

New Integrated Combustion Engines for future Passenger Car Engines (**NICE**)

Background

- EUCAR SG P group, after consulting RTRAC, had submitted an Expression of interest on CCS for EC FWP6 programme in July 02.
- A revised version has been made taking into account other topics addressed by other research institutes .

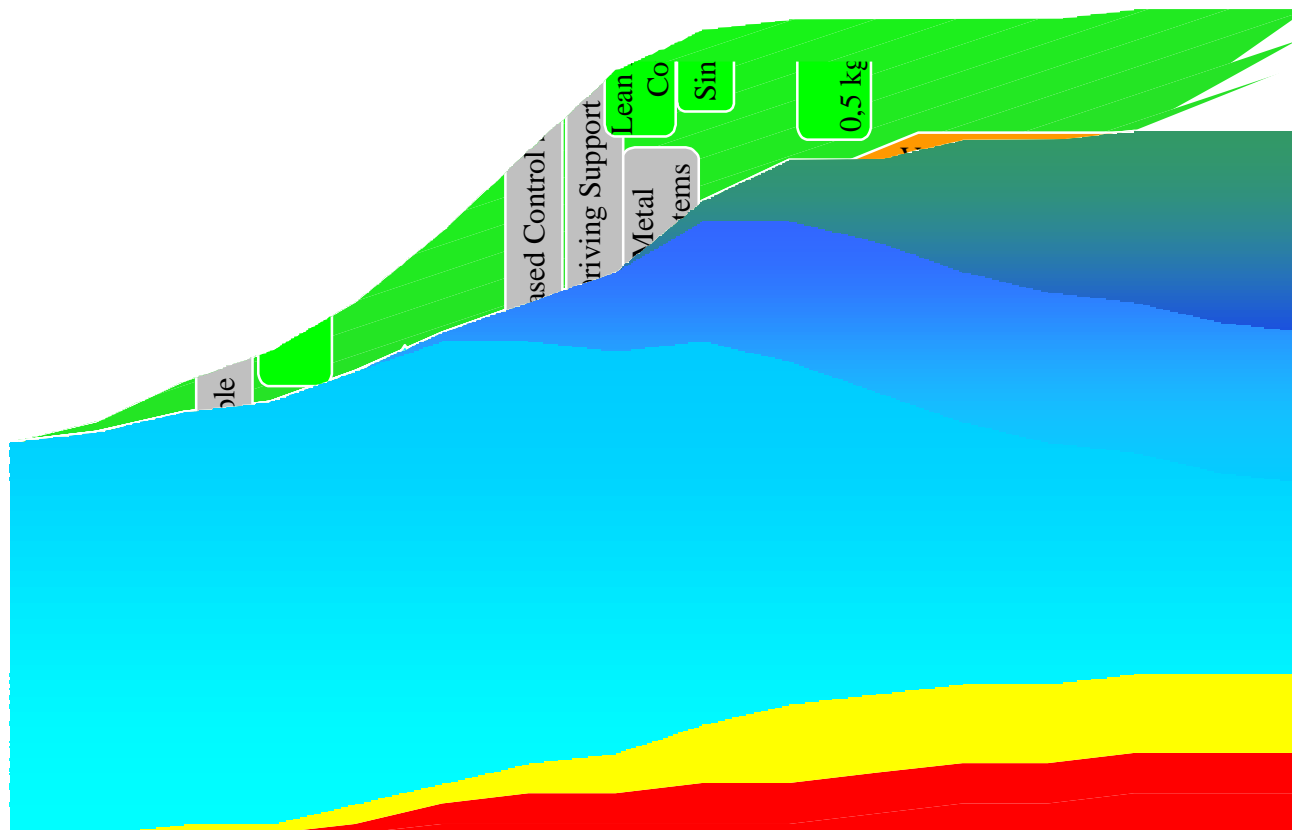
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- **Rationale:** Future IC engines will have to fulfil strict regulations, and very low CO₂ emissions. Today, diesel engines have significantly lower CO₂/fuel consumption than gasoline ones, with the best efficiency from well to wheel. But their exhaust emissions reduction capacity, beyond Euro IV, is much more difficult and expensive in term of cost and energy. Gasoline PC have to reduce fuel consumption significantly.
- **Objectives:** The objective is to bring both type of gasoline and diesel engines to the same level of reduced consumption and near zero emissions with required NVH characteristics by introducing new technologies of combustion, offering therefore, affordable advance powertrain propulsion systems based on Internal Combustion Engines

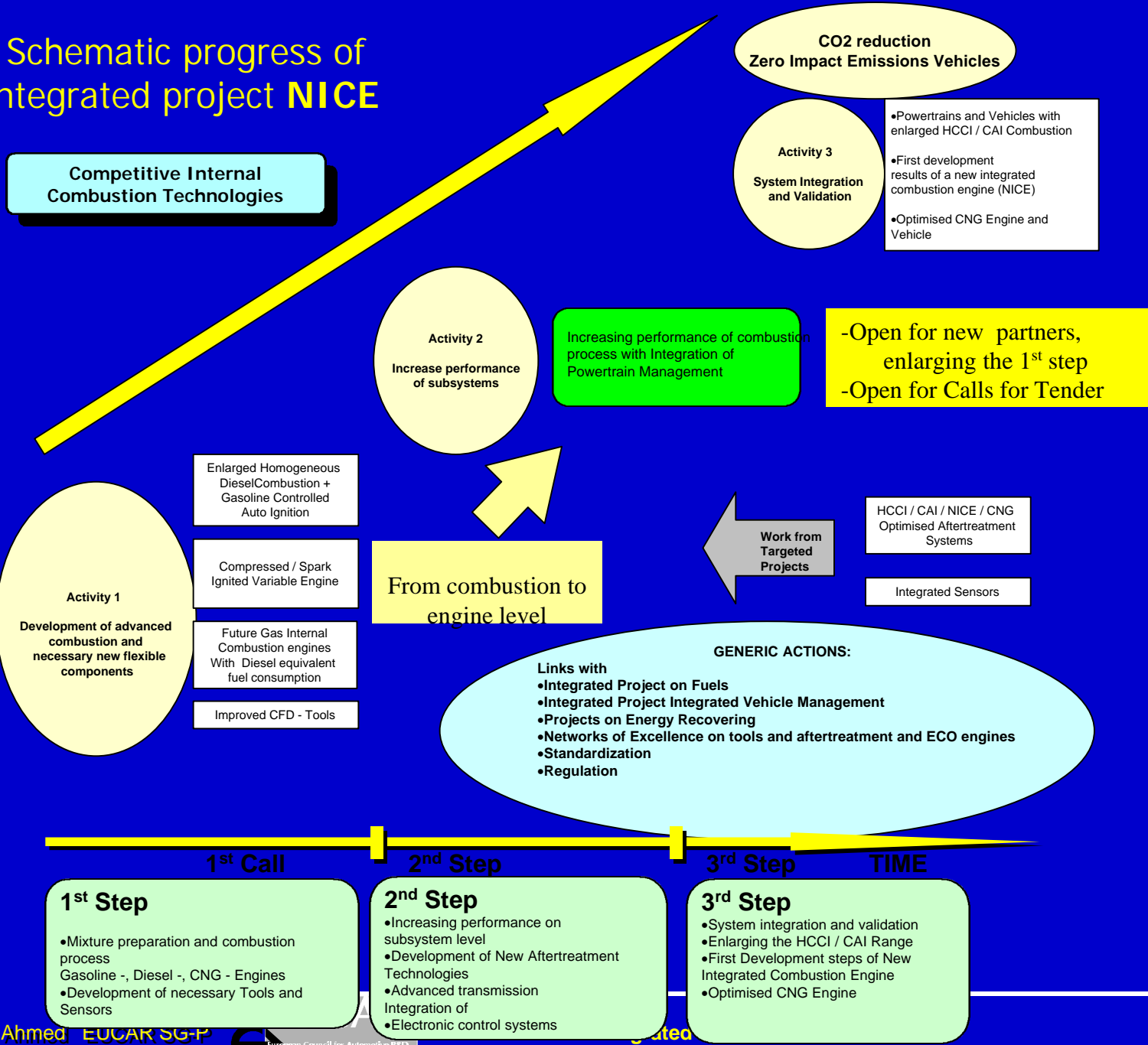
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- **Approach:**

- The starting point is the extension of existing clusters in FP5 on CO2 reduction and a clear vision of main technology trends for future passenger car engines.
- The next step is Interactive development of components for combined homogenised combustion process HCCI/CAI with other known promising technologies (downsizing, VVA, flexible injection, etc) and optimised fuels.
- The assessment of these new combustion systems will then be carried out before final validation on complete powertrains and vehicles by specific sub-projects



Schematic progress of Integrated project NICE



Competitive Internal Combustion Technologies

**CO2 reduction
Zero Impact Emissions Vehicles**

- Activity 3
System Integration and Validation**
- Powertrains and Vehicles with enlarged HCCI / CAI Combustion
 - First development results of a new integrated combustion engine (NICE)
 - Optimised CNG Engine and Vehicle

**Activity 2
Increase performance of subsystems**

Increasing performance of combustion process with Integration of Powertrain Management

-Open for new partners, enlarging the 1st step
-Open for Calls for Tender

**Activity 1
Development of advanced combustion and necessary new flexible components**

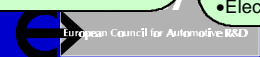
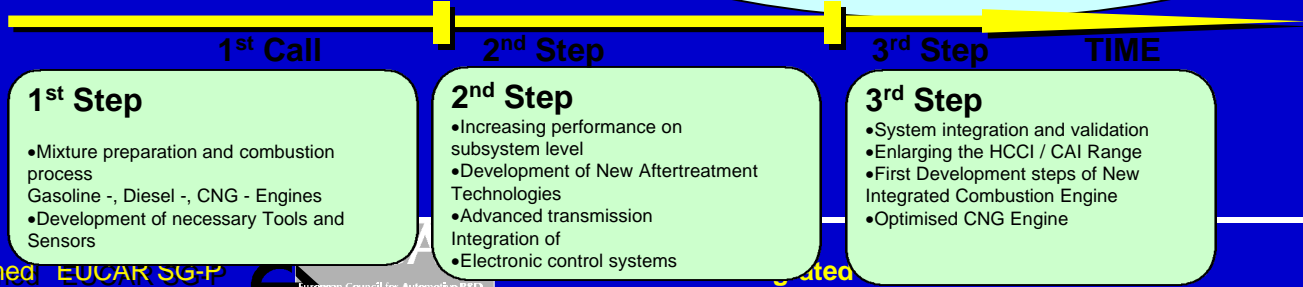
- Enlarged Homogeneous Diesel Combustion + Gasoline Controlled Auto Ignition
- Compressed / Spark Ignited Variable Engine
- Future Gas Internal Combustion engines With Diesel equivalent fuel consumption
- Improved CFD - Tools

From combustion to engine level

- Work from Targeted Projects
- HCCI / CAI / NICE / CNG Optimised Aftertreatment Systems
 - Integrated Sensors

GENERIC ACTIONS:

- Links with Integrated Project on Fuels
- Integrated Project Integrated Vehicle Management
- Projects on Energy Recovering
- Networks of Excellence on tools and aftertreatment and ECO engines
- Standardization
- Regulation



Technology and tools needed

- Flexible variable valve actuation and control
- Increased/variable compression ratio
- Advanced charging devices
- Flexible injection systems with variable geometry
- Flexible and variable air/fuel mixing strategies
- Improved combustion modelling and systems
- New after-treatment devices
- New materials for reduced friction and high temperatures
- New transmission systems
- Flexible powertrain electronic controls

Proposed sub-projects in IP NICE for the 1st call of FP6 in Priority 6.2 Sustainable Surface Transport

A1: Enlarged HCCI-Diesel / CAI-Otto combustion process under transient operation

A2: Compressed / Spark Ignited Variable Engine with High EGR and Supercharged

A3: Future Gas Internal Combustion Engines with Diesel equivalent fuel consumption

B1: Improved CFD Tools

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- **Organisation & Management**

Steering committee from the Core group (EUCAR members, EARPA members, others)

- **Core group:**

Renault, Volvo, DC, CRF, VW, FEV, AV

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