



SCR-Technology in Agricultural Tractors

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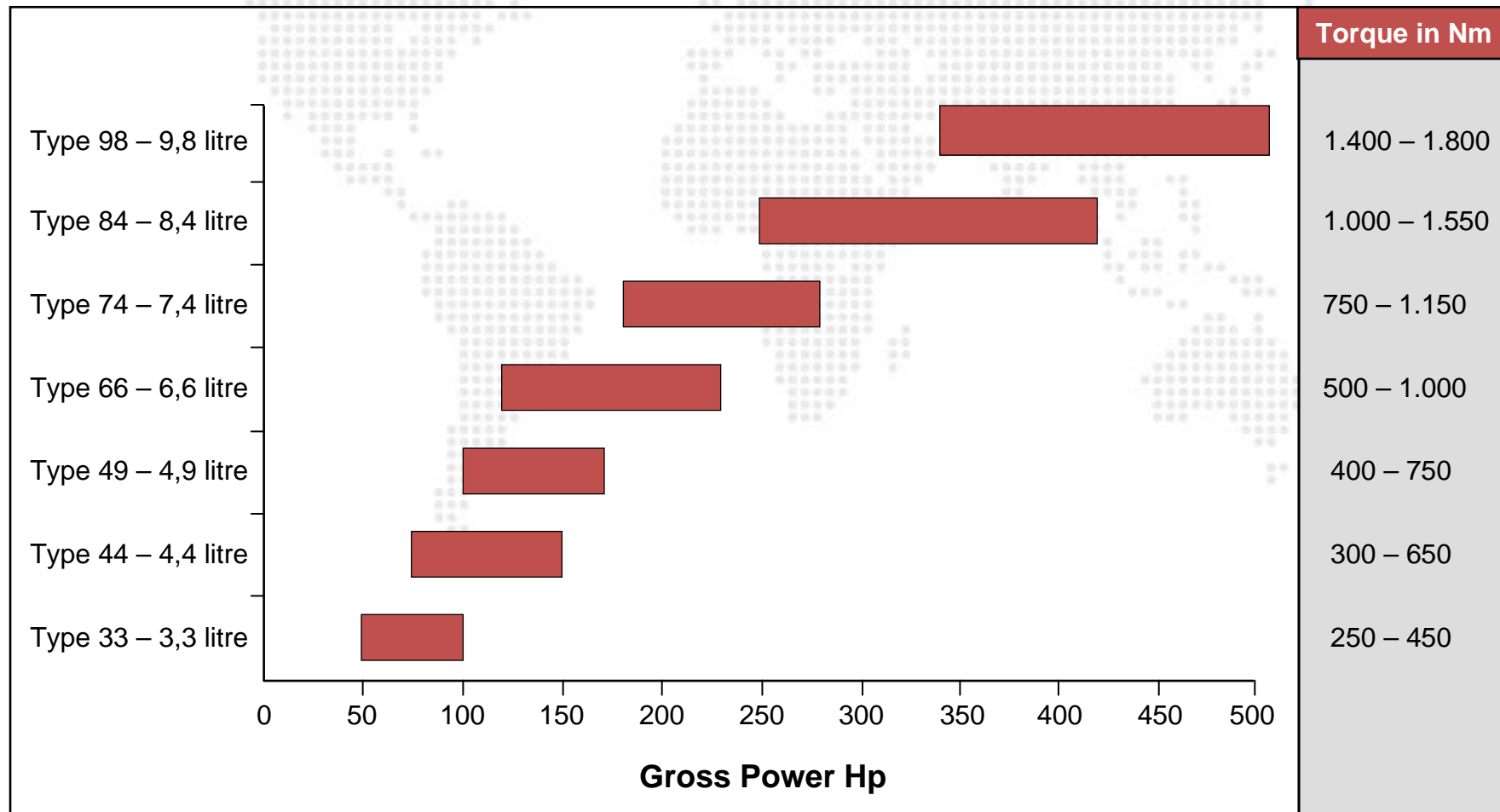
No Compromises

Increased Power **Reduced** Emissions **Improved** Fuel Economy



1	Stage 3b: Why SCR, not cEGR ?
2	SCR in Agricultural Equipment
3	Integrator partners
4	SisuTronic – EEM4

SISU offers the most comprehensive off-highway engine family below 10 liters

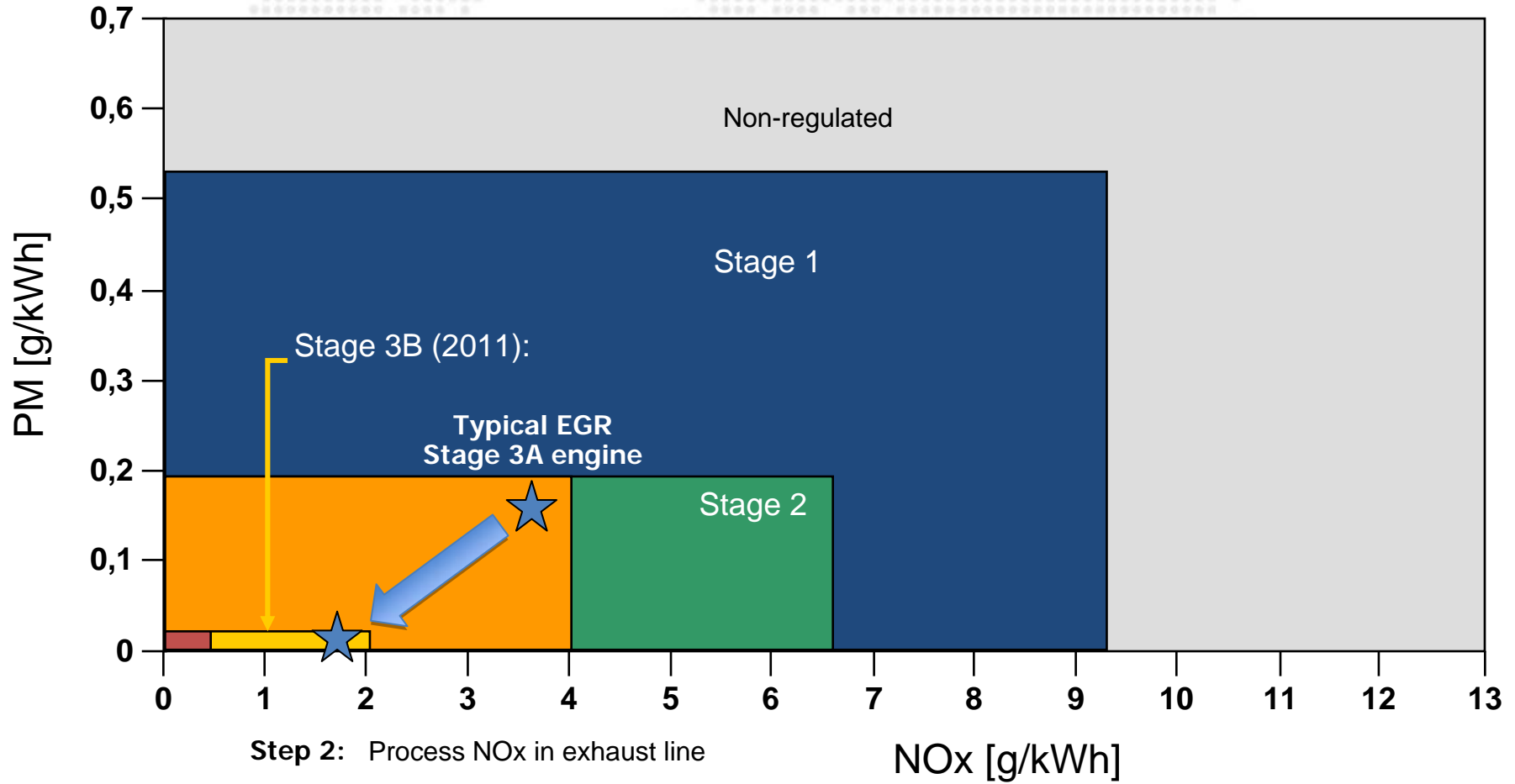


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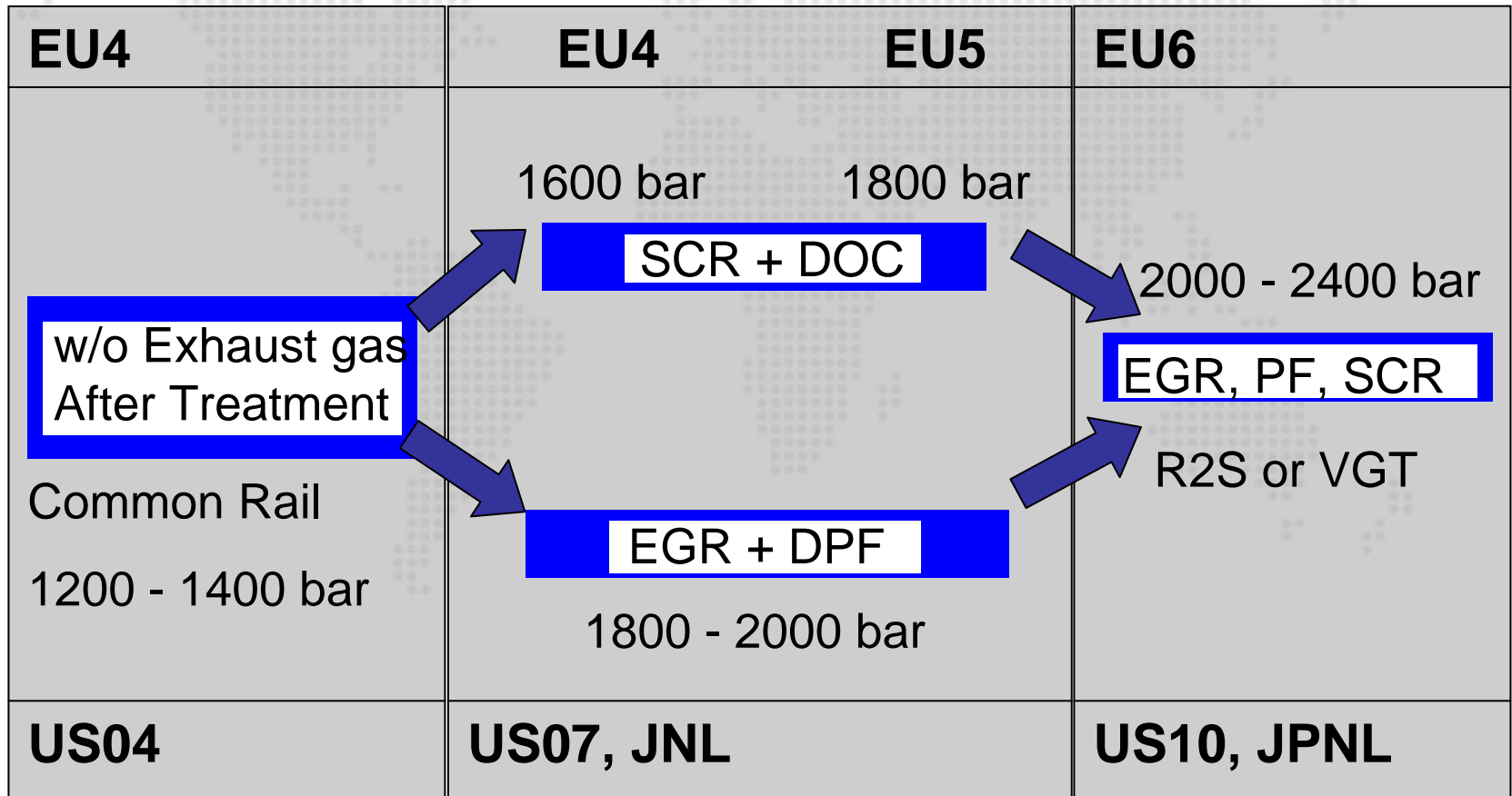
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SCR technology launch at STAGE 3B



Emission reduction strategy



Stage 3A

Stage 3B

Stage 4

Benefits of SCR route in Stage 3B compared to EGR route

- Around 7-8 % better fuel consumption (net power)
- Remarkably lower heat rejection to coolant
 - Significantly lower fan power than with cEGR -> Lower noise
 - Re-design of cooling package may lead to significant tooling costs
 - With SCR 3A cooling package is sufficient (CAC dimensioning still open)
- More tolerant to low quality fuel
- Longer oil drain interval
- Diesel Particulate Filter (DPF) can be avoided
 - DPF needs active regeneration by separate fuel injection leads to additional sfc penalty
 - DPF needs additional "master regeneration" time to time
- No need for Variable Geometry Turbo (VGT)
 - Expensive
 - Problems in durability
- SCR is proven technology used by european truck industry



1 Stage 3b: Why SCR, not cEGR ?

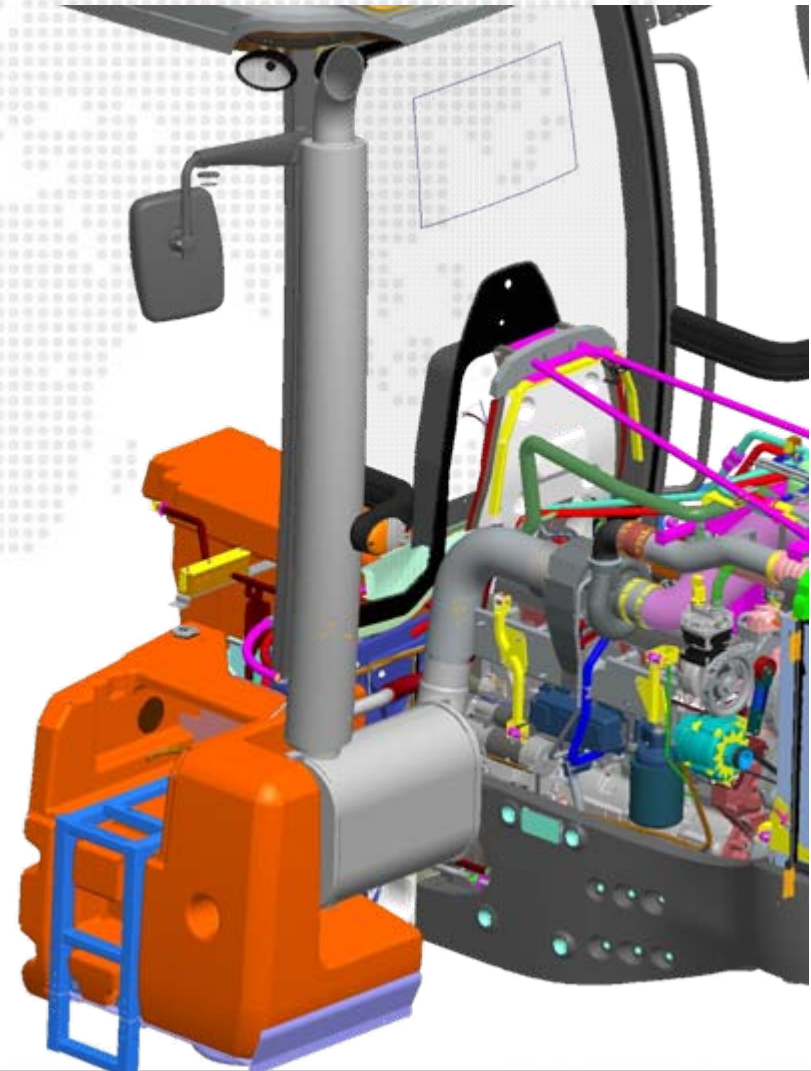
2 SCR in Agricultural Equipment

3 Integrator partners

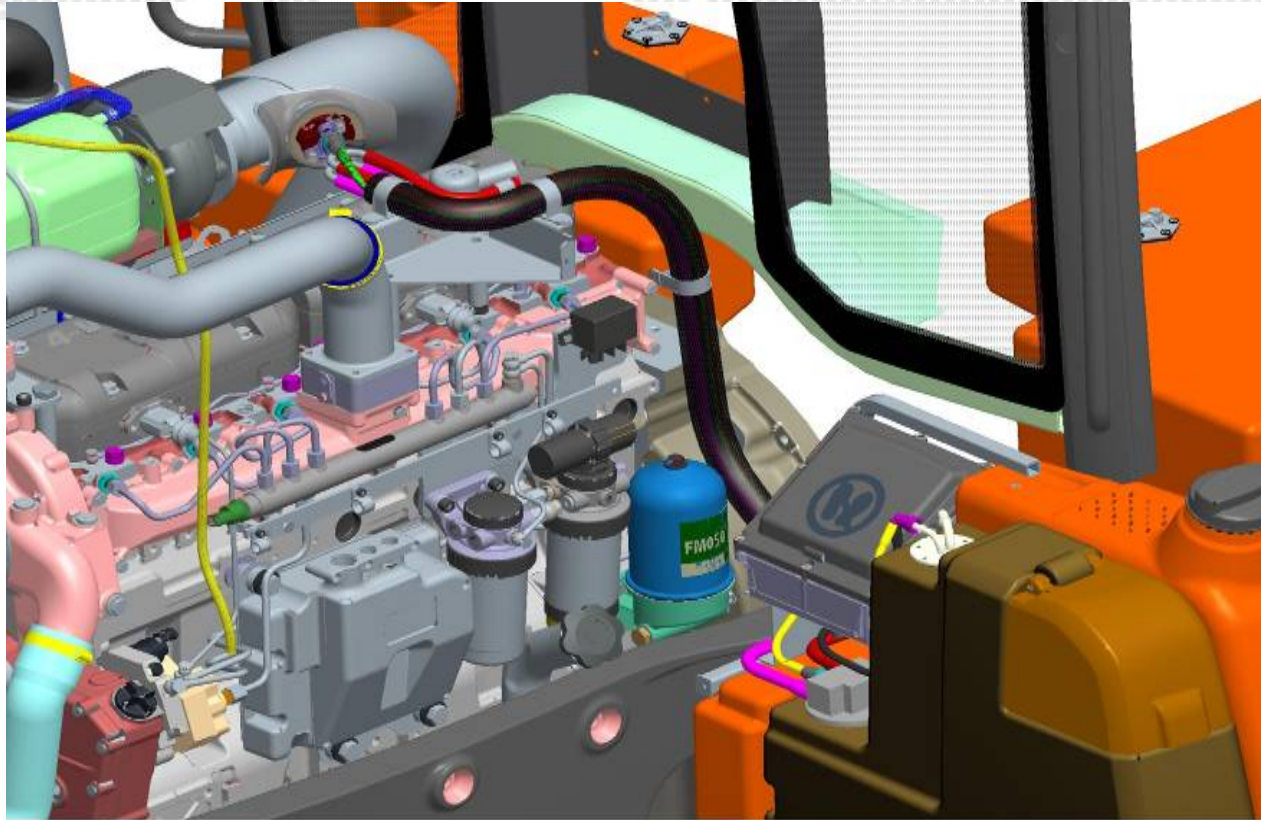
4 SisuTronic – EEM4

SCR-system in Stage 3A tractor

- Same base engine than in standard tractor
- Best in class fuel economy
 - 10 % sfc reduction to standard Stage3A
 - Adblue cost
- 10-15 % lower heat rejection compared to standard Stage 3A engine
 - Smaller cooling package
 - Opportunity to increase tractor power
- Clean combustion
 - No visible smoke in any condition
 - Longer oil drain interval
- SCR packaging quite easy

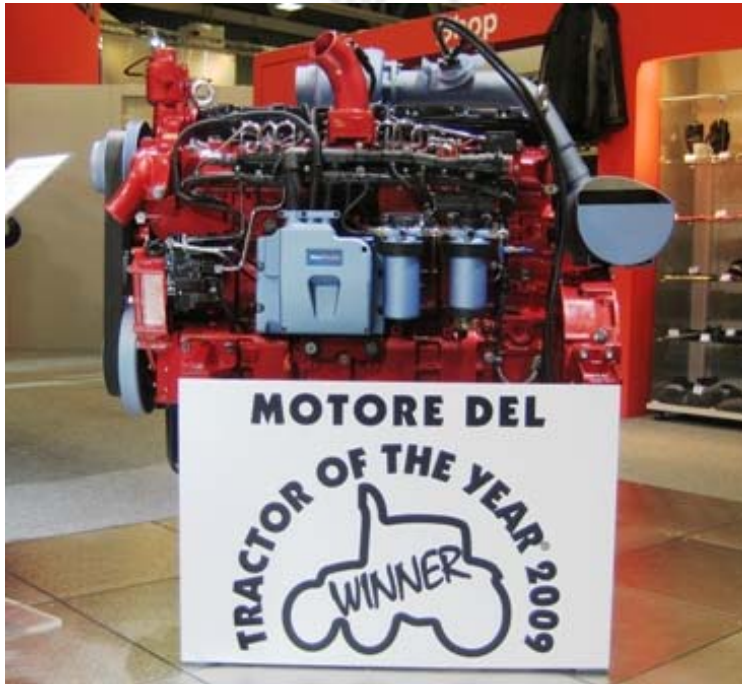


SCR-system in Stage 3A tractor

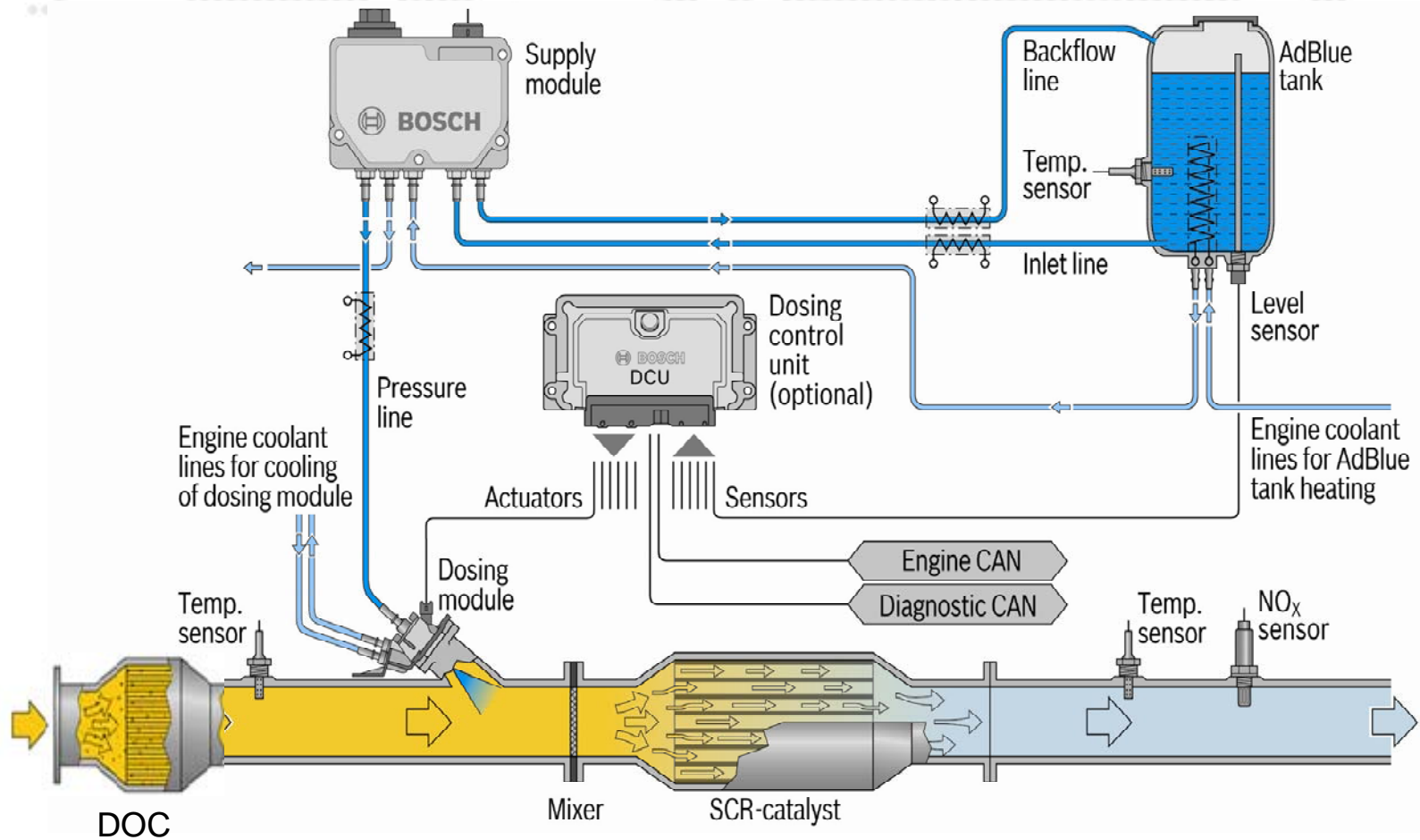


- Urea tank 51 litre
- Fuel tank 580 litre
- Urea consumption ~3 %
- Bosch Denox 2.0
- Airless system

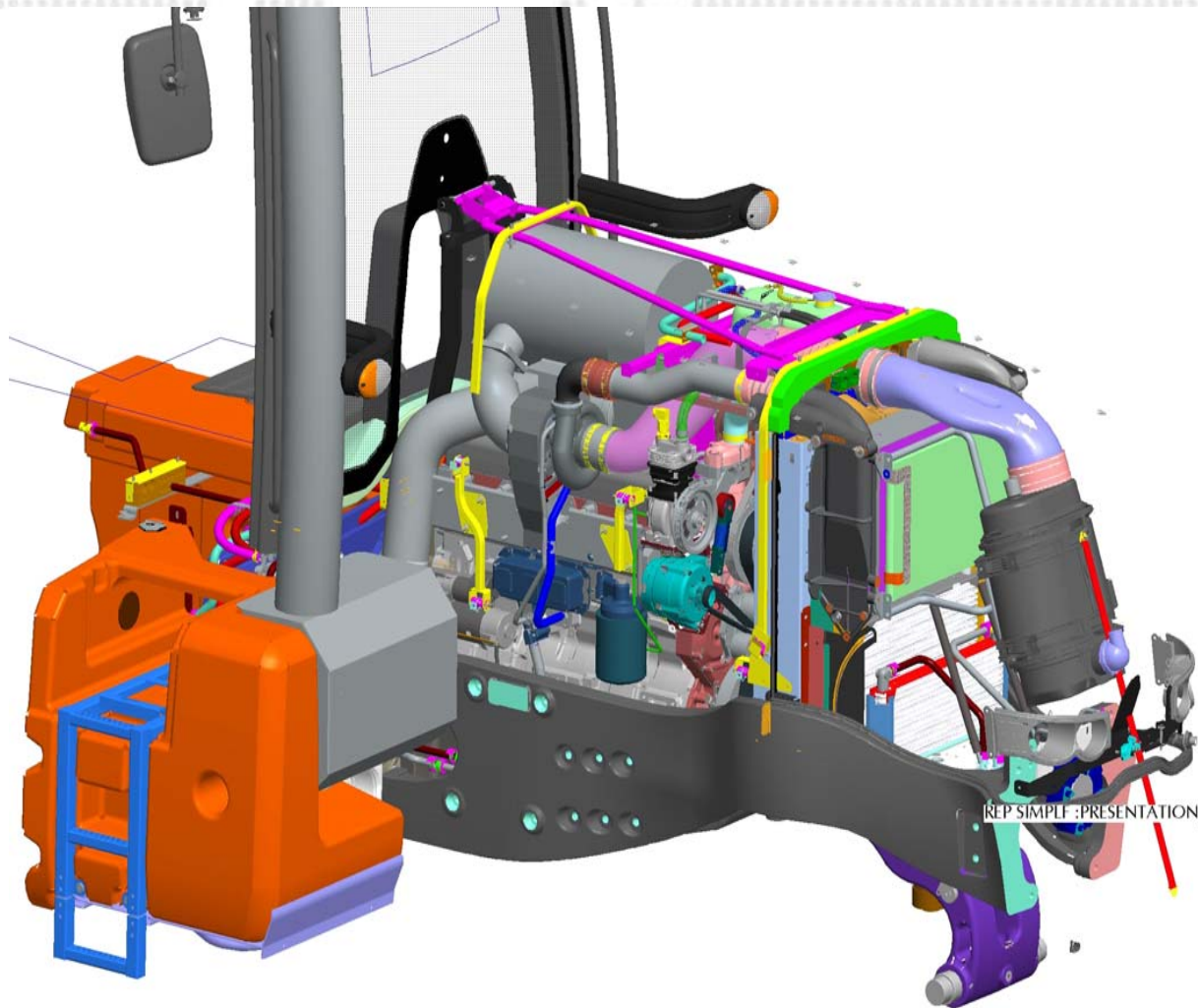
Tractor of the year 2009 prize with SCR engine



DNOX2.2 System Components for Stage 3B



SCR-system in Stage 3B tractor



Agenda

1 Stage 3b: Why SCR, not cEGR ?

2 SCR in Agricultural Equipment

3 Integrator partners

4 SisuTronic – EEM4

Close co-operation between Sisu-OEM-Integrator

- Approved integrators are Donaldson and Proventia
- Experts in exhaust line design, simulation and manufacturing
- Various different exhaust lines in Off-road equipment
- Sisu is responsible of engine emissions
 - Validation in engine lab
- Effort in exhaust line development phase. In production phase no difference to current OEM logistics.





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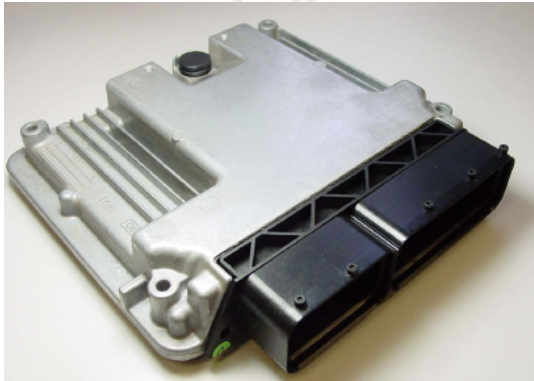
4 SisuTronic – EEM4

General information :

- 4th Generation Electronic Engine Management system
- Bosch EDC17 ECU & CarTronic SW platform
- SisuTronic SW + CarTronic SW = EEM4 SW
- Integrated SCR/Denox functionality in the ECU SW
- Two system levels, ECO Common Rail ECU for 3-, 4-, and 6- cyl.
HD common Rail ECU for 7-cylinder engine
- Provides same functions as EEM3

EEM4 ECU's

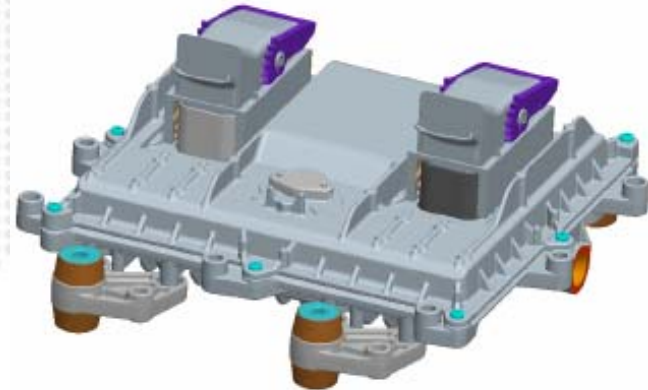
ECO Common Rail



EDC17CV54

12/24V, Engine mounted

HD Common Rail



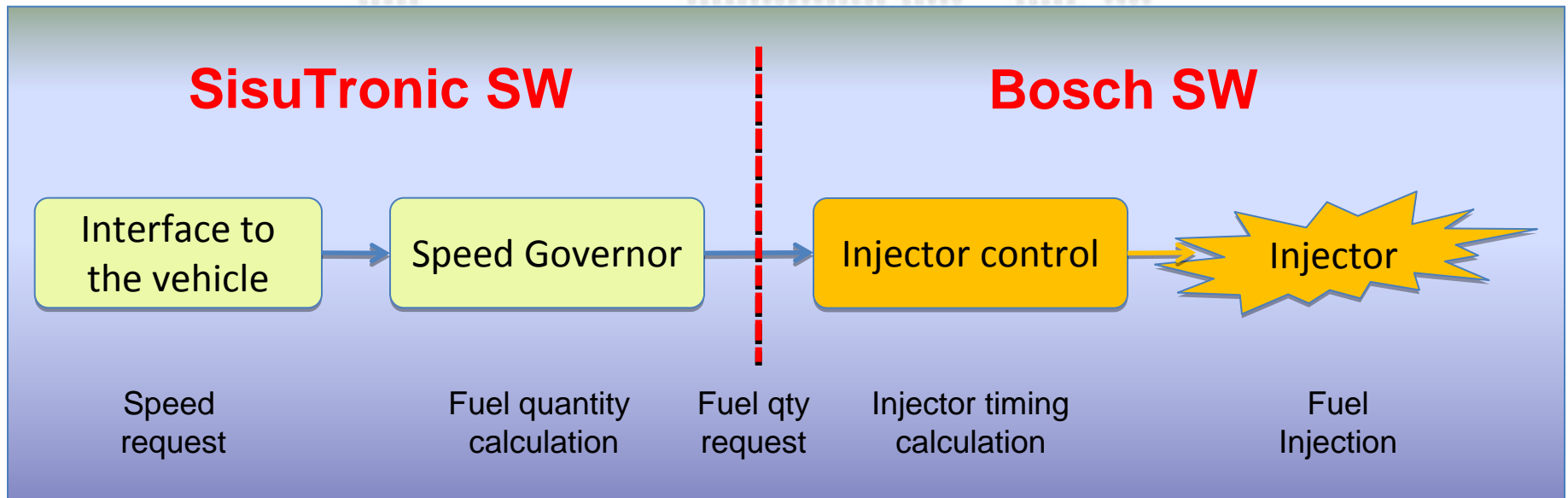
EDC17CV41

12/24V, Engine mounted

Chapter 4 SisuTronic-EEM4

Sisu Power – Bosch has a unique Software co-operation model

Example : Principle of engine speed / torque control



SisuTronic EEM4 SW :

- Bosch deliver Cartronic SW as a source code and Sisu removes the modules that are not needed or are not suitable for Sisu applications. Sisu builds the SW and is a system integrator
- SisuTronic SW provides control for engine speed/torque, CAN-bus communication , customer specific functions etc.
- Sisu is able to build the control SW for SCR, EGR and other needed EAT systems.
- One SW version for all applications, customer specific differentiation is made with a parameters

Chapter 4 SisuTronic-EEM4

EEM4 vs. EEM3

	EDC7UC31	EDC17CV54	EDC17CV41
<i>Generation</i>	Tier-3	Tier-4	Tier-4
<i>Number of Cylinders</i>	up to 7-cyl	3-, 4- and 6-cyl.	up to 7-cyl
<i>Mounting location</i>	Engine	Chassis / Eng.	Engine
<i>Supply Voltage</i>	12 / 24V	12 / 24V	12 / 24V
<i>Bosch SW Platform</i>	TruckTronic	CarTronic	CarTronic
<i>Connectors / pins</i>	3 / 141	2 / 154	2 / 192
<i>CAN-bus</i>	2	2	2
<i>SCR/Denox control</i>	-	Yes	Yes
<i>Comparison to Tier-3</i>		Lower cost level integrated Denox	Higher performance integrated Denox

SisuTronic / EEM4 Summary

HARDWARE:

High quality and reliability components

SOFTWARE:

Latest Common Rail know-how

Precise engine control

Tailor made for Off Highway use

Flexibility to adapt for customer needs !

THANK YOU



ALWAYS GROWING

AGCO
SISU POWER



No Compromises

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