

Summary

The last decade there has been a large boost in the development of energy storage systems and energy management. This has been stimulated by the increasing fuel prices. Although these prices have dropped due to the economic recession, the developments that have been started are still holding on.

The energy storage systems are most attractive for diesel-electric and diesel-hydraulic applications. Fuel savings of up to 50% are no exception. Examples of popular energy storages are batteries, supercapacitors and flywheels.

The energy storage systems that have been developed use an energy storage to act as a buffer for the diesel-electric generator set. This allows the diesel engine to run at its most efficient speed. The energy storage is used to match the required power demand throughout time, while the diesel engine runs at an efficient speed.

Energy management systems are the rules that are used to control the generator and the energy storage. These strategies can vary, from rule based strategies to optimization algorithms. These more complex strategies do show an increased fuel efficiency over a simple rule based strategy. With relatively larger energy storage, this advantage disappears, as there is more room for error for a simple strategy.

Concerning the different types of storage systems, there is no clear best solution. Every systems has it upsides and downsides. It will depend on future developments in the different technologies, to see which technology will overcome the others.

The design process itself is complicated. The optimal design will be the design that minimizes the cost per move. However, this not only depends on the storage size and type, but also on the energy management strategy that is applied. To determine the effect of the different energy management strategies, simulation is needed.

In the future we can expect to see a fast increase in the usage of energy storage and management systems. This literature research has shown the potential of the systems. The last few years a variety of systems has been developed and the first systems are already operational.