Introduction

In order to ensure high availability of operation time for remote located wind/diesel (WD) systems, the service and controlling operation shall at all times support that the diesel generator sets are operating under the optimal conditions.

Reduced engine conditions will lead to increased fuel consumption and unnecessary wear of the diesel engine. Especially during operations with big load variations over the day - for example low load operation during night or low load operation supporting high wind penetration - the engine will have increased soot formation. It is therefore important to be able to follow the engine performance and conditions in order to follow the normal recommended standard service intervals.

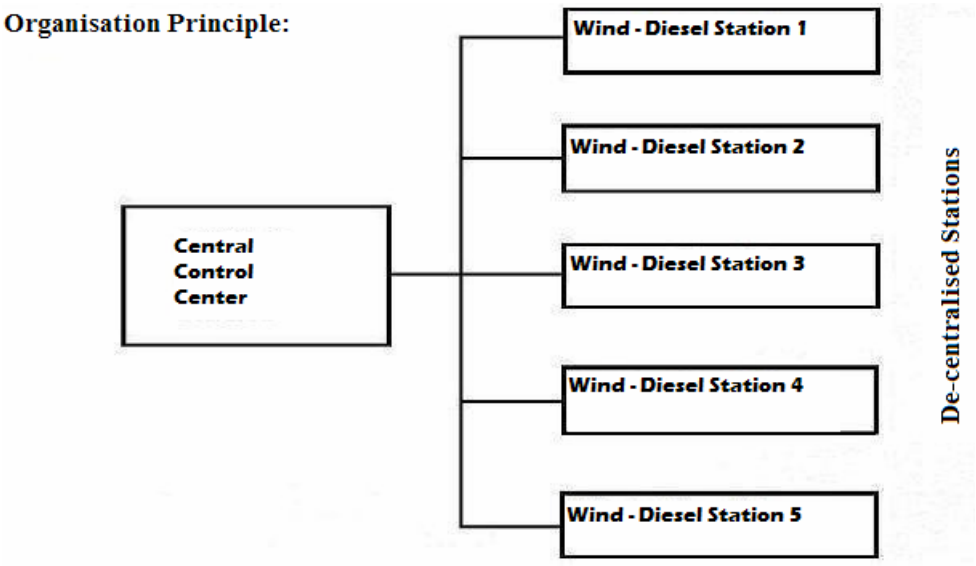
The central controlling system for the decentralised WD systems will be able to control this with a central organisation supporting the decentralised staff.

The communication between the central and the decentralised organisations can be via PLC based remote monitoring system with phone modem, satellite communication. As an alternative fax communication can be used.

The organisation related to this will be:

Decentralised WD systems
The staff at each WD project takes care of the daily operation and maintenance.
This includes standard operations related to fuel, lubrication, cooling and observation.

Centralised controlling centre
The central staff is analysing the received data from the decentralised power stations.
Based on the analyzing of the received data the central staff is planning the corrective actions related to Maintenance & Service.



Decentralised Services

Daily Operation and Maintenance According to Operation Manual

Below are the tasks related to the diesel engine(s) for the decentralised staff.

Fuel	Register received fuel quantity Take samples of received fuel for analysing
Lubrication oil	Level: Top up Operation time: Oil change according to recommended periods Change: Filters, according to recommended periods Check: Pressure and temperature Take samples of lubrication oil for analysing
Cooling system	Coolant level: Fill up Check: Pressure and temperature
Fuel system	Fuel level in day tank Fuel level in storage tank Change: Filters, according to recommended periods
Exhaust system	Check: Exhaust gas for soot level Check: Temperature
Inlet air	Check: Pressure drupes Change: Inlet air filter Change: Filter for turbo charger, according to recommended periods
Start batteries	Check: Conditions Water top-up Check: Charger system
Others	Send data to the Central Control Centre Fill-in record tables Fill-in operation data in log book Check for alarms and eliminate the reasons for the alarm Check for un-normal noise Check for un-normal leaks Check for un-normal vibrations Check for un-normal temperatures and pressure Keep the station clean Replace used spare parts Replace worn-out tools Calibrate tools according to recommendations
General	Record disposal of lubrication oil and other environmental hazardous waste At all times follow the instructions according to the operation manual.

Central Services

Overall Condition and Consulting Service

The Tasks of the Central Service Organisation are.

Legal	Manage the supplier contracts related to warranty obligations Manage the reporting related to environmental and other authorities Purchase agreements with suppliers of fuel and consumables Sales agreements with consumers
Financial	Establish financial control and reporting Prepare budgets Consumer invoicing
Decentralised staff	Employment and management Training in operation and maintenance Quality control at decentralised stations after a planed schedule, e.g. every 1 month Establish and maintain communication system for the daily reporting
Daily reporting, engine control	Evaluate daily reporting of engine conditions by comparing the reports with the basic records according to enclosed graphs for: ➢ kW generator set ➢ Fuel consumption ➢ Temperature charge of air ➢ Pressure charge of air ➢ Pressure charge of air ➢ Temperature of exhaust gas after turbo charger ➢ Temperature of inlet air in general Analyse the recorded operation data with comments and instructions for maintenance and service; plan the needed corrective actions if any. Analyse laboratory test results of fuel and lubrication oil.
Consulting	Consulting for external service works Consulting related to extension of power capacity Consulting for environmental and building permits for future extensions
Spare parts	Common ordering of spare parts and consumables Ordering of external service engineers Communication with suppliers and contractors

Engine Condition graphs