Automotive Heat Management Solutions
The smart way to improve fuel and energy efficiency
Why Heat Management?

Improved fuel economy for internal combustion engine (ICE) vehicles and increased driving range for battery-electric vehicles (BEVs) are two of the most important trends in the automotive industry today. Energy consumed by the use of heat, ventilation and air conditioning (HVAC) systems in vehicles is one of the major causes for increased fuel consumption in ICEs and limited battery autonomy (driving distance) of BEVs. Passive heat management solutions developed by BASF can help to maintain the cabin’s temperature and thus reduce the amount of energy being used by the HVAC significantly. This results in an improved fuel economy and the reduction of CO₂-emissions.

Heat Management delivers tangible benefits

Our holistic and material-based approach focuses on the optimization of the heat flow in the whole vehicle and increases the energy efficiency of auxiliary systems. By conducting a comprehensive simulation under different real-life conditions*, BASF has been able to quantify and show that passive heat management technologies are a viable solution to some of the most important challenges in the automotive industry today. By keeping vehicles pleasantly cool in summer and insulating it against the cold in winter, our heat management solutions also improve the individual driving comfort - even under adverse conditions.

* The simulation was performed in cooperation with AVL List GmbH based on the New European Driving Cycle (NEDC). All figures published in this document are based on this simulation.
BASF’s Heat Management Solution Package

Thanks to our unique material expertise and the global R&D network of “The Chemical Company”, BASF can offer a full package of heat management solutions for all types of vehicles.

**Solar Heat Management:**

More than 50% of the energy of the solar radiation is not within the visible range. Most of this radiation is being transformed into heat when hitting the vehicle. This heat is kept inside the cabin as heat radiation as it is not easily permeating the cabins surfaces. By reflecting this part of the sunlight the heat build-up can be reduced by a major fraction. BASF has developed technologies partly reflective or transparent (but both non-absorbing) to the near IR-fraction (NIR) of the solar spectrum – without disturbing the visible effect.

BASF’s solar heat management package includes:

- NIR reflective coatings
- NIR reflective glazing
- NIR reflective interior surfaces

**Thermal insulation**

The effect of thermal insulation is well known for example in the construction industry (use of Styropor®, Neopor® or Basotect®) or in appliances (e.g. Elastocool® for fridges). Until now automotive cabins are not thermally insulated. The insulation reduces the thermal transfer of the surfaces and helps to maintain the cabin temperature at the desired level. New developments in thermal insulations are high performance foams, which can be e.g. nanocellular foams or evacuated foams in the form of vacuum insulation panels. These materials can provide outstanding thermal barriers.

BASF’s thermal insulation technology package includes:

- State-of-the-art polymer foams (PU, EPP, EPS, open-celled MF foam)
- Innovative high-performance foams (e.g. SILENTITE™ – the high-performance insulation panel)
Heat Management

- **Fact 1**
  It makes short trips more efficient
  BASF's heat management solutions reduce the need for additional air-conditioning on short trips in summer, thus improving fuel efficiency. The most efficient measures are the NIR reflective glazing with 2.8% of fuel saving and the thermal insulation with approximately 7%. The high fuel saving of thermal insulation systems emphasizes the importance of properly insulated cabins, even at summer scenarios.

- **Fact 2**
  It makes $1+1=3$
  A combination of all passive heat management measures can reduce fuel consumption by more than 8 percent on short trips in summer. For BEV, the driving range can be increased by 20 percent using the full bundle of passive heat management technologies.

- **Fact 3**
  It's even more useful on the long haul
  On long-distance trips, BASF's Heat Management solutions show their real potential. Fuel savings of up to 12% are possible by combining all measures in one car. The combination of thermal insulation (keeping the heat out) and Solar Heat Management measures (keeping the irradiation out) shows a strong synergistic behavior.

- **Fact 4**
  It makes even batteries enjoy long drives
  Combining the full package of BASF's heat management solutions in a battery-powered electric car, up to 25% more range is possible on long trips in summer. This is a major contribution to reduce the seasonal variation of the driving range and make BEV more attractive.
Let’s find out more – together

In order to exploit the full potential of passive heat management solutions and help car manufacturers and suppliers to improve fuel and energy efficiency and reduce their CO₂ footprint, we are eager to find out more. Our interdisciplinary team of material and application experts offers advice and consultancy on all technical aspects of heat management in order to jointly develop tailor-made solutions for your specific challenge. If you want to find out more about how heat management with BASF materials can help to improve the fuel and energy efficiency of vehicles and reduce their CO₂ footprint, we are looking forward to supporting you.

Please get in touch with:
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