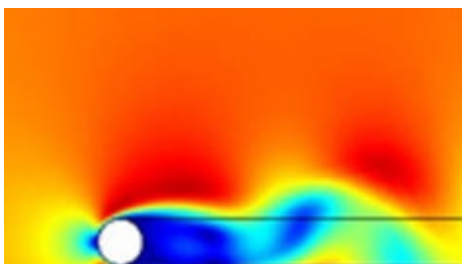


Mobility

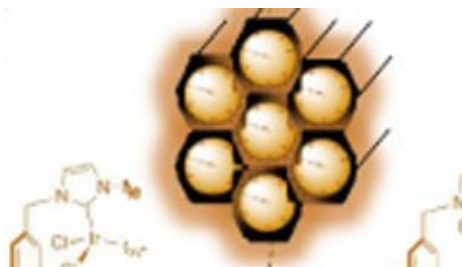
Running Projects



Catalysis in Porous media for automotive Applications (CatPor)^[1]

Ceramic foams have excellent properties as catalyst substrates for automotive applications. Extensive studies have shown that ceramic foam based catalysts can achieve similar pollutant conversion efficiencies but with roughly a third of the precious metal amount and a half of the external dimensions, compared to the state of the art conventional honeycomb catalysts. The results of this project may lead to catalysts with extremely efficient deployment of the precious metals and will be implemented in several applications of automotive catalysts.

[Show full project description](#)^[2]



Highly Durable Oxide-based Catalysts for Polymer Electrolyte Fuel Cells (DuraCAT)^[3]

The project aims at developing stable Polymer Electrolyte Fuel Cells (PEFCs). In PEFCs the electrochemical reactions, viz. the hydrogen oxidation reaction (HOR) and the oxygen reduction reaction (ORR) take place on the surface of typically Pt-based catalysts at the so-called three-phase boundary. Today, improving the performance of the cathode of PEFCs, where the ORR takes place, is probably one of the most urgent requirements because both the catalyst kinetics and its corrosion stability are clearly insufficient to make PEFCs cost competitive devices for automotive and stationary applications.

[Show full project description](#)^[4]



In-cylinder emission reduction in large diesel engines (NO_x-Reduction)^[5]

The International Maritime Organization set legislative limits of NO_x emissions to enact in 2016. The current project aims at reducing specific NO_x emissions towards the required limit; combining further measures in the Large Engines Research Facility at PSI while maintaining low CO₂ emissions and close-to-zero soot emissions.

[Show full project description](#)^[6]



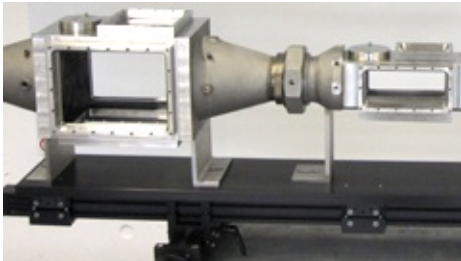
Hydrogen Driven Municipal Vehicle (Hy.muve)^[7]

A fuel cell driven cleaning vehicle is investigated in this project. The three main tasks are the development of a dynamic computer model of such an application, based on the system performance in its practical use. The



second task is integration of the fuel cell system into the hydraulic drive, including the development of the control strategies needed and as third task the development of a market introduction strategy and the demonstration and field testing across Europe. The vehicle will be operated at 2 – 3 geographical locations during different seasons.

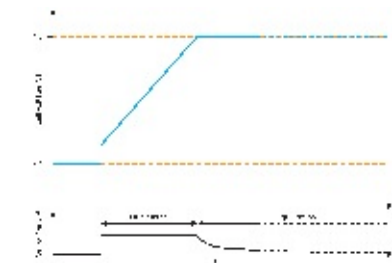
[Show full project description](#) ^[8]



NO_x Abatement in Diesels: Process Analysis, Optimisation and Impact (NADiP)^[9]

The selective catalytic reduction of NO_x with urea is one of the key technologies for nitrous oxide abatement in the field of heavy-duty vehicles and naval engines. The project NADIP focuses on increasing the efficiency of urea selective catalytic reduction (SCR) DeNO_x systems by optimization of the urea decomposition upstream the SCR catalyst.

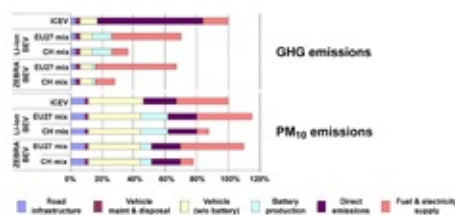
[Show full project description](#) ^[10]



Ultra-Fast Charging of Electric Vehicles (UFCEV)^[11]

One of the main problems with electro-mobility is the need to provide ultra-fast charging of electric vehicles (UFCEV). This project aims to examine both direct connectivity to the distribution grid as well as new storage technologies as a means of enabling ultra-fast charging. In addition, load leveling methodologies should be studied, including load shifting from day to night. To demonstrate how the developed solutions may be implemented, a transportable charging station for an average-size vehicle will be developed on a small scale, including the interface to a household electricity supply.

[Show full project description](#) ^[12]



Technology-Centered Electric Mobility Assessment (THELMA)^[13]

Electric mobility technologies have the potential to contribute to the goals of Swiss energy policy which include assuring a more sustainable supply of energy. A detailed, technology-centered system analysis is a prerequisite for understanding the strengths and weaknesses of the options developed, evaluating trade-offs compared to both conventional and other advanced alternatives, and assessing the potential contributions of the technology options to a more sustainable future.

[Show full project description](#) ^[14]



Customized Hybrid Powertrains (Cohyb)^[15]

Hybrid-electric vehicles (HEV) will play an important role in the mobility of the next twenty years. They combine the excellent efficiency of electrical power-trains with the advantages of liquid or gaseous fuel combustion engines, i.e. easy and fast refueling, excellent travelling range. For historical reasons the components which build a hybrid powertrain are chosen with a focus on availability and not with a previous optimization. This results in suboptimal configurations which cannot exploit the possible potential.

[Show full project description](#) ^[16]

Completed Projects



Large Engine Research Facility (LERF)^[17]

To investigate emission reductions or efficiency improvement potentials of large engines, simulation and laboratory scale experiments (single cylinder engine and high pressure/high temperature combustions chambers) show significant limits. Therefore a test rig for a 1.2 MW mechanical output diesel engine will be realized to test concepts for future NO_x-emission standards on a full scale engine. The test facility is equipped with a dynamic generator set to allow transient operation.

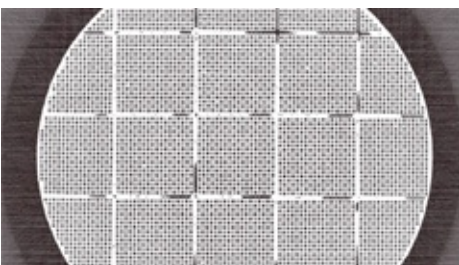
[Show full project description^{\[18\]}](#)



Transient Heavy Duty Engine Test Facility (TransEngTesting)^[19]

Nuclear fission energy represents 40% of today's electricity production in Switzerland. Nuclear power thus constitutes one of the principal options for closing the country's growing energy gap in a mid-term perspective and, depending on the availability of new generations of nuclear facilities and technologies, also a potentially crucial resource in the long-term.

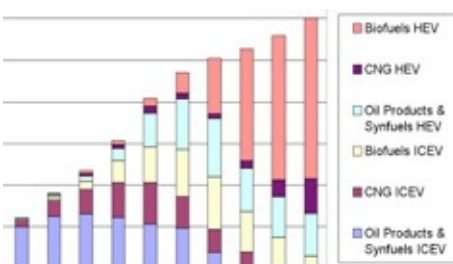
[Show full project description^{\[20\]}](#)



Next Generation Exhaust Aftertreatment for Diesel Propulsion Systems (NEADS)^[21]

New SCR catalyst materials are investigated in order to achieve high reactivity and conversion also at low exhaust gas temperatures. In addition a ceramic foam based substrate is under development in order to replace the conventional diesel oxidation catalyst improving the performance and lifetime of the subsequent aftertreatment system (particulate filter and or SCR system).

[Show full project description^{\[22\]}](#)



Transition to Hydrogen Based Transportation (HY_Change)^[23]

The project comprises two main streams: The ecological and economic assessment of alternative fuels and powertrains on the one hand, and the impact of these alternatives upon introduction into vehicle fleets on the other hand.

[Show full project description^{\[24\]}](#)



Computational Engineering of Multiscale



Transport in Small-scale Surface Based Energy Conversion (CEMTEC) [25]

The scope of the present work is to develop a numerical tool for the simulation of multicomponent reacting flows in porous media with specific applications in solid oxide fuel cells (SOFC) and microreactors for portable power generation. The collaboration among different partners will provide to the numerical groups the data needed for the implementation and validation of novel accurate models. Moreover, once the models are implemented and are ready to simulate realistic systems, the experimental groups will benefit from the calculations in optimizing their experimental setups and eventually in building a micro-fuel cell prototype.

Show full project description [26]



Clean and Efficient Large Diesel Engines (CELaDE) [27]

The project is organised in 3 tasks emphasising the development and validation of the turbulence thermochemistry interactions in the combustion process of large internal combustion engines, diagnostics of NO for high pressure combustion and quantitative two-dimensional soot diagnostics in high pressure combustion as well as cylinder-pressure based algorithms for future heavy duty diesel engines controls.

Show full project description [28]

URLs:

- [1] : <http://www.ccem.ch/.catpor>
- [2] : <http://www.ccem.ch/.catpor>
- [3] : <http://www.ccem.ch/.duracat>
- [4] : <http://www.ccem.ch/.duracat>
- [5] : <http://www.ccem.ch/.nox-reduction>
- [6] : <http://www.ccem.ch/.nox-reduction>
- [7] : http://www.ccem.ch/.hy_muve
- [8] : http://www.ccem.ch/.hy_muve
- [9] : <http://www.ccem.ch/.nadip>
- [10] : <http://www.ccem.ch/.nadip>
- [11] : <http://www.ccem.ch/.ufcev>
- [12] : <http://www.ccem.ch/.ufcev>
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- [14] : <http://www.ccem.ch/.thelma>
- [15] : <http://www.ccem.ch/.cohyb>
- [16] : <http://www.ccem.ch/.cohyb>
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- [24] : http://www.ccem.ch/.hy_change
- [25] : <http://www.ccem.ch/.cemtec>
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- [27] : <http://www.ccem.ch/.celade>

[28] : <http://www.ccem.ch/.celade>

<http://www.ccem.ch/mobility>