

Power Generation with Gas Engines, what makes it so special?



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Agenda:

Power Generation with Gas Engines, what makes it so special?

- Short Introduction
- About gas engines
- New developments in the CHP market
- Facing new challenges



What's So Special About Gas Engines?

- Industrial applications
 - High load factor
 - Severe oil stress
 - Remote operations
 - Reliability essential
 - Wide variation in types/fuels
 - Flexible products required
 - over 90 CHP manufactures in Europe
 - they produce over 1.200 different applications
- No industry oil specifications
 - Oils must demonstrate performance in field testing
 - Oils must be compatible with engine catalyst
 - Oil and additive company expertise is required



Gas Engine Technology Trends



Power, efficiency and size

- High pressure ratio turbochargers improve performance and emissions
- Use of Miller cycle to increase efficiency
- Mechanical efficiency is increasing (51+ %)
- Brake Mean Effective Pressure (BMEP) is increasing (24+ bar)
- Manufacturers adding larger engines to line
- Increasing use of Combined Heat & Power

Drier engines, longer drains

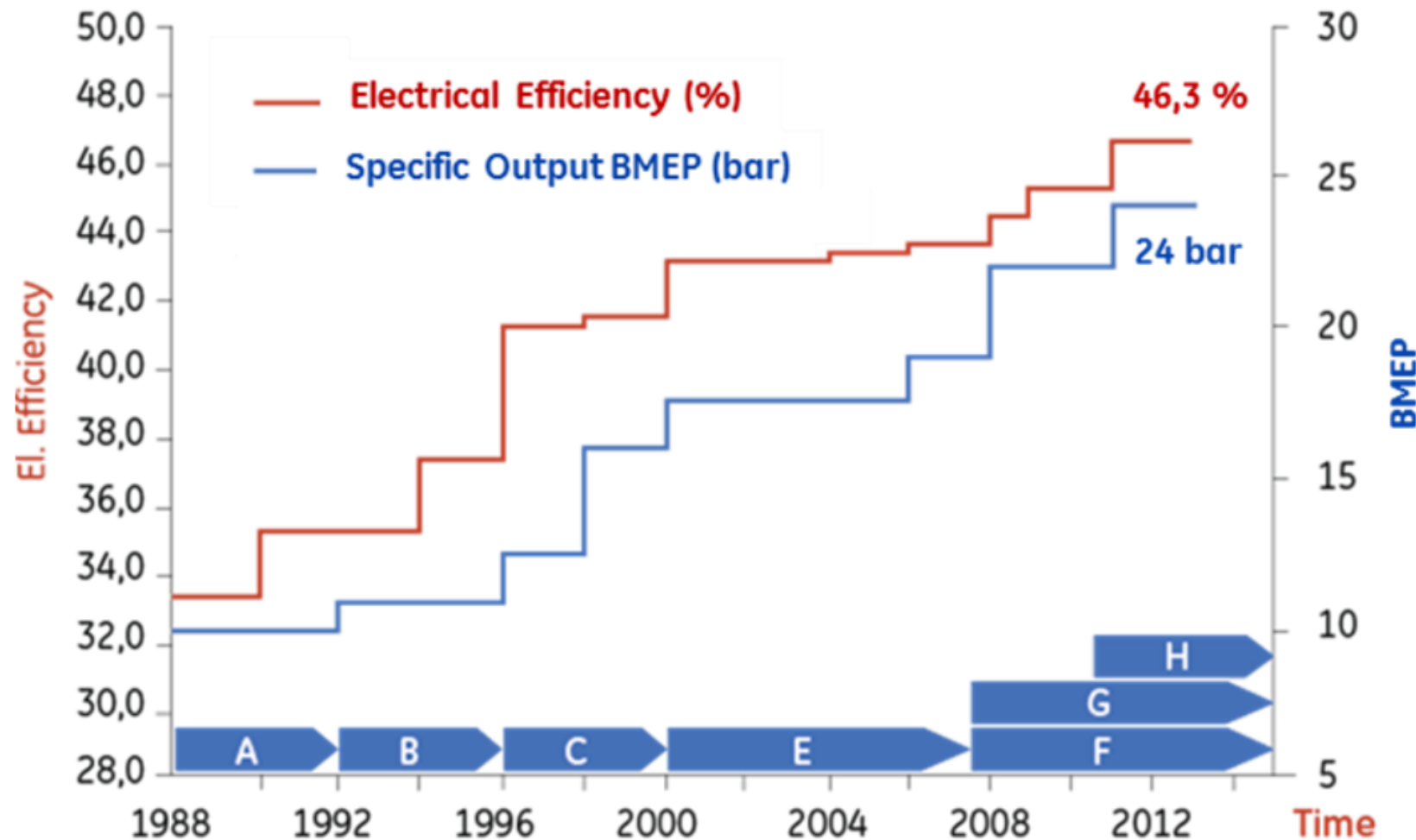
- Modified ring designs for better oil control and improved wear characteristics
- Use of oil spinners, and high efficiency filters
- Use of metering valve guide seals
- Increasing sump capacity
- Drain-on-condition Used Oil Analysis programs allow extended drain intervals

Emissions

- “Lean-Burn” Combustion
 - Pre-chamber ignition or stratified charge designs
 - Precise electronic air/fuel ratio controllers
 - Electronic controls, adaptive timing, O₂, NO_x sensors
 - CO oxidation catalyst and SCR (44.BImSchV)
 - Retrofits for older engines
- Stoichiometric Combustion With Three-Way Catalyst
 - Higher combustion temperatures lead to greater oxidation and nitration rates
 - Catalyst compatibility proven with low ash oils
 - Hydrogen

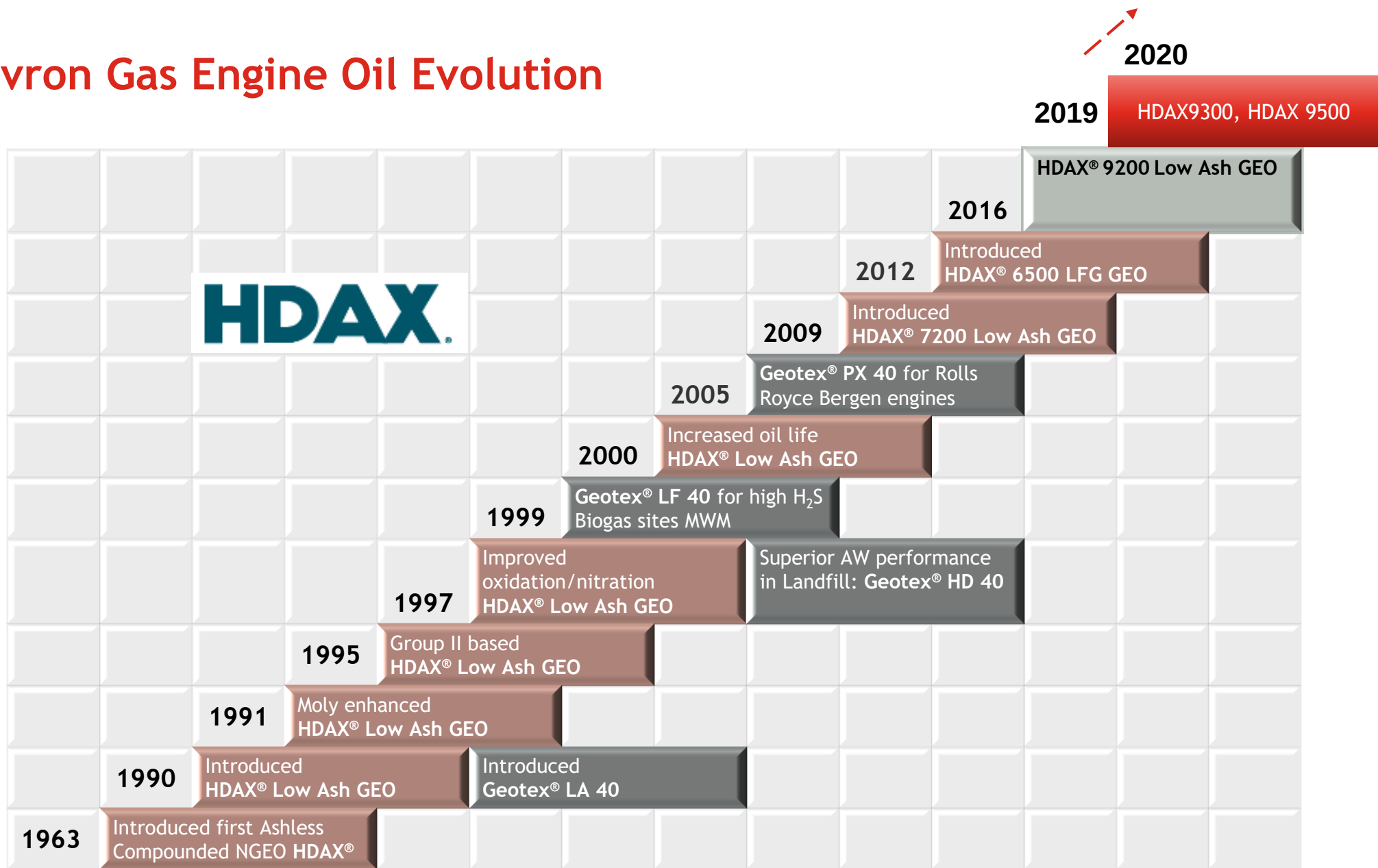


Evolution of gas engine efficiency



Quelle: INNIO Jenbacher

Chevron Gas Engine Oil Evolution



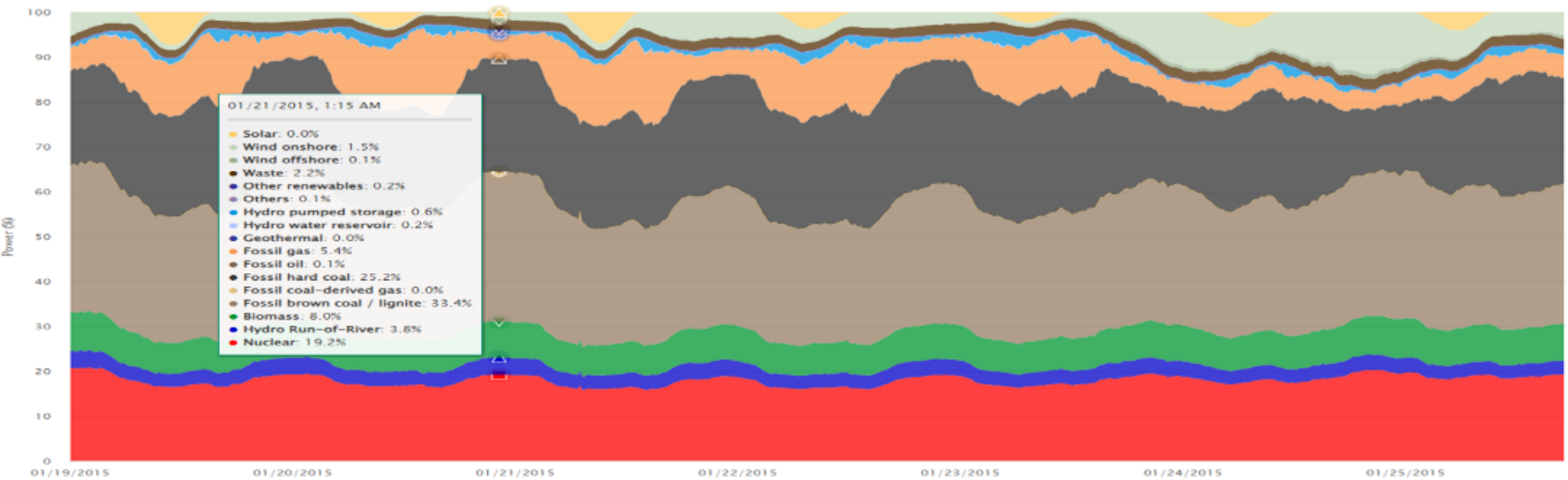
New CHP market requirements



Changes in the energy market

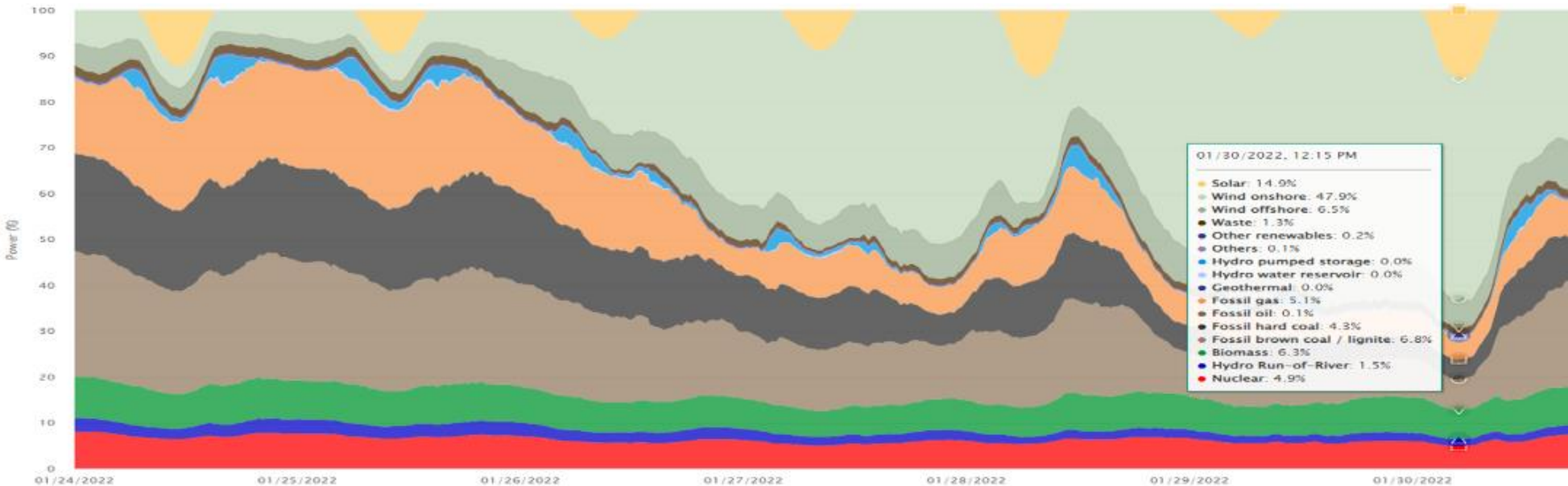
Electrical power generation 2015 (Jan) compared to 2022 (Jan)

2015
Week 4



78 % Coal &
Nuclear Power

2022
Week 4



16 % Coal &
Nuclear Power

CHP operating parameters are changing....

24/7 operation

- Up to 8,600 operating hours/anno
- 100-150 Starts/anno
- 100% Leistungel
- Oil temperature at: 45-60 °C

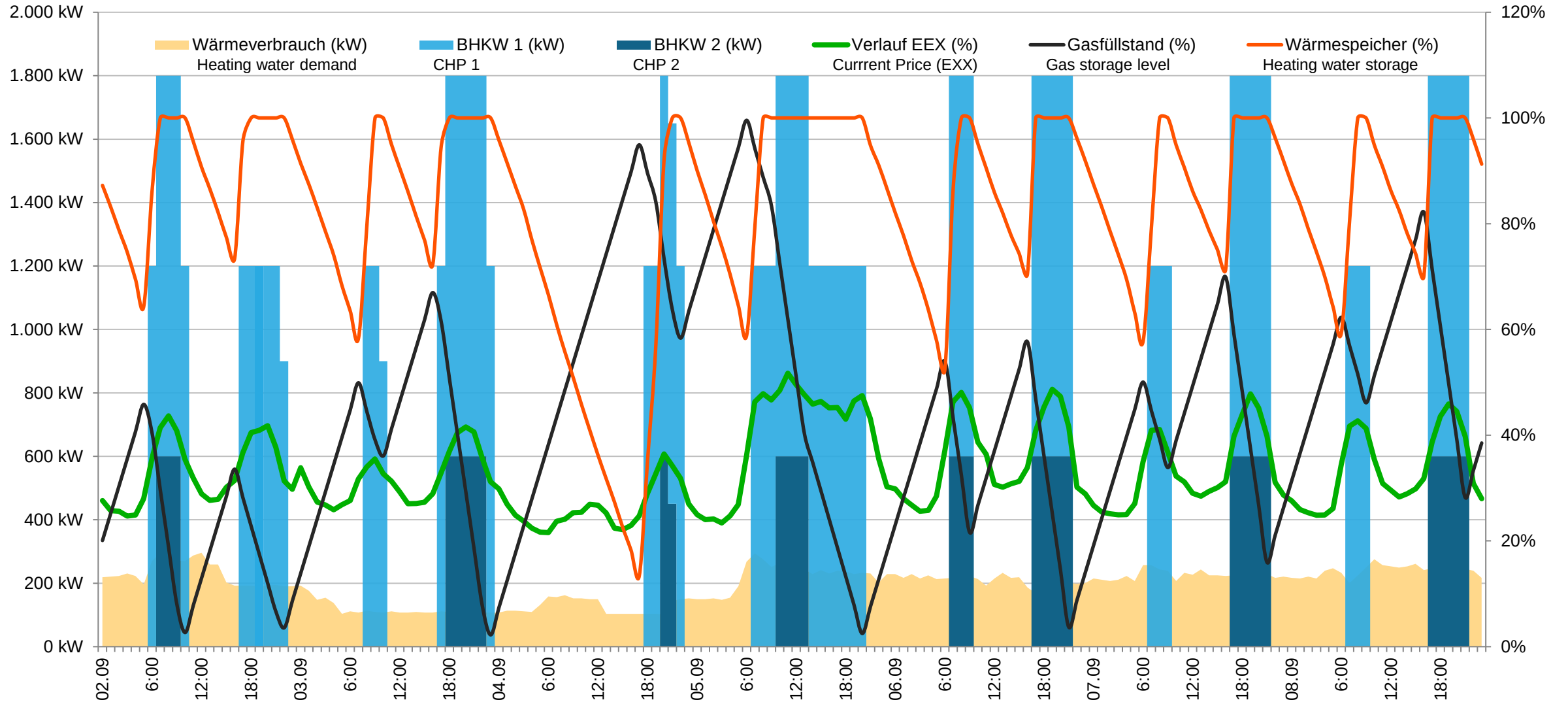
- CHP in flex mode
- 500-2,000 operating hours/anno
- 1000-2500 Starts/anno
- 50-100 % Leistungel
- Oil temperature at start: 5-35 °C

About 71% of the CHPs in flex mode are installed in a container.

- Low outside temperatures in winter.
- Often insufficient preheating/heating
- The oil pan often cools down drastically



Flex Operation



Quelle: SKVE AG

Texaco® HDAX applications



Engine (landfill and biogas)

HDAX 9500	Power Generation	4-Cycle
HDAX 6500	Power Generation	4-Cycle

Engine (natural gas)

HDAX 9300	Power Generation	4-Cycle
HDAX 9200	Power Generation	4-Cycle
HDAX 7200	Power Generation and Oil & Gas	4-Cycle
HDAX 5200	Power Generation and Oil & Gas	4-Cycle
HDAX 5100	Power Generation and Oil & Gas	2-Cycle

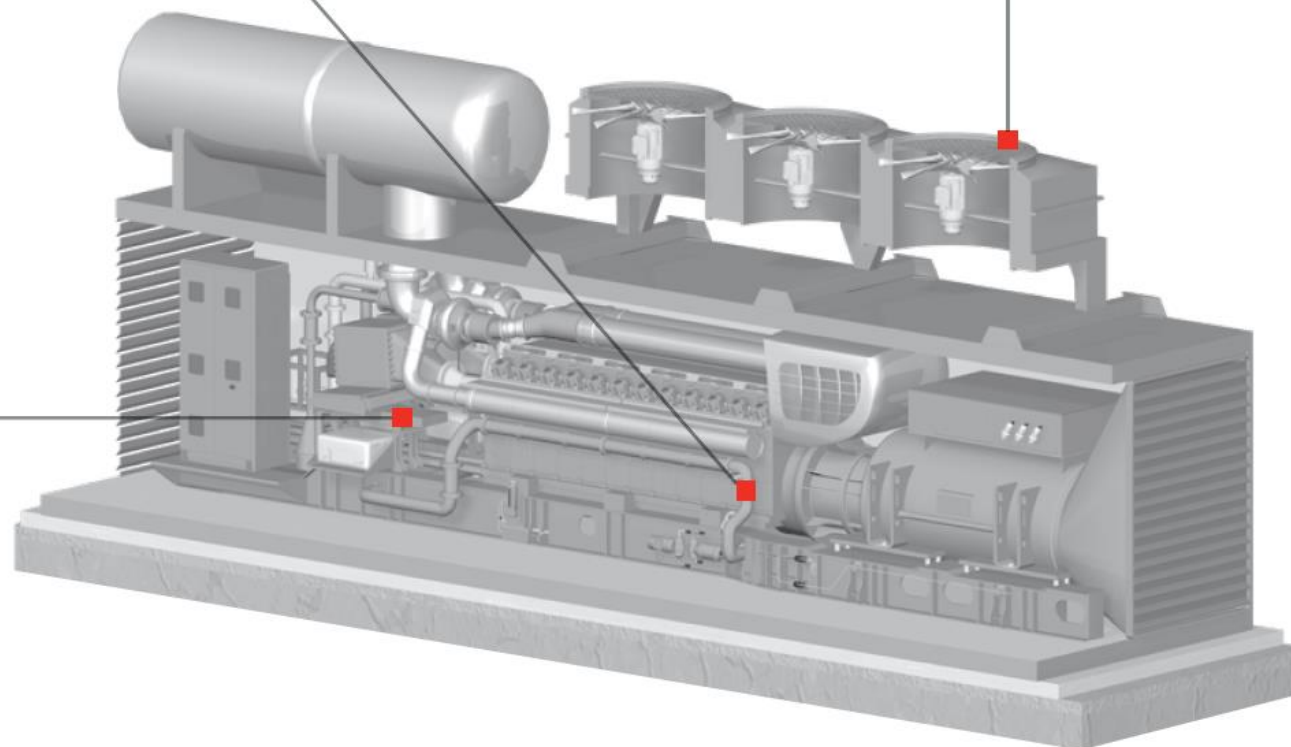
Cooling system

HDAX ELC Premixed 50/50

Delo XLC Antifreeze/Coolant
Concentrate, Premixed 50/50,
Premixed 40/60

Cooling fans

SRI Grease NLGI 2





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Answers, right now.....

