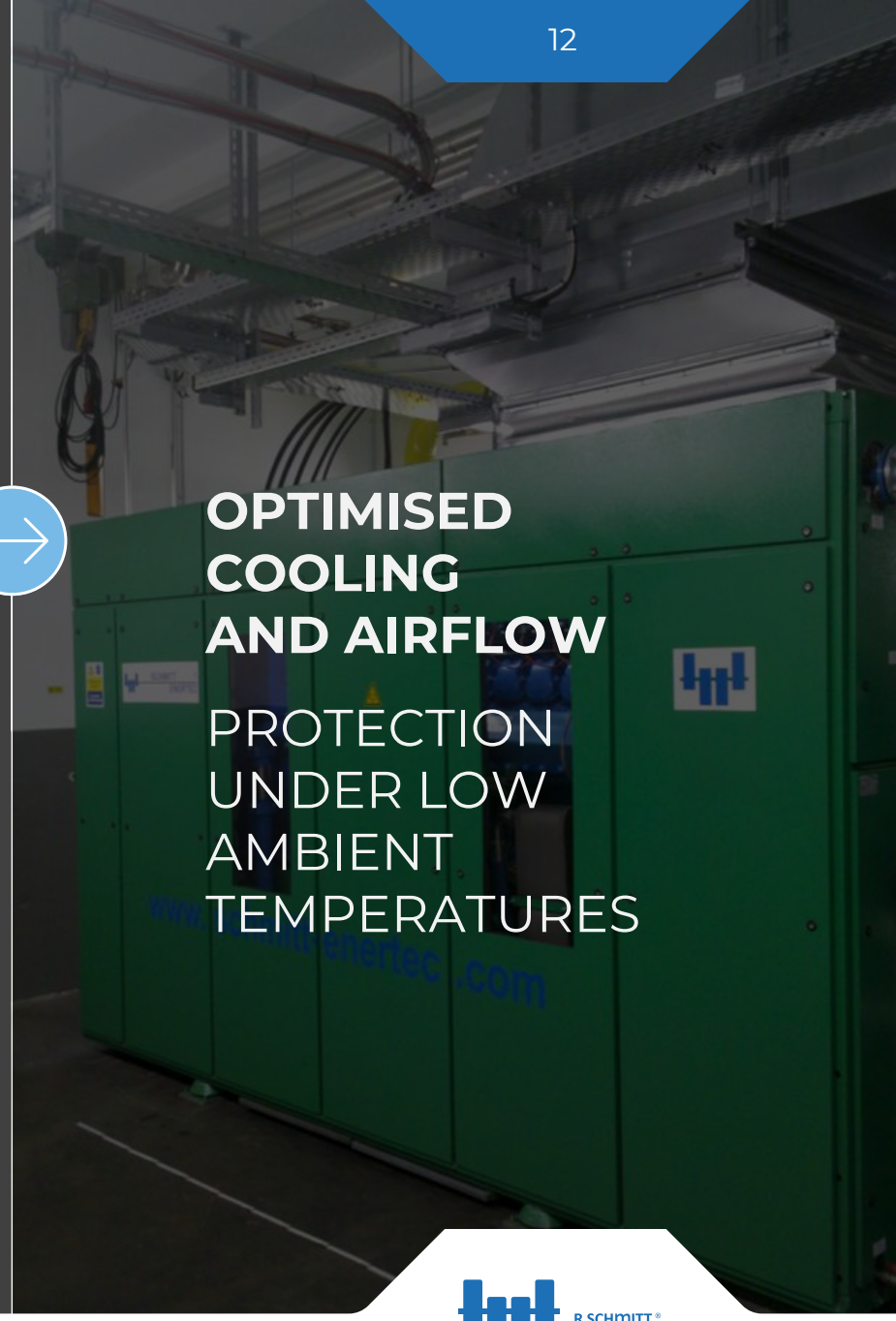
- Air used for combustion and unit cooling
- Ventilator on top of the enclosure directs warm air through air ducts and silencers

## Operational Feature

- Air re-circulation system installed to prevent damage at low temperatures

## Cold Climate Protection

- Ensures stable operation below 5 °C



# CITY HOSPITAL GERMANY

## Facility
Stadtklinik Frankenthal, Germany

## Challenge
Replacement of an outdated CHP system
during ongoing hospital operations without interruption

## Solution
Natural gas CHP system:
ENERGIN M08 CHP G151

## Key Specifications
- Electrical output: **151 kW**
- Thermal output: **235 kW**
- Fuel input: **419 kW**
- Additional equipment: **Installed in existing sound enclosure**, integrated into existing building interfaces

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# CITY HOSPITAL
# PROJECT DETAILS

## Project Context

- Hospital providing continuous healthcare services
- Critical infrastructure with no downtime allowed

## System Integration

- Installed in existing sound enclosure
- Connected to existing building interfaces
- Minimal structural modifications required

## Implementation

- Replacement of an existing CHP system carried out during ongoing hospital operations
- Installation completed without interruption of daily medical activities

## Commissioning & Training

- System successfully commissioned on site
- Technical staff trained for safe and efficient operation

**315 beds**
Inpatient and day-care capacity

**600 employees**
Medical and technical staff

**24/7 operation**
Continuous healthcare services

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# RESIDENTIAL AREAS
# GREAT BRITAIN

## Facility
Residential Area Green Man Lane,
London, Great Britain

## Challenge
Reducing $CO_2$ emissions and energy costs
in a large residential development

## Solution
Natural gas CHP system:
ENERGIN M12 CHP G334

## Key Specifications
- Electrical output: **334 kW**
- Thermal output: **485 kW**
- Fuel input: **913 kW**

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# RESIDENTIAL AREAS
# PROJECT DETAILS

## Project Context

- Large residential development
- Focus on affordable energy supply

## System Integration

- Connected to district heating network
- Scalable for future expansion

## Energy Concept

- On-site generation of heat and electricity
- Reduced operating costs for residents

## Results

- Lower energy costs for residents
- Reduced environmental impact
- Affordable and sustainable energy supply

**50,000 apartments**
Large residential development

**57% $CO_2$ reduction**
Lower environmental impact

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# GUTENBERG GYMNASIUM GERMANY

## Facility
Gutenberg Gymnasium, Bergheim, Germany

## Challenge
Integration of CHP into existing school infrastructure with connection to district heating network and building control system

## Solution
Natural gas CHP system:
ENERGIN M08 CHP G220

## Key Specifications
- Electrical output: **220 kW**
- Thermal output: **314 kW**
- Fuel input: **590 kW**

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# GUTENBERG GYMNASIUM
# PROJECT DETAILS

## Project Context

- CHP supplies electricity for the school
- Supports operation of a heat pump
- Surplus electricity fed into the public grid
- Excess heat stored in heat storage tanks

## System Integration

- Connected to building control system (LAN)
- Integrated into district heating network of Bergheim

## Installation

- CHP lifted over the school building and positioned inside the boiler room
- Custom-made frame used to overcome height differences
- Safe and precise placement within existing infrastructure

# SOFT DRINK INDUSTRY USA

## Facility
Pepsi Bottling Co., Queens, New York, USA

## Challenge
Meeting grid requirements (60 Hz, 480 V) and supplying low-pressure steam for industrial processes

## Solution
4 × natural gas CHP systems:
ENERGIN M12 CHP G400

## Key Specifications
- Electrical output: **400 kW (each)**
- Thermal output: **457 kW (each)**
- Fuel input: **1117 kW**
- Frequency: **60 Hz**
- Voltage: **480 V**
- Additional equipment:
  **Steam production (low-pressure steam)**



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# OFFICE BUILDING
# USA

## Facility
Office Building Varick Street, New York, USA

## Challenge
Reliable power supply under US grid requirements with additional backup for emergency situations

## Solution
4 × natural gas CHP systems ENERGIN M12 CHP G400 with backup generator ENERGIN GEN G500

## Key Specifications (CHP)
- Electrical output: **400 kW (each)**
- Thermal output: **457 kW (each)**
- Fuel input: **1117 kW**
- Frequency: **60 Hz**
- Voltage: **480 V**

## Backup system (GEN)
- Electrical output: **400 kW**
- Frequency: **60 Hz**
- Voltage: **480 V**

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# CONTAINER PLANT SERBIA

## Facility
NIS Gazprom Neft Oil Fields, Serbia

## Challenge
Efficient utilisation of associated gas
to supply local infrastructure with electricity

## Solution
5 × gas-powered GENsets
ENERGIN M12 GEN G500

## Key Specifications
- Electrical output: **482 kW (each)**
- Fuel input: **1,220 kW**
- Additional equipment:
  **Containerised units with gas cleaning systems**


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# CONTAINER PLANT
# PROJECT DETAILS

## Project Context

- Use of associated gas as a by-product of oil extraction
- On-site power generation for local infrastructure

## Energy Concept

- Conversion of gas into electricity directly at the oil field
- Potential use of exhaust heat for heating surrounding buildings

## System Design

- GENsets installed in steel containers
- Modular design for flexible deployment on site
- Integrated gas cleaning systems for reliable operation


**5 GENsets**
Installed in 3 containers

**–40%**
Fuel consumption reduction in oil extraction

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# WOOD GAS POWER PLANT SLOVAKIA

## Facility
Wood Gas Power Plants, Slovakia (Mokrance & Kokava)

## Challenge
Efficient use of low-calorific wood gas
for power generation and biomass processing

## Solution
Wood gas GEN and GEN+ systems: ENERGIN M12 GEN H250

## Key Specifications
- Electrical output: **250 kW (each)**
- Thermal output (GEN+): **244 kW**
- Fuel input: **746 Kw**
- Additional equipment: **Gasification plant and multi-stage gas cleaning system**

## Configuration
- Mokrance: **2 × GEN units**
- Kokava: **4 × GEN+ units**

# WOOD GAS POWER PLANT PROJECT DETAILS

## Project Challenge

- Use of wood gas as a fuel with very low and unstable energy content
- Reliable power generation from biomass-based gas

## Solution

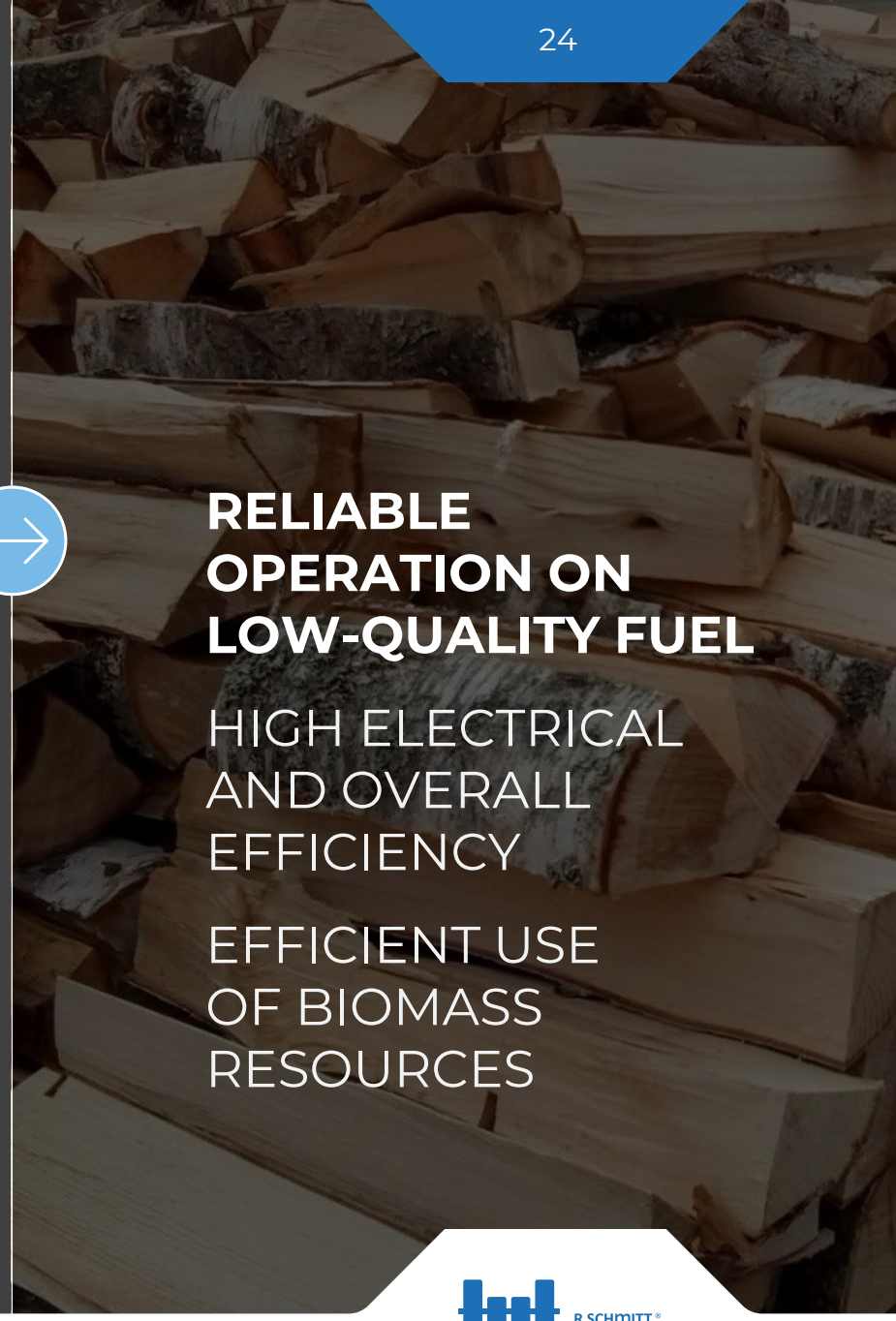
- Integrated system combining: gasification, gas cleaning and power generation
- Multi-stage gas cleaning: cyclone, scrubbing, tar removal and filtration
- High-compression engines optimised for wood gas operation

## Technical Complexity

- Wood gas contains impurities and requires intensive cleaning
- Low calorific value (~1.6 kWh/Nm³) limits engine efficiency
- Stable operation requires controlled gasification conditions

## Energy Utilisation

- Electricity generated on site for system operation
- Heat recovery (GEN+) used for: Biomass drying and building heating



**RELIABLE OPERATION ON LOW-QUALITY FUEL**

HIGH ELECTRICAL AND OVERALL EFFICIENCY

EFFICIENT USE OF BIOMASS RESOURCES

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# ICE ARENA
# GERMANY

## Facility
Hacker-Pschorr Arena, Bad Tölz, Germany

## Challenge
Efficient energy supply for a multi-purpose arena with simultaneous demand for electricity, heating and cooling

## Solution
Natural gas CCHP system with absorption chiller ENERGIN M12 CHP G400

## Key Specifications
- Electrical output: **400 kW**
- Thermal output: **503 kW**
- Refrigeration capacity: **235 kW**
- Fuel input: **1,055 kW**

# ICE ARENA
# PROJECT DETAILS

## Project Challenge

- Simultaneous demand for electricity, heating and cooling within one facility
- High and variable energy loads depending on arena operation

## Cooling Solution

- Absorption chiller converts heat into cooling energy
- Production of chilled water at 6–12 °C

## System Concept

- Combined Cooling, Heating and Power (CCHP)
- Electricity used for arena operations (lighting, equipment, catering)

## Energy Utilisation

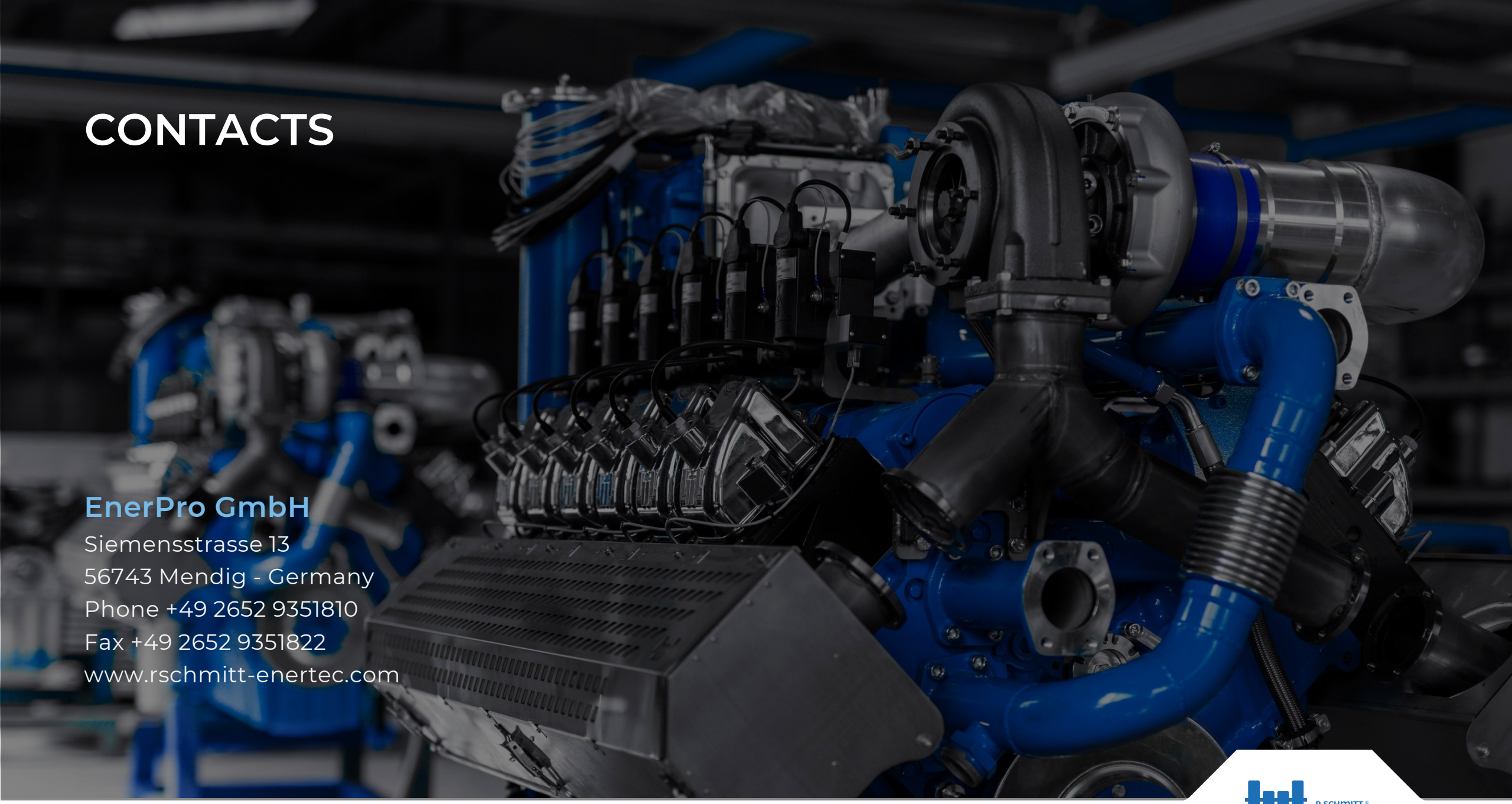
- Heat used for space heating or for cooling generation
- Flexible use depending on demand

**INTEGRATED SUPPLY OF POWER, HEAT AND COOLING**

HIGH OVERALL ENERGY EFFICIENCY

OPTIMISED USE OF FUEL ENERGY

# CONTACTS

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