

C1 About the Installation

Use of Natural Gas:

Data pertaining to use of natural gas is required given that natural gas is identified as one of the BAT options. It offers clear advantages in terms of achievement of National Emission Ceilings.

The cost-benefit analysis shows that gas is an option and may be considered as BAT from 2015 onwards.

Should the decision be taken to convert the Diesel engine plant to natural gas firing, alterations are required to the plant, the major changes to the plant can be summarized as follows:

1. The engine will be converted to an engine of type 18V50DF, i.e. a natural gas engine utilizing a small amount of diesel oil (DO) as pilot fuel for ignition.
2. The exhaust gas path will be modified to comply with the requirements of a gas engine exhaust ducting. The alterations will mainly comprise the diversion of the exhaust gas after the Exhaust Boilers directly to the stack and the installation of various safety equipment to the exhaust ducting, i.e. ventilation fans, bursting plates and vacuum breakers.
3. A natural gas supply line shall be established from the future measuring and reduction station to the engine compartments

Engine

The following engine parts shall be changed / added/ modified:

- New cylinder head and cylinder head equipment
- New pistons and piston ring sets
- New cylinder liners
- New con rods (upper parts)
- New camshaft pieces (miller timing)
- New turbocharger specification
- Exhaust wastegate system (air/fuel ratio control)

- Gas fuel system
- Pilot fuel system
- Engine control system
- Cylinder machining, bore increase (460 mm -> 500 mm)
- Engine control and emergency stop system

Exhaust gas specification

Based on a typical NG specification:

- Methane 92.3 v.%
- Ethane 4.0 v.%
- Propane 1.1 v.%
- Butane 0.3 v.%
- Pentane 0.3 v.%
- Nitrogen 1.3 v.%
- CO₂ 0.7 v.%
- Heat value (LCV) 36.9 MJ/Nm³ equal to 47.8 MJ/kg

The expected exhaust gas specification emitted from the engines operating on natural gas is approximately:

- Exhaust gas mass flow: 27.2 kg/s
- Exhaust gas density: 1.254 kg/Nm³
- Exhaust gas temperature: 406 °C
- Unabated NO_x content: approx. 215 mg/Nm³, ref. 15 v.% O₂, dry
- Abated NO_x content 400mg/Nm³ ref 5% O₂ dry.
- SO_x content: Virtually nil due to the very low sulphur content of natural gas
- Particulates: Very low (in the region of 10-13 mg/Nm³)

Data pertaining to metals and ammonia concentrations present in Natural gas is not currently available.

Exhaust gas system

After conversion of the plant to NG then the flue gas desulfurization plant (FGD) is bypassed as the natural gas combustion products contains only negligible traces of sulfur and very few particulates. The FGD plant will be blanked enabling a re-commissioning in case that HFO operation occasionally should become an option even after the conversion to NG.

Refer to Annex 4: "Wartsila Performance info"

And schematic drawing (Annex A: Natural gas) for plant operating on Natural gas.

Choice of Fuel:

The choice of fuel will have an impact on costs, both direct (investment and operational) and indirect (e.g. environmental, public health), which will need to be included in the projected target revenue (collected through electricity tariffs from residential, domestic and non-residential consumers). Enemalta is therefore required to submit a socio-economic impact assessment taking account of both the direct and indirect costs (including public health and environmental considerations such as Malta's and Enemalta's obligations under the EU Acquis [e.g. NEC Directive, ETS Directive] and other international instruments) evaluating their impact on residential and non-residential consumers and the economy in general. The resultant impact on tariffs must be clearly explained, as must the environmental and public health impacts.

This assessment shall consider the expected lifetime of the plant, including inter alia any potential requirements involving changes in the operation such as, but not exclusively, changes in the type of fuel and the generation capacity needed, waste management costs (including transportation), abatement costs (including frequency of replacement of filters, catalysts), additional abatement required as a result of possible new obligations (e.g. lowering of the Air Quality Framework Directive PM_{2.5} Limit Value in 2015), etc. Past and projected fuel prices must be taken into account when preparing the economic impact assessment.

A Cost Benefit Analysis was carried out and is enclosed as Annex 3.

Reference is made to Annex B: MSDS Gasoil, Annex C: MSDS HFO and Annex D: MSDS Lubricating Oil T40.