P-4 Selective Catalytic Reduction and Exhaust Gas Recirculation Systems Optimization

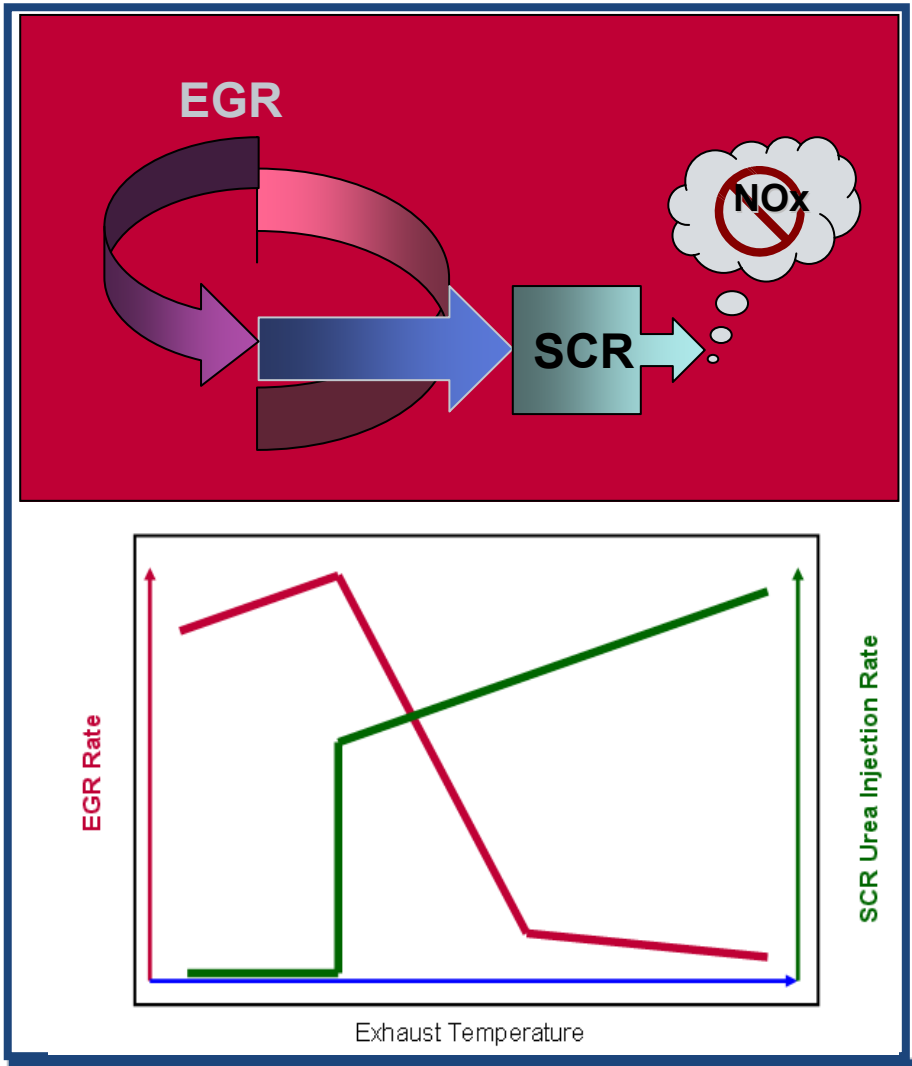
Walter G. Copan, Daniel Skelton and Curtis J. Knapper
Clean Diesel Technologies, Inc.

Clean Diesel Technologies

- Next generation SCR: **airless return flow cooled** urea injection systems simplified, cost effective, fuel efficient NOx control
- Single fluid return flow urea injection **preferred for heat removal**.
  - Safe, proven durable, effective (proper design required)
  - Passenger Car to Heavy Duty Diesel and Large Engine
- Combination of EGR with SCR envisioned by Clean Diesel in 1995-6, and subsequent to research programs was Patented 1997.
- SCR + EGR can be used to **optimize diesel fuel economy with NOx emissions performance**

Manage fuel combustion for highest thermal efficiency
Apply EGR at low temperature cycles
Reduce EGR rate with SCR activated at temperature

SCR + EGR Summary



- ✓ Fundamental Innovations for Fuel Economy and NOx Emission Control
- ✓ Clean Diesel provides key patents on EGR and SCR combined
- ✓ EGR + SCR is the approach of choice for NOx control meeting US EPA 2010 and Euro 5/V and 6/VI limits, with optimized fuel efficiency
- ✓ Manage EGR control for synergy with SCR for NOx removal
- ✓ Achieve proposed CO_2 targets
- ✓ Licenses available from Clean Diesel directly or pass-through from authorized licensees