SUMMARY

A growing demand to reduce the emissions and the use of energy can be observed. Transportation equipment often is subject of those discussions because of their use of old diesel engines. One possibility for a more sustainable way could be the use of electric drives. The technology for these drives has developed tremendously the last years. Therefore they became useful for application in mobile transportation equipment like tractors, forklift trucks and road trucks for city logistics.
In this report an overview is presented of the various possibilities for all functions of the drive system. For one of these functions, the storage of energy in the vehicle, a more detailed analysis is made with a distribution truck as example. Finally a survey of existing and prototype applications is put together.

Energy supply within the vehicle can be done with a battery, supercapacitor, flywheel or fuel cell with hydrogen as fuel. The most important property of these systems is the specific energy, the amount of energy that can be stored per unit mass. From this property follows that a battery and fuel cell are useful as constant energy supply, while the supercapacitor and flywheel are better as additional equipment to smoothen the energy flow.
With the development of power electronics ac motors became suitable as traction motors. Especially the induction motor is useful because of its simple construction, performance and low cost. Newer types, like permanent magnet motors, have an even better performance, but are still very expensive because of these rare earth magnets.
Since electric motors can be constructed more compact than combustion engines more possibilities for the driveline are useful. From a conventional configuration with one central motor to a motor completely integrated into the wheel.

In an example of a distribution truck various alternatives for the energy supply in the vehicle are compared. The most favorable electric options are lithium-ion batteries and fuel cells running on hydrogen produced from natural gas. For these alternatives was found that:

- The mass of an empty truck will increase with respect to a diesel driven truck (+30% for lithium-ion, +6% for hydrogen).
- The total energy use, from well to wheel, is similar to a diesel driven truck.
- The total emission of greenhouse gasses, from well to wheel, will decrease with respect to a diesel driven truck (-28% for lithium-ion, -25% for hydrogen).