How will Dale future proof Diesel Generators ?

- Latest Consultation Opinions what level of future proofing?
- Level 1 (estimated 10% reduction in NOx) MTU & Scania (2MW & 400kW) able to operate on HVO Green D+ bio diesel fuel available from June 2016.
- Level 2 (estimated 90% reduction in NOx) MTU engines (2MW definitely & 400kW under review) with optional diesel engine exhaust gas treatment with SCR available from Q2 2017.
 - Selective Catalytic Reduction (SCR) is an advanced active emissions control technology system that injects a liquid-reductant agent through a special catalyst into the exhaust stream of a diesel engine. Reduces levels of NOx using ammonia as a reductant within a catalyst system up to 90%.



Current Product - Exhaust Emission Comparison

EN590 Diesel Engine Emissions @ 100% Power Rating	Units	MTU Diesel 2000kW	el 2000kW Cummins Gas 2000kW Scania Diesel 400k		MTU Diesel 400kW	
ENSSO Dieser Engine Emissions @ 100/01 Ower Rating		16V4000G63	QSV91G	DC16 71A	10V16000G80F	
NOx (fuel optimised diesel engine)		8.8	1 /13	2 28	18	
NOx (emissions optimised diesel engine)		6.4	1.43	0.00	4.0	
CO (fuel optimised diesel engine)		0.5	2 70	0.44		
CO (emissions optimised diesel engine)	g/k//b	0.7	2.13	0.44		
HC (fuel optimised diesel engine)	8/ K VVII	0.12	NA	0.17	0.17	
HC (emissions optimised diesel engine)		0.17				
Particulates (fuel optimised diesel engine)		0.04	0.00	0.04	0.07	
Particulates (emissions optimised diesel engine)		0.03	0.00	0.04	0.07	
SO2 (fuel optimised diesel engine)		0.002			0.002	
SO2 (emissions optimised diesel engine)		0.002			0.002	



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Engino Tuno	2N	1W Engine NOx Emissions i	400kW Engine NOx Emissions in g/KWh	
Lingine Type	MTU Fuel Optimised	MTU Emission Optimised	Cummins Nat.Gas Engine	MTU Stage IIIA Engine
EN590 Diesel	8.8	6.4		4.8
Level 1 HVO	7.9	5.8	1.43	4.3*
Level 2 SCR	0.88	0.64		0.48*
				*Under review



The basics of the catalytic exhaust purification are to use the following methods:

- Selective Catalytic NOx-Reduction (SCR)
- Diesel Particulate Filter (DPF)
- Diesel Oxidation Catalyst (DOC)

- → NOx reduction
- → particulate matter (PM) reduction
- ➔ CO and HC reduction



EGT can yield significantly lower emission levels than engine internal means.
There is potential to substitute muffler sound attentuation by EGT components.



NOx and PM reduction (SCR + DPF) – Technical details









- Todays technology and generation of engines meet current exhaust emission regulations.
- Future regulations unknown! But assuming a target of the future EU Medium Combustion Plant Directive (0.5g/kWH / 190mg/NM³)
- Exhaust gas treatment (EGT) with SCR + DPF + DOC available today with current 3rd generation of diesel engines at penalty of power output circa.
 25%.
 - Add more generators to compensate for loss of power if emission regulations change.
 - SCR Effectiveness curve is currently being obtained. (% reduction vs time)

