# Status of the HDDF retrofit regulation

GFV Jan 13th 2016

Geneva

# Progress since June 2015 GRPE

- 13 tele/web meetings
- 3 face to face meetings
- informal document submitted to GRPE
- work still in progress:
  - administrative and documentation provisions
  - details and verification of simplified testing

# Next steps and time schedule

Drafting will be continued

A working document for the complete regulation will be submitted for the June 2016 GRPE (deadline 4 March 2016)

# HDDF retrofit regulation

Structure:

I - Preamble and guidance

II - Requirements and specifications

- Annex 1 - Information and Communication documents
- Annex 2 - Requirements and tests

# HDDF retrofit regulation overview

- The following contains an update of GFV41-03 which was presented during the GFV session at the June 2015 GRPE
- Green text reflects new developments

# Overview

A new regulation will include the requirements for the type approval of **retrofit systems** intended to be fitted on a heavy duty diesel vehicle to enable its operation either in diesel mode or in dual-fuel mode.

Only ~~Euro IV,~~ Euro V and EEV vehicles will be included in the first release of the regulation.

~~The principles of the new regulation are still under discussion.~~

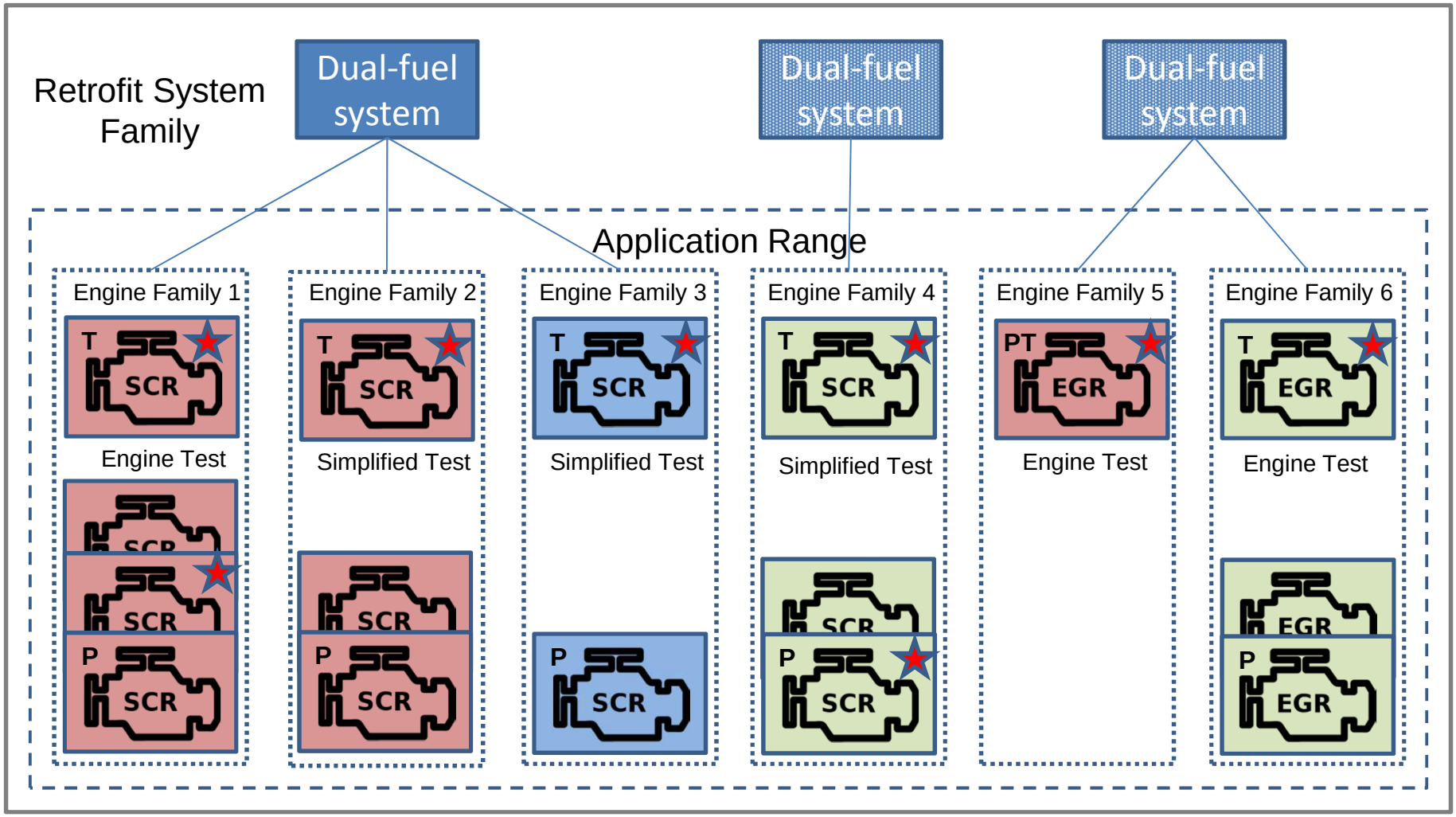
# Issues to be considered

- Regulation for type approval of **systems** for retrofitting diesel vehicles to dual fuel operation, but it references to R49: type approval of **engines**
- Tension between retrofit conversion effort/costs and environmental impact/benefit
- Level playing field for both retrofit system manufacturers and engine/vehicle manufacturers
- Euro IV, V and EEV diesel engines have limited diagnostic functionality and no $NO_X$ closed loop control (difference with R115 for LDV's)

# Principles

- Type Approval process
- Emission Tests: Engine test and simplified test
- Methane emissions
- Safety

# System Family, AR and Actual Applications



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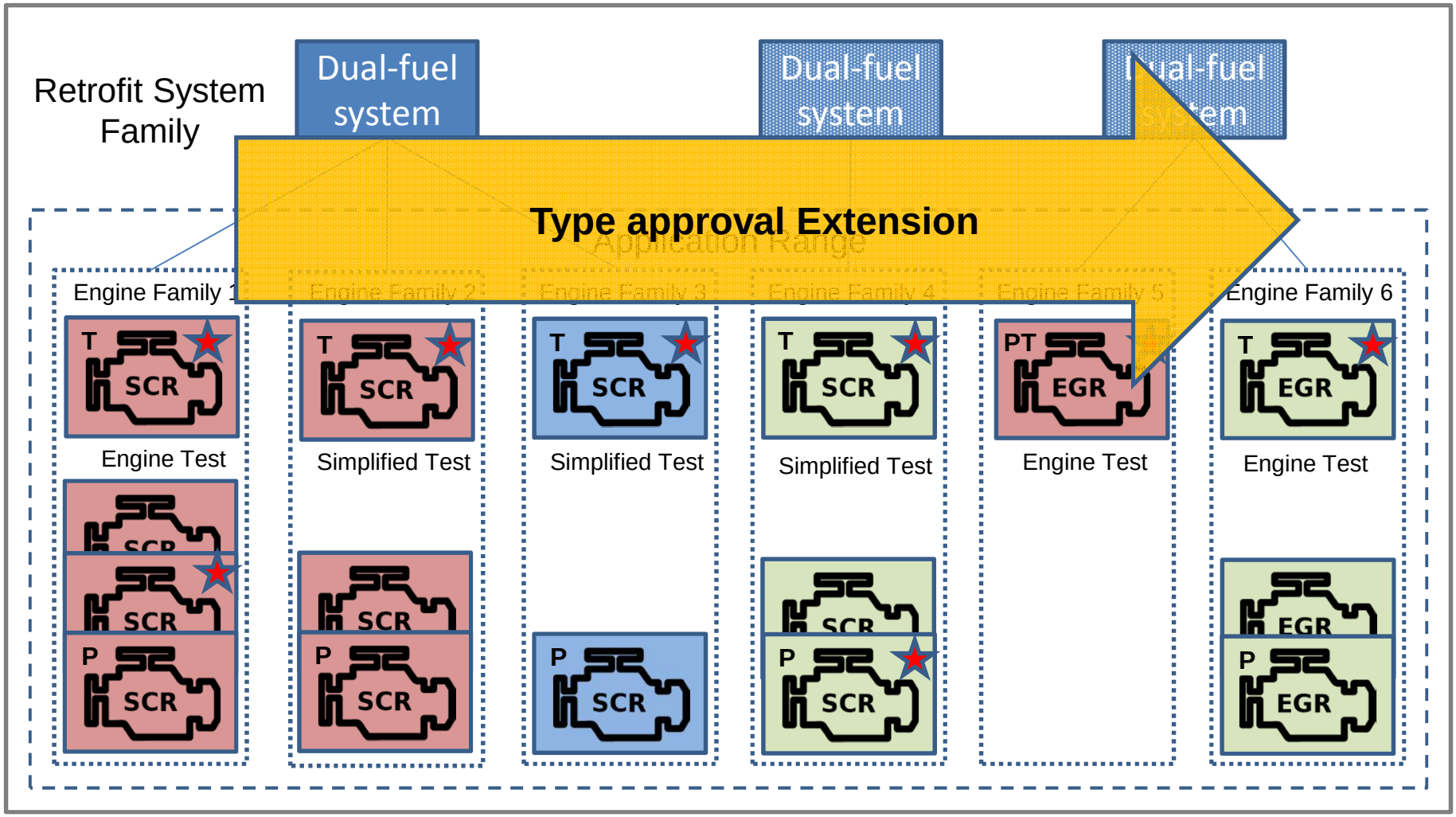

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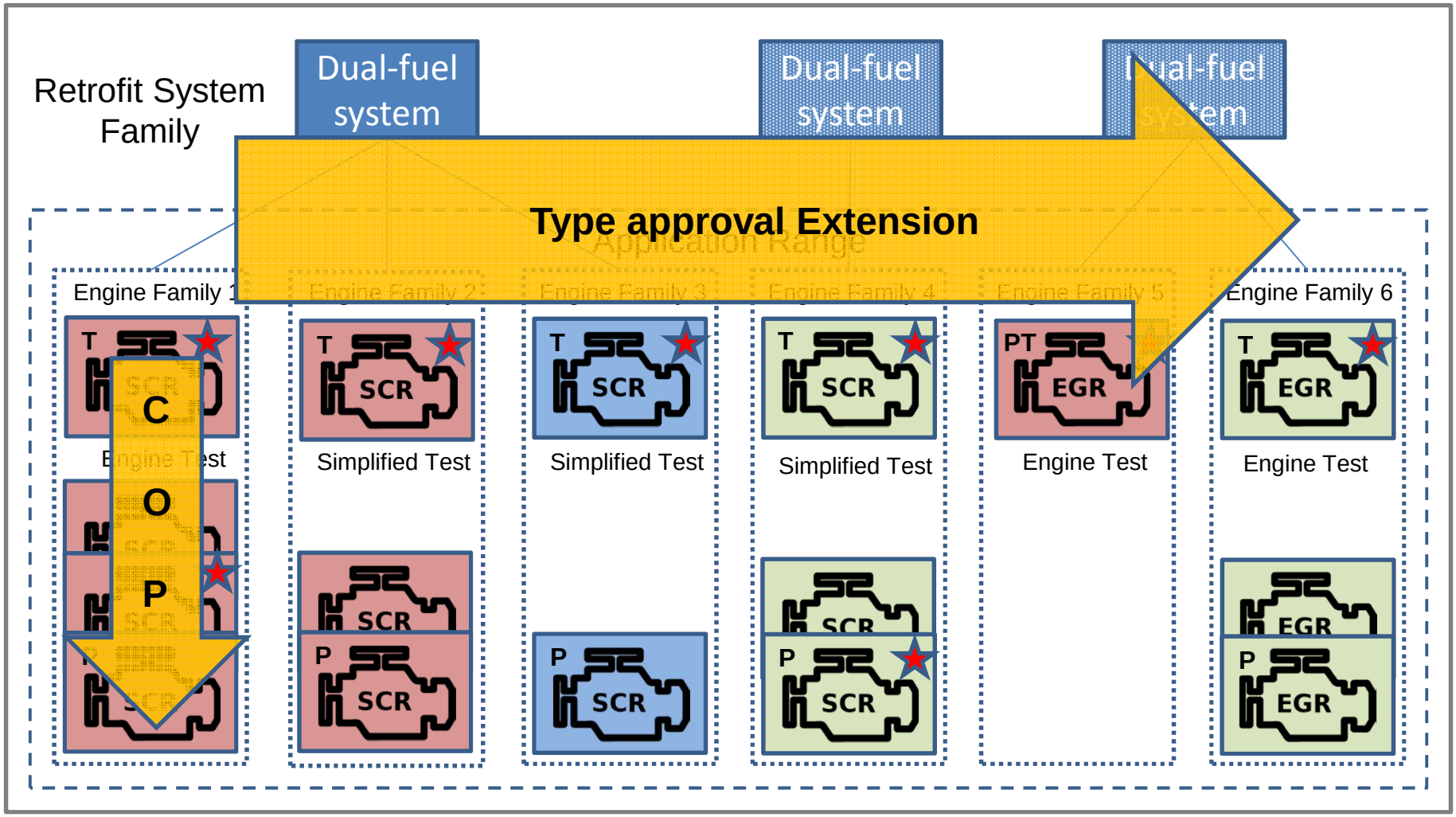

# Vehicle certification / Vehicle approval after the retrofit conversion

The (re-)certification of a retrofitted vehicle including all the quality requirements should be handled in national and/or CP legislation

- The check that the Vehicle Retrofit System is approved for the engine/vehicle combination and is installed in line with the installation manual
- Safety check of the conversion in line with R67 and R110 (including check of the used components)
- Specific attention for the installation of the cylinders and the safety devices.

# Principles

- ✓ Type Approval process
- Emission Tests: Engine test and simplified test
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# Emission Tests

- Emission Tests:
  - Initial Type Approval: Engine test
  - Type Approval extension: Simplified test

# Emission tests
## *Type-approval extension*

For a type approval extension, the emissions may be measured with a (retrofit specific) test procedure using a Portable Emission Measurement System mounted on a vehicle equipped with the retrofit system.

Back-to-back comparison between a test in diesel mode and a test in dual-fuel mode.

Measurement on an engine test bench, on a chassis dyno or on the road at the choice of the manufacturer.

Details of this simplified test method still to be developed and verified.

# Principles

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# Engine emission tests

## *Dual-fuel mode requirements ~~(under development)~~*

The manufacturer of the retrofit system could choose between two options:

- OPTION 1 ~~*(Possibility to claim $CO_2$ reduction)*~~
  - All emission limits for dual-fuel mode as specified in the applicable R49 series of amendments apply

- OPTION 2
  - The $NO_X$, NMHC, PM and CO emission limits for dual-fuel mode as specified in the applicable R49 series of amendments apply;
  - The $CH_4$ emissions shall not exceed the following GER dependent $CH_4$ limit:

    $CH_4 \leq 6.84 * GER/100$ AND $CH_4 \leq 6$ [g/kWh]

# Principles

- ✓ Type Approval process
- ✓ Emission Tests: Engine test and simplified test
- ✓ Methane emissions
- Safety

# Safety

- OEM concerns regarding possible torque differences between diesel and dual-fuel operation (physical and/or CAN parameters)
- ~~Possible solution (torque test) in development~~
- Torque test and CAN communication requirements specified

# Retrofit Heavy Duty Dual Fuel

Thank You