European Council for Automotive R&D (EUCAR)

Ulf Palmquist

CO$_2$ and EUCAR Office
EUCAR European Manufacturers of Cars and Commercial Vehicles

Members:

- BMW
- FIAT
- VOLVO
- OPEL
- PORSCHE
- PSA PEUGEOT CITROËN
- DAIMLERCHRYSLER
- Ford
- RENAULT
## EUCAR Organisation

### System Integration Groups

<table>
<thead>
<tr>
<th>SGI</th>
<th>SGP</th>
<th>SGV</th>
<th>SGA</th>
<th>SGD</th>
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<tbody>
<tr>
<td>Human/</td>
<td>Powertrain</td>
<td>Overall</td>
<td>Adv. Control &amp; Vehicle Information</td>
<td>Vehicle Development &amp; Production</td>
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<td>Vehicle</td>
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<td>Interaction</td>
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<td><strong>Svensson</strong>, <strong>VOLVO</strong></td>
<td><strong>Aust</strong>, <strong>DC</strong></td>
<td><strong>Gilardi</strong>, <strong>FIAT</strong></td>
<td><strong>Clarke</strong>, <strong>FORD</strong></td>
<td><strong>Stahl</strong>, <strong>PORSCHE</strong></td>
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<td><strong>CC :</strong> <strong>Diquelou</strong>, <strong>Renault</strong></td>
<td><strong>CC :</strong> <strong>Pera</strong>, <strong>FIAT</strong></td>
<td><strong>CC :</strong> <strong>Flegl</strong>, <strong>PORSCHE</strong></td>
<td><strong>CC :</strong> <strong>Haug</strong>, <strong>BMW</strong></td>
<td><strong>CC :</strong> <strong>Mertens</strong>, <strong>OPEL</strong></td>
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### Enabling Technology Groups

<table>
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<tr>
<th>EGR</th>
<th>EGM</th>
<th>EGC</th>
<th>TF</th>
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<tbody>
<tr>
<td>LCA &amp; Recycling</td>
<td>Materials Structures &amp; Related Processes</td>
<td>Technologies for Control Systems</td>
<td>Mobility</td>
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<tr>
<td><strong>Liljenroth</strong>, <strong>VOLVO</strong></td>
<td><strong>Baur</strong>, <strong>DC</strong></td>
<td><strong>Passeron</strong>, <strong>PSA</strong></td>
<td><strong>Nicolai</strong>, <strong>DC</strong></td>
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<td><strong>CC :</strong> <strong>Schnehage</strong>, <strong>VW</strong></td>
<td><strong>CC :</strong> <strong>Larsson</strong>, <strong>VOLVO</strong></td>
<td><strong>CC :</strong> <strong>Reiniger</strong>, <strong>DC</strong></td>
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</table>
EUCAR Fuel Cell R&D belongs to the System Group Powertrain

SUSTAINABLE DEVELOPMENT

- Low emission vehicle
- Low fuel consumption
- High driving performance
- Good driveability
- Overall energy optimisation
- Overall cost reduction
- Systemic approach and competencies integration
CO₂ Emission Reduction

EUCAR - ACEA R&D Program
Why a CO\textsubscript{2} R&D Programme?

CO\textsubscript{2} g/km

1995 1998 2004

190 140 120

1998 2004

2003 Review

CEC - ACEA Agreement

\underline{CO2perate CO\textsubscript{2} R&D}

2008 2012
Monitoring the CO$_2$ Emission Reduction

CO$_2$ Monitoring: Achievements on 1995-2000

- ACEA
- EU 15
- Targets
Top-Down Requirements, Bottom-Up Integration

Requirements
Complete Vehicle
• CO₂ reduction
• Safety
• Affordability
• Functionality
• ...

Assessment
Complete Vehicle
• CO₂ reduction
• Safety
• Affordability
• Functionality
• ...

System Assessment
• LCA
• Recycling

Technology Areas
• Powertrain
• Material
• Manufacturing
• System Efficiency
• Mobility

Technology R&D
• Sub-Systems
• Components
• Methods
• ...

Demonstrators
• Virtual
• (Sub-) system
• Vehicle system

Integration
Requirements
Integration
CO2perate: Over-all status end of 2000

- # Projects = 33
- Total Budget = 108 MEuro
- EU funding = 54%

- Conventional Powertrain
- Alternative Powertrain
- Material
- Others
Three Powertrain Platforms

• GET
  *Downsized, supercharged gasoline*

• EUDIESEL
  *Low emission diesel*

• SUVA
  *Hybrid / Electric*

**TREMOVE**
*Assessment of cost effectiveness of CO₂ reduction*
Sharing Assessment while Protecting Solutions

Platform Projects
(Integration, Verification)

Common Assessment

Automotive Company B
Small Engine Approach B Solution B

Automotive Company A
Large Engine Approach A Solution A

Technology Projects

Injector system
After treatment

Basic Research

Combustion Modelling
Fuel Analysis and Design
Energy Supply and Future Fuels

- This is a “hot potato”
- Automotive industry is conservative
- Automotive industry is protective
Fuels for engines of the future:
• Clean combustion products with clean fuels / fuel components
• Search for performance and production paths of alternative liquid fuels
• Renewable fuels in large quantities and high qualities
• Can we produce and use hydrogen at large scale at reasonable costs?

Source: IG Fuels 1999
Evolution of Fuels

- Evolutionary development
- No sudden steps in technology
- Gradual introduction of maturated technologies (fuels, powertrains)
- Market forces (costs, availability, consumer acceptance) will ensure longest use of proven technologies with existing infrastructures
Fuel Scenario of the IG Fuels

- Oil Based Fuels
- Designed Fuels
- Improved Fuels
- Clean Fuels
- Gas Based Fuels
- CNG, GTL Fuels
- Renewable Fuels
- Bio-Fuels
- Hydrogen
Hydrogen

from regenerative production

- sustainable and ecologically favourable perspectives
- CO$_2$-free or CO$_2$-neutral along the whole energy chain
- inexhaustible resources

but: 3 critical technical and economical barriers

- storage systems for mobile application is lacking
- infrastructure not available
- sustainable production from regenerative energy at competitive costs unsolved

Long-Range Solution
Combustion engines (Gasoline and Diesel) will be the main propulsion systems for passenger cars even in 20 years

Development of Fuel-Cell Vehicles will take a long time still (weight and costs), mass production not likely before 2015

Use of Hydrogen for mobile application is only feasible, after all technical and economical barriers have been overcome (past 2020)
So what should and can FUERO do to break this conservative outlook?
Future Research for Vehicle and Road Transport
EU’s 4 Year Framework Programs (FP) for R&D

Research activities 4th FP

Research activities 5th FP

4th FP 5th FP 6th FP

1998 2002 2006

Preparation of next FP

**EUCAR Task Force FP6**
- Provide one common approach
- Formulate agreed R&D topics
- Communicate
Future Road Transport Research: 
Main Messages by EUCAR - ACEA CV Dec. 2000

• Major Challenges for the Road Transport System
  – Environment, Energy and Resources
  – Safety for Road Users
  – Mobility and Transport

• Framework needed for Road Transport Research
  – Initial 4 year phase in FP6
  – Annual budget of order 600 MEuro (50% funding from FP6)
  – Linking and cooperation with National R&D

• Industry offers to be
  – a partner of the Road Transport R&D Framework
  – an active contributor to the solutions
Automotive Position Paper on Road Transport RTD

Mobility, Transport

Safety for Road Users

Environment, Energy, Resources

Road Transport Research Framework
## Identified Dimensions of Needed Research

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Objectives and Research Priorities</th>
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</table>
| ENVIRONMENT ENERGY RESOURCES | Environmentally compatible and sustainable transport systems based on renewable resources.  
• Solutions towards the use of clean conventional and renewable energy.  
• Road and traffic noise reduction.  
• Lean production and recycling.                                                                                       |
| SAFETY FOR ROAD USERS      | Steady trend of decreasing number of traffic accidents.  
Affordable safety systems for vehicle, infrastructure and road users through development and integration of  
• preventive, active and passive safety and  
• post-crash assistance.                                                                                                 |
| MOBILITY TRANSPORT         | A sustainable and efficient traffic and transport system providing mobility and goods delivery services to the citizens.  
• Intermodal concepts and supportive systems.  
• Monitoring and management of traffic and goods for efficiency.  
• Global harmonisation and standards.                                                                                   |
## Commission’s proposal & structure on FP6

### INTEGRATING EUROPEAN RESEARCH

<table>
<thead>
<tr>
<th>PRIORITY THEMATIC AREAS</th>
<th>ANTICIPATING SCIENTIFIC &amp; TECHN. NEEDS</th>
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<tr>
<td>Genomic and biotechnology for health</td>
<td>Research for policy support</td>
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<tr>
<td>Information society technologies</td>
<td>Frontier research, unexpected developments</td>
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<tr>
<td>Nanotechnologies, intelligent mat., new production processes</td>
<td>Specific SME activities</td>
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<tr>
<td>Aeronautics and space</td>
<td>Specific international cooperation activities</td>
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<td>Food safety and health risks</td>
<td>JRC activities</td>
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<td>Sustainable development and global change</td>
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<tr>
<td>Citizens and governance in the knowledge society</td>
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### STRUCTURING THE ERA

<table>
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<tr>
<th>Research and innovation</th>
<th>Human resources &amp; mobility</th>
<th>Research infrastructures</th>
<th>Science and society</th>
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### STRENGTHENING THE FOUNDATIONS OF ERA

| Coordination of research activities | Development of research/innovation policies |
EUCAR - ACEA Concerns;
Road Transport in FP6

• The need of technological developments for preserving environment, energy and resources is not sufficiently acknowledged.

• R&D on measures for increasing safety in traffic (cf Liikanen 23 April in EP) need to be clarified and confirmed.

• The complexity, magnitude and impact of mobility and goods transport are far greater than recognised.
Expanding / Amending Road Transport into FP6

INTEGRATING EUROPEAN RESEARCH

PRIORITY THEMATIC AREAS

- Genomic and biotechnology for health
- Information society technologies
- Nanotechnologies, intelligent materials and production processes
- Aeronautics and space
- Food safety and health risks
- Sustainable development and global change

STRUCTURING ERA

- Mobility, Transport
  - Traffic/Transport Planning and Management
  - Field trials / Demonstrations
  - Deployment issues

- Environment, Energy
  - Emissions: CO2, PM, Noise, ...
  - Future fuels: production, distribution, use
  - Vehicle Technologies

- Resources, Production
  - Improved material
  - Lean and clean production

- Strong Coordination of Road Transport R&D
  - Integrated Projects: Focused Program
  - ERA, Article 169: EUREKA type of collaboration
  - Network of Excellence: Multidisciplinary, focused

- Road Transport Safety
  - Active / Integrated Safety
  - Telematics
  - Electronics

- Coordination of research activities

Research and innovation
Human resources & mobility
Research infrastructures
Science and society
Coordination of research activities
Development of research/innovation policies
Concluding Remarks

FUERO

• is the centre point of the European Fuel Cell collaborative research done among the EUCAR members

• has a strategic role to deliver technology breakthroughs
What is expected from FUERO?

- Clear direction of Fuel Cell R&D
- A vehicle system approach
- Demonstrators: Functional vehicles
- Infrastructure and supply considerations
- Deployment strategies
- An European “leadership” for mobile FC
END PRESENTATION
CO2perate: The CO₂ R&D Programme

**Objective:**
- Identify, develop and demonstrate new technologies and system concepts of CO₂ reduction relevance.

**Constraints:**
- Other environmental factors
- Safety
- Affordability and customer acceptance.

**Cooperation:**
- Automotive manufacturers
- System and component suppliers, fuel suppliers, ....
- Research institutes and academia.
Evolution of Fuels

Fuel evolution will occur in phases:

- improvement of oil-derived fuels (clean fuels, designed fuels)
- supplement by gas-derived fuels (blending into existing fuels, niches for neat GTL)
- supplement by renewable fuels (blending into existing fuels, transition to neat renewable fuels)
- possible end of this path: hydrogen
## CEC’s FP6 Budget Proposal: 17.5 billion Euro

### Seven Priority Thematic Areas

<table>
<thead>
<tr>
<th>Thematic Area</th>
<th>Budget, M Euro</th>
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<tbody>
<tr>
<td>1. Genomics and biotechnology for health</td>
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<tr>
<td>7. Citizens and governance in European knowledge-based society</td>
<td>225</td>
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Additional to these areas is the activity:

8. Anticipating the EU’s scientific and technological needs                  | 2 345          |

and the actions to establish ERA:

- Structuring and Strengthening the European Research Area.                  | 3 500          |