



1 *There are many facets of mobility, but they must all address the question of how traffic can be made more ecologically compatible and more efficient.*

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2 *Fuels play a key role in industry and transportation. Innovative technologies are needed for the production of environment-friendly alternative fuels, so that problems arising from the shortage of crude oil can be effectively prevented in future.*

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## COMPETENCES IN DETAIL

# ENERGY AND MOBILITY

### Fraunhofer Institute for Building Physics IBP

Department Life Cycle Engineering  
Group Energy and Mobility  
Wankelstrasse 5  
70563 Stuttgart

#### Contact

Dr.-Ing. Michael Held  
Phone +49 711 970-3160  
michael.held@ibp.fraunhofer.de

Dipl.-Ing. Roberta Graf  
Phone +49 711 970-3166  
roberta.graf@ibp.fraunhofer.de

[www.ibp.fraunhofer.de](http://www.ibp.fraunhofer.de)

The group Energy and Mobility at Fraunhofer IBP, Department Life Cycle Engineering, deals with the fundamental issues of Life Cycle Assessment (LCA) in the areas of energy production, delivery and storage as well as analysis of current and future mobility concepts. Current activities concerning energy focus on sustainability studies on electricity generation, provision of fuels and energy storage.

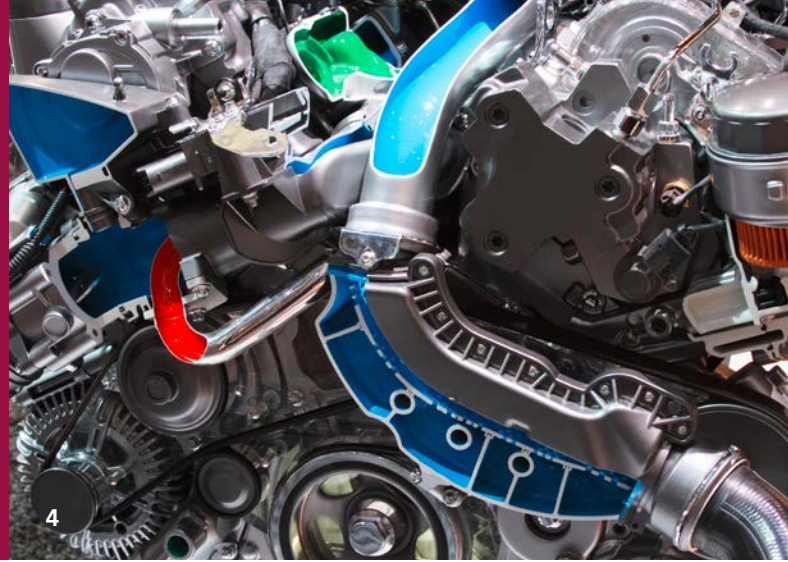
#### Electrical energy supply

Faced with the challenge of rising global greenhouse gas emissions, sustainable energy supply becomes increasingly important. In Germany, for example, the share of renewable energies in gross electricity consumption is to be increased by 2020 to at least 30 percent. The main activity fields of the group Energy and Mobility are the development of methods for the ecological assessment of renewable energy sources (wind power, photovoltaics, solar thermal energy, hydro

power, biomass, biogas), fossil fuels (e.g. crude oil, natural gas, coal), power plant systems (electricity, steam, thermal energy) and energy storage systems (e.g. batteries, compressed air energy storage).

#### Fuels

The future demand for renewable fuels will continue to rise. To provide appropriate alternatives to conventional fuels, also from an environmental perspective, it is necessary to have extensive knowledge of the process chain of fuel production and the thereby required energy carriers. Hence, the group deals with the ecological assessment of innovative fuels – including their comparison to conventional fuels. Different fuel delivery systems, such as refinery technologies and hydrogen electrolysis, are analyzed. These activities form the basis for generally accepted guidelines for the Life Cycle Assessments of specific fuels, e.g. hydrogen production.



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## Mobility

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The current activity focuses on the development of methods for the ecological assessment of alternative propulsion technologies, in aviation and the support of the sustainable design of mobility systems.

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## Propulsion technologies and vehicle concepts

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In addition to the ongoing development of conventional automobiles in terms of vehicle production, fuel consumption and emissions of driving, the automobile industry is increasingly concentrating on the development of alternative vehicle concepts. Concerning this field the current work focuses on the development of complex life cycle assessment system models which depict the environmental profiles of various electric vehicle and driving concepts (e.g. battery electric vehicles, plug-in hybrid electric vehicles, fuel cell vehicles). These models allow an analysis of a variety of mobility scenarios, such as the analysis of the entire life cycle of vehicles based on specific application areas and vehicle fleets. Thus, reliable evaluations of alternative vehicle concepts can be made and their optimal field of application be determined.

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## Aviation

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Air transport plays an important role in the global economy. Various national and international studies show that transport and passenger volumes and thus the aviation

sector in general will grow strongly in the upcoming years. To reduce environmental impacts despite this growth it is necessary to examine new developments in terms of their environmental profile and to optimize existing processes. As a great number of aircrafts of today's fleet will have to be substituted in the near future we today experience an unprecedented momentum to greatly reduce the environmental impacts of the aviation sector. To grab this momentum the Department of Life Cycle Engineering at Fraunhofer IBP provides the aviation industry LCA studies, which are necessary for the development of future aircrafts within a DfE approach. To make LCA of as complex product systems as aircrafts more economic, aviation specific life cycle databases are built up and aviation tailored methods to streamline LCA studies are developed and integrated into user friendly software interfaces.

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## Today's and tomorrow's mobility

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In order to ensure a sustainable development of future mobility, there is a need for a greater variety of available mobility concepts integrated into an environmentally sound system. The challenge is to integrate innovative mobility concepts into existing mobility structures according to their optimal contribution to further environmental improvements in the mobility sector. To do so, the group Energy and Mobility assesses current and future vehicle and mobility concepts regarding their environmental impacts and identifies their optimal field of application

by making best use of synergies present in the various concepts for today's and tomorrow's mobility.

### Our competences

- Life Cycle Assessment in the field of energy and mobility
- Sustainability Assessment
- Assessment of future technologies
- Development of LCA methods and databases
- eco DESIGN (Design for Environment)
- Consulting in product development

3 *The objectives of the turnaround in energy policy can be supported through the energetic optimization of the electrical supply sector and investments in efficiency technologies.*

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4 *The commercial viability of drive components and concepts, and of their further developments, is being influenced to an increasing extent by considerations of resource consumption and environmental compatibility.*

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