

# Electrical & hybrid propulsion systems

Hybrid propulsion technology is a viable solution for addressing demands from governments, municipalities and authorities to protect urban and coastal areas from noise and pollution.

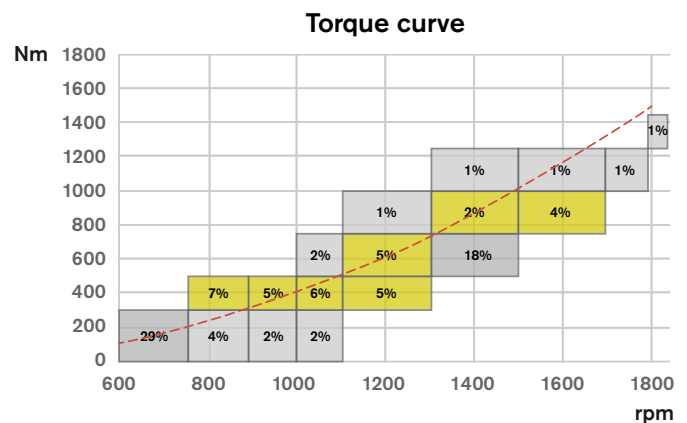


- Electrical & hybrid propulsion solutions for road ferries, patrol boats, rescue vessels and coast guard vessels.
- Realize clear economic benefits through lower fuel consumption and improved equipment reliability
- Power on demand increases vessel operational efficiency and responsiveness
- Use of proven technology minimises operational risk

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## Operational efficiency

While a diesel engine requires 80-90% load to be efficient, the average operational load is typically 10-20% of installed power. A hybrid solution with a larger number of small diesel generators, together with a battery pack, increases operational efficiency by delivering the appropriate power for different operational profiles. In addition, the battery pack gives instant power, otherwise known as a “peak shaver” without a delay. This feature is used for starting and synchronizing an additional diesel generator when needed for manoeuvring.



Operational profile for a small coastal passenger ferry, showing various load and rpm running times.

## Key success factors

In this typically conservative industry, there is often natural resistance to introducing new technology, particularly for operation-critical systems. Electrical and hybrid technology has now been proven over many years in land and marine operations. The key to success is to design and deploy the right configuration and dimensioning of diesel generators, batteries, battery chargers and shore connections.

## **Our expertise**

Callenberg Technology Group has been working with diesel electrical, hybrid and battery powered ships for over two decades. Our focus is finding the optimal solution for each operator and route based on the actual route requirements, timetables, vessel design and of course requirements from authorities and societies.

Callenberg supports the whole life span of the vessel from design to operation.