EU7 and electrification challenges

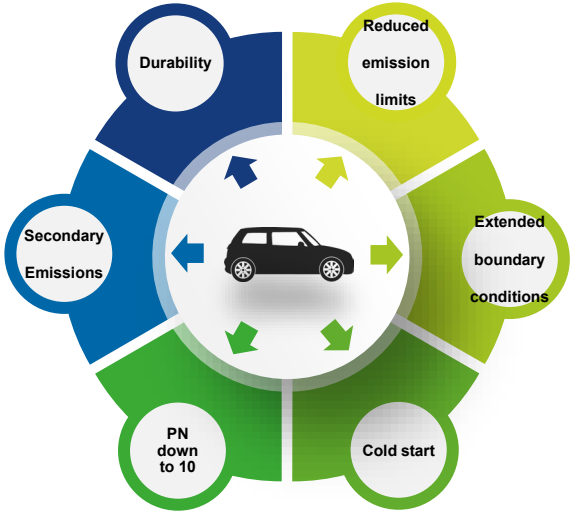
EU7 Challenges

EU7 challenges

Date

Presentation outline

- **New challenges through EU7 scenarios**
  - Extended boundary conditions
  - Cold start conditions
  - New PN-regulations
  - Secondary Emissions
- **Catalyst developments to adress EU7 challenges**
  - Improved trimetal light-off catalyst and coated EHC´s
  - New high filtration efficiency GPF
  - Advanced ammonia slip catalysis for gasoline applications
- **Concluding remarks**

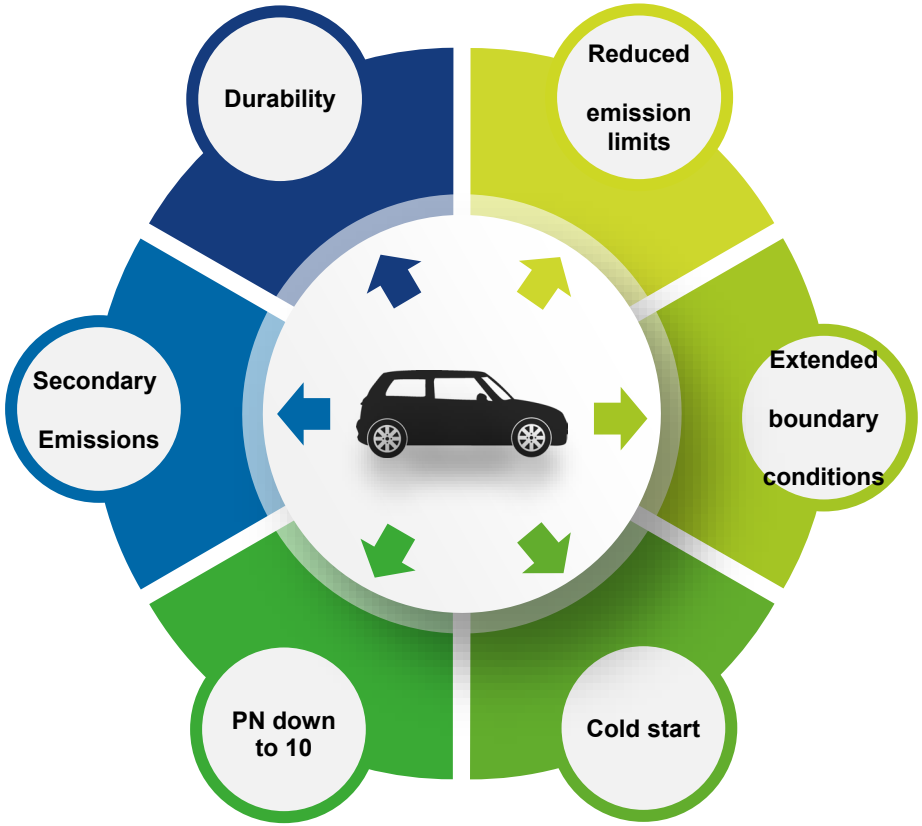


New challenges through Euro 7

Durability requirements extended to 240.000 km

Emission limits for up to now unregulated pollutants: ammonia, nitrous oxide, methane and aldehydes

Particulate numbers measured to a diameter down to 10 nm



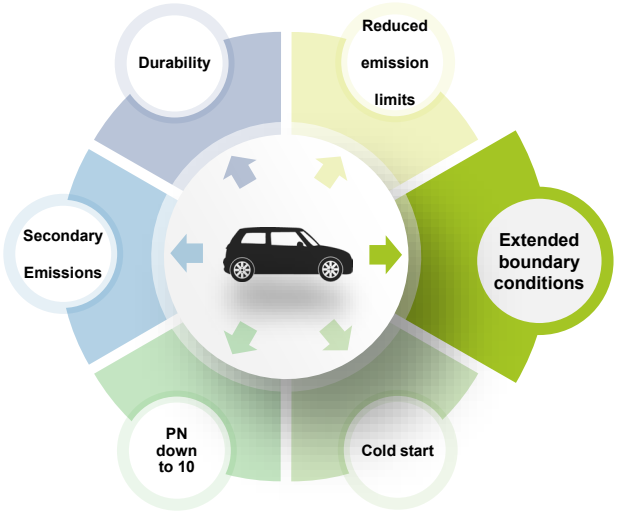
Sharp reduction of CO, HC and NOx reduction of PN
Some limits are reduced by more than half

Wide range of vehicle operation conditions
Normal driving conditions extended, e.g. down to -7 °C

Higher weight of cold start under “any trip” conditions
major challenge even with emission budget for short trips

Scenarios for Euro 7 pose numerous new challenges for the exhaust aftertreatment

Extended boundary conditions play a crucial role for emissions

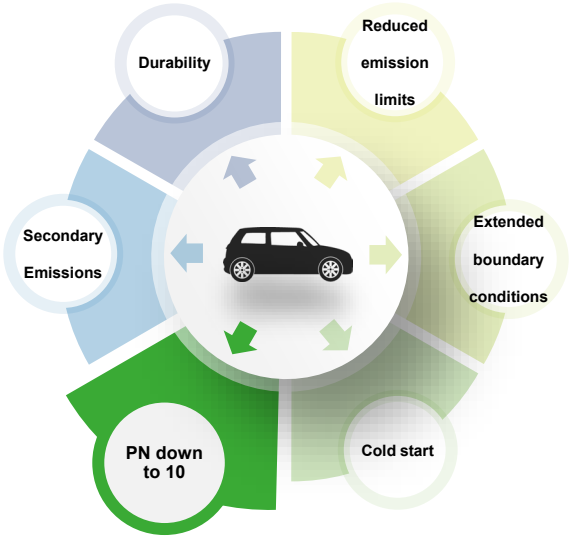


Much higher raw emissions especially for HC and NOx

Cold start as a major challenge

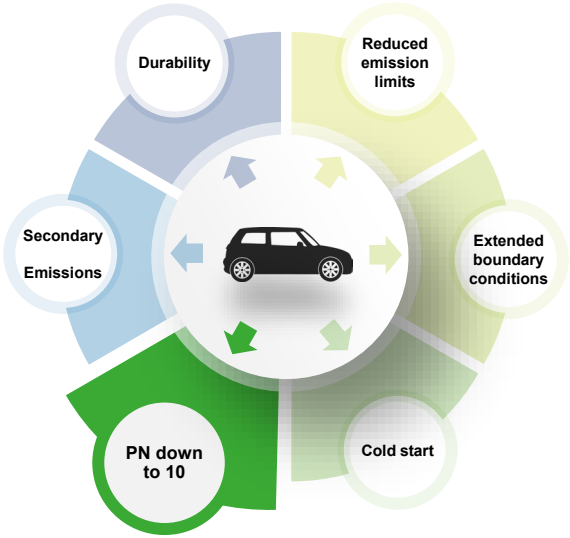
Higher raw emissions in combination with low temperature foster need for improved TWC function and better light off

Impact of measurement of particles down to 10nm increase the PN raw emissions of gasoline engines



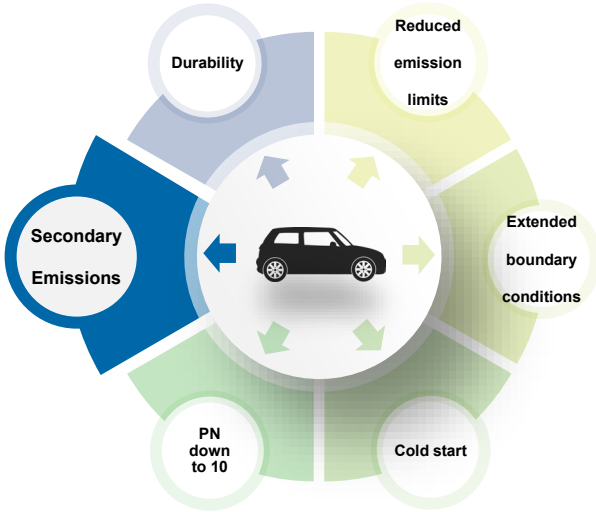
For gasoline engines high number of small particles that is now included

With inclusion of PN down to 10 nm, some applications face a 2 times higher raw emission



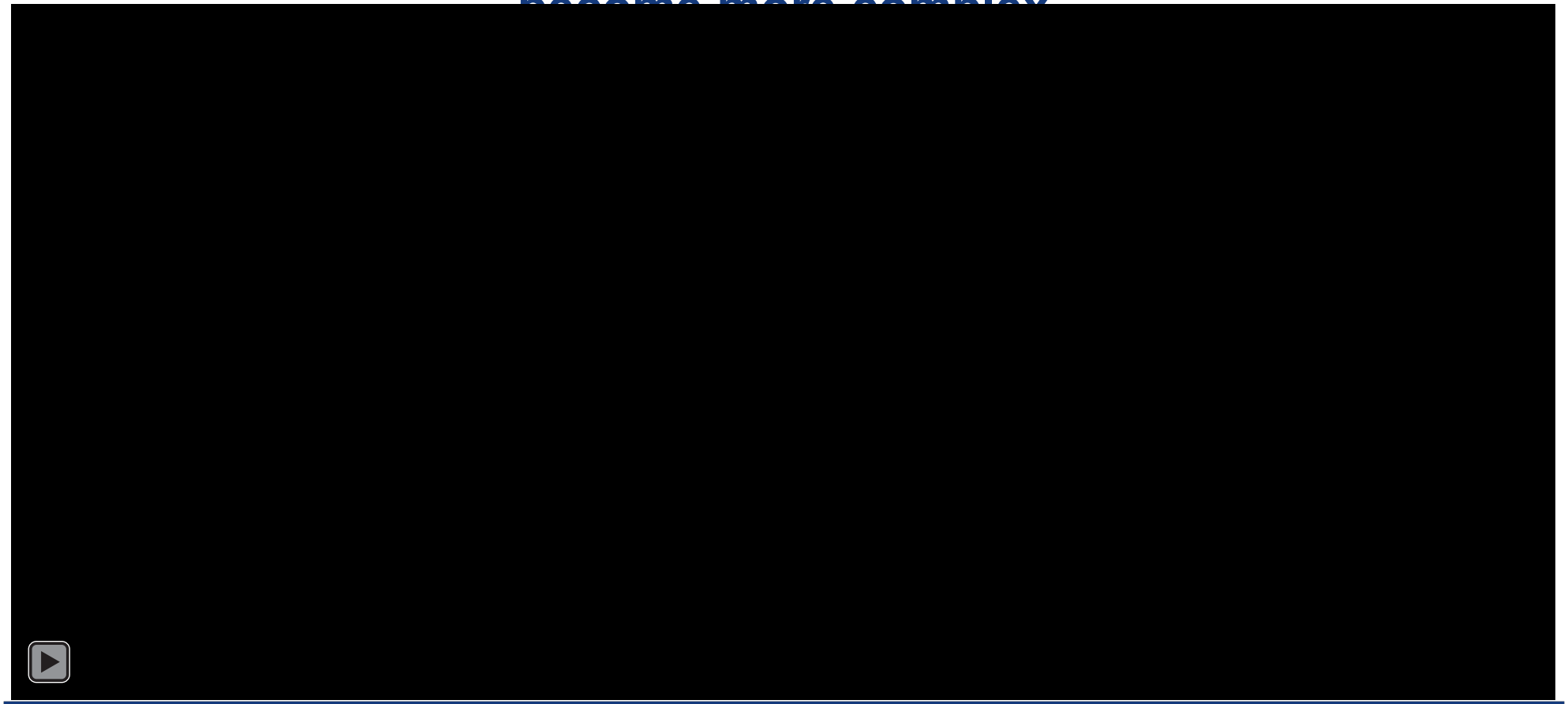
Higher raw emissions and reduced PN emission limit drive the need for increased filtration efficiency of GPFs especially in fresh state

New regulated pollutants NH_3 and N_2O to be considered



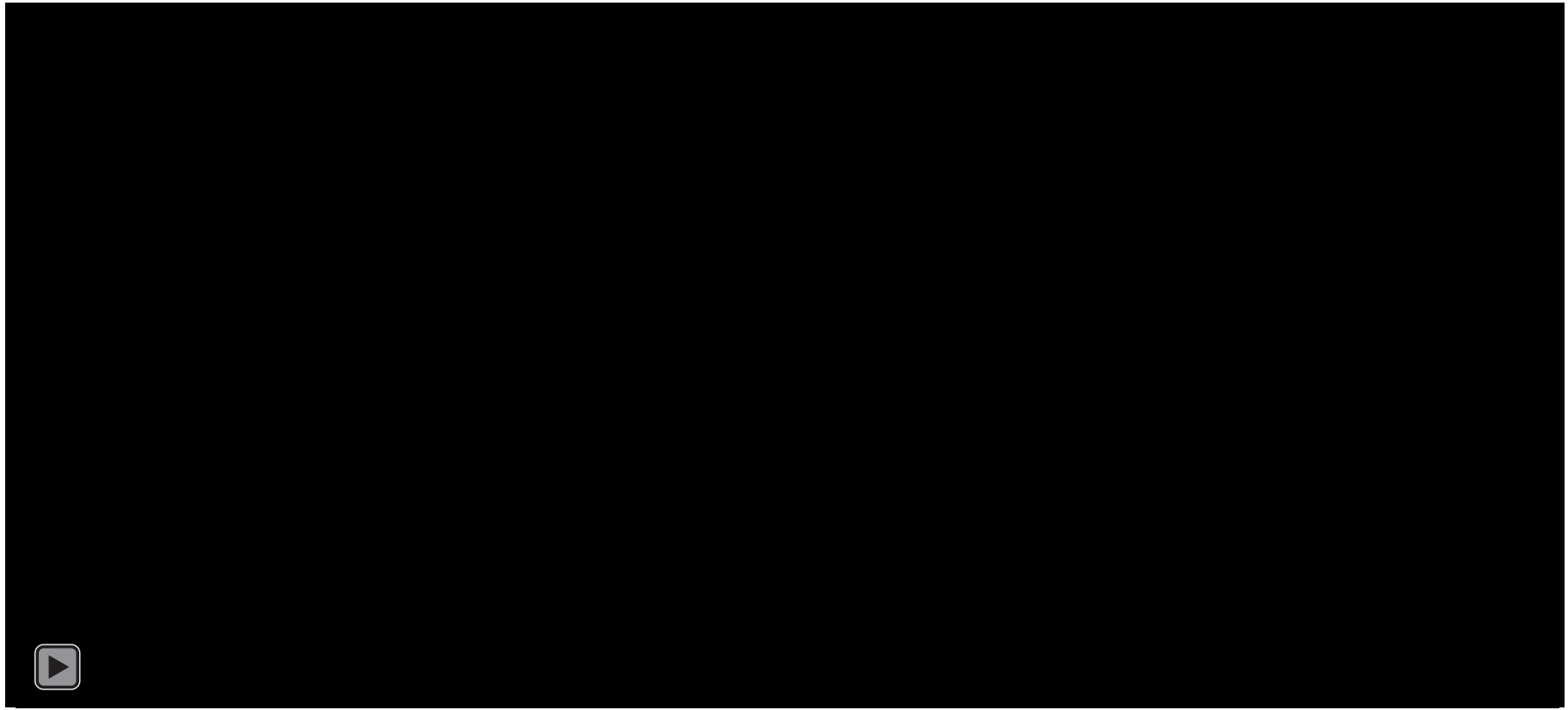
For gasoline engines N_2O is less critical while NH_3 limits need solutions to convert NH_3

Euro 7 aftertreatment systems become more complex



To comply with stringest Euro 7 improved or new catalyst technologies are needed

Superior TWC technology with lower light of as enabler for better cold start emissions

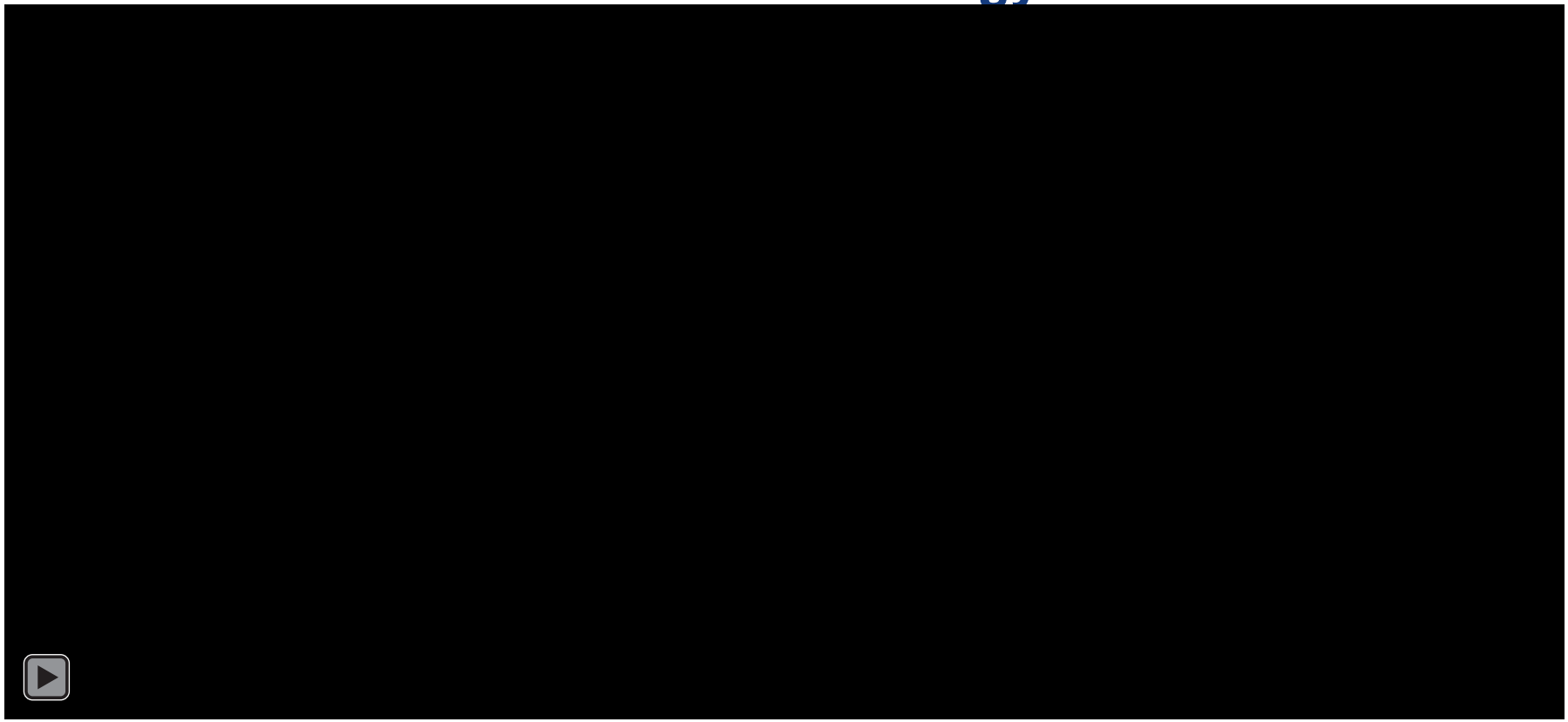


New Tri metal technology offers better light-off at reduced PGM costs

Higher raw emissions due to PN10 and lower limit require higher FE

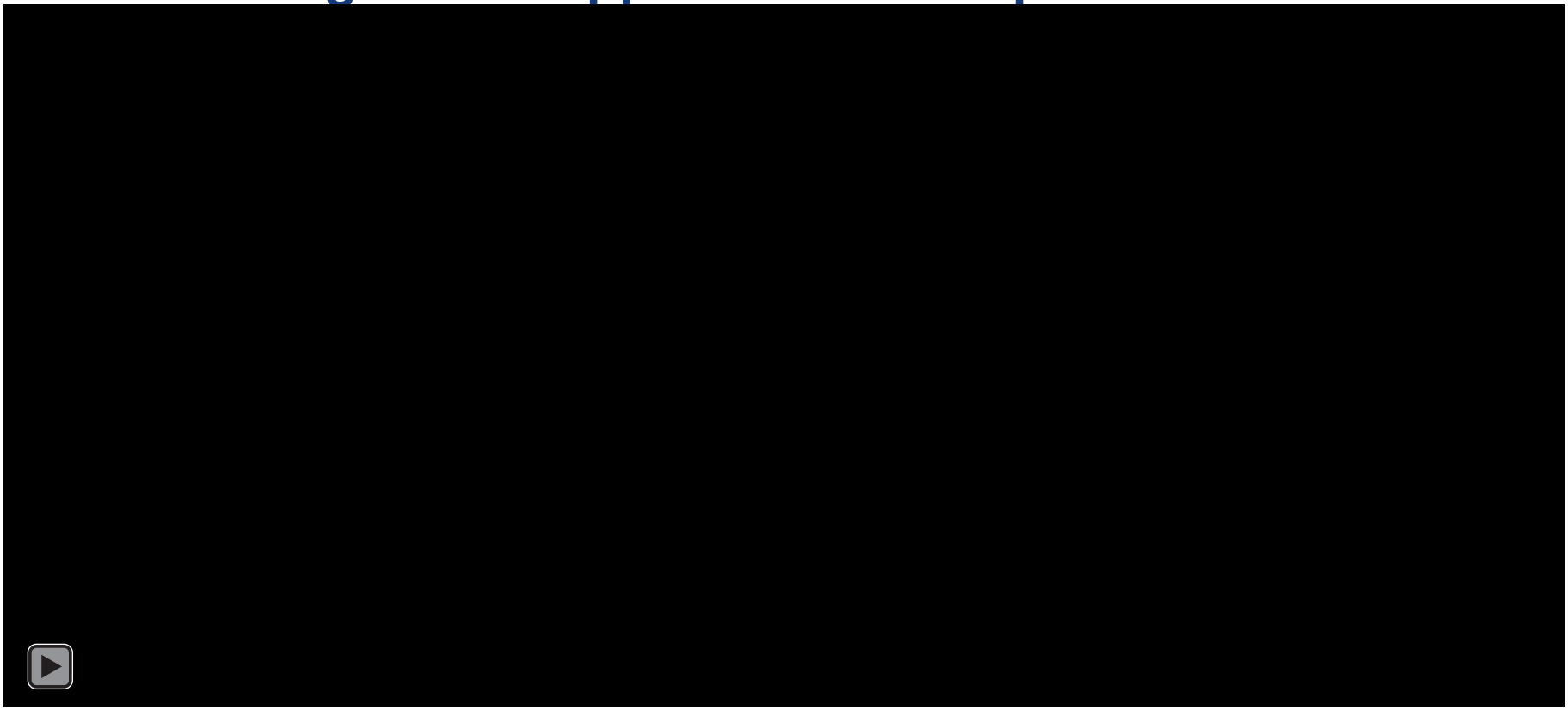
New GPF technology with FE enhancement show FE > 90 % also for small particles down to 10

New GPF technology is superior of Serial technology



With GPF technology with FE enhancement the EU6d vehicle complies with the stringent Euro 7 PN limits discussed

Simple carry-over of diesel ASC to a gasoline application is not possible



g-ASC – a dedicated technology for gasoline applications was developed

Potential of a g-ASC to reduce ammonia emissions

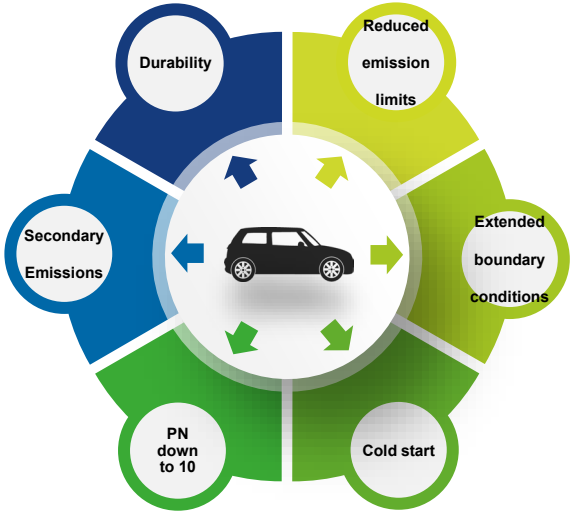
g-ASC effectively controls NH_3 emissions under gasoline conditions

To address aging stability further improvement of g-ASC generation 1 was needed

For the new g-ASC technology an improved NH_3 performance with a decreased N_2O make and higher aging stability was achieved

Summary

- Tightened cold-start requirements, new limits for NH_3 and the inclusions of the sub 23 nm particles are of special concern
- As a consequence, future exhaust gas aftertreatment concepts become more complex and require optimized catalyst technologies
  - New Tri metal technology offers better light-off at reduced PGM
  - GPF technology with FE enhancement to comply with stringent Euro 7 PN limits
  - a new g-ASC technology with improved NH_3 performance and higher aging stability
- Umicore will continue inventing and developing new tailor-made solutions together with our partners in the automotive industry



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