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KONGSBERG

INNOVATIV KRAFT. BÆREKRAFTIGE LØSNINGER



# Utvikling av ladbare elektrifiserte biler de neste 10 år

*Morten Gunnerud  
Kongsberg Automotive*



# Kongsberg Automotive (KA) in brief

## Global footprint, portfolio and capabilities

- ▶ Kongsberg Automotive (KA) is a global supplier of components and systems for cars, trucks, buses and off-highway vehicles
- ▶ The product portfolio includes products and systems within the vehicle driveline, interior and suspension
- ▶ Close to 9.000 employees
- ▶ About 50 locations in 20 countries (Europe, Americas and Asia)
- ▶ Cost competitive production
- ▶ R&D team of about 350 people

## Some of our customers

### Automotive



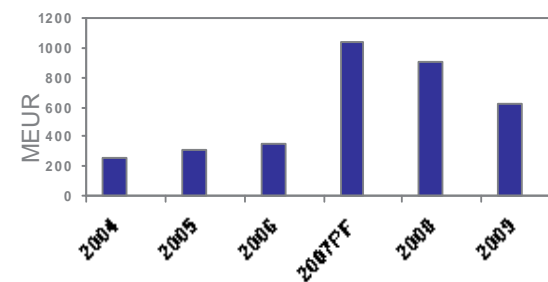
### Commercial Vehicles



### Power Products



## Revenues of MEUR 623 in 2009



NOTE: 2007PF adjusted for acquisition of GMS



# Utvikling av ladbare elektrifiserte biler de neste 10 år

- ▶ Hvorfor elektrifisering?
- ▶ Teknologisk utvikling av bilene
- ▶ Utvikling av markedet



# Hvorfor elektrifisering?

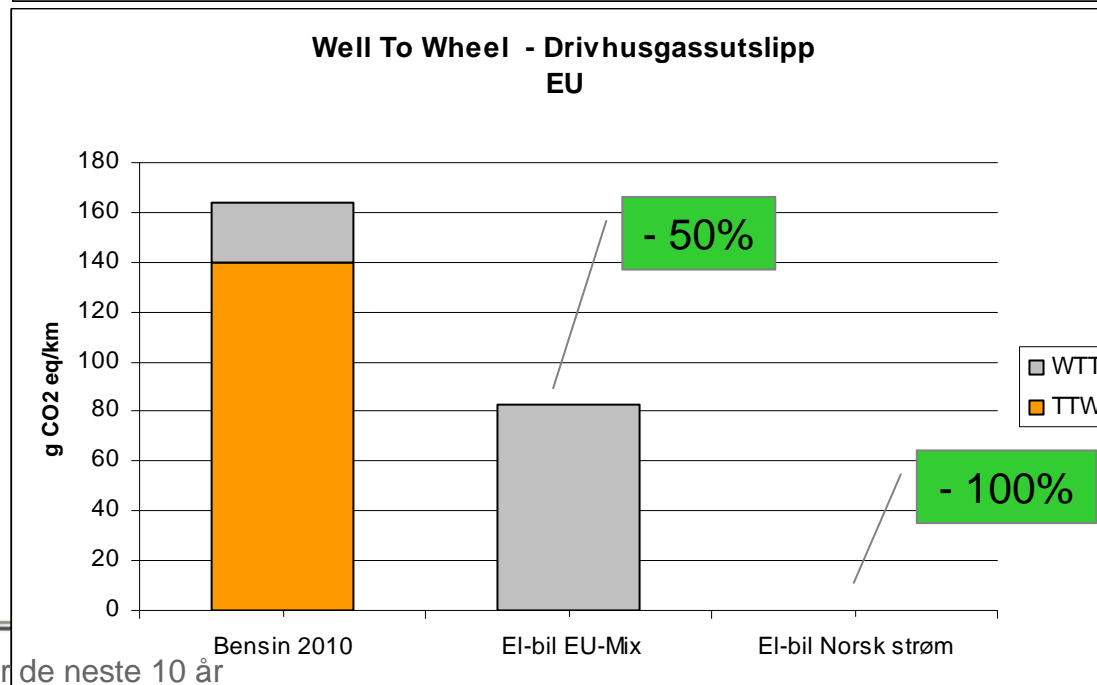
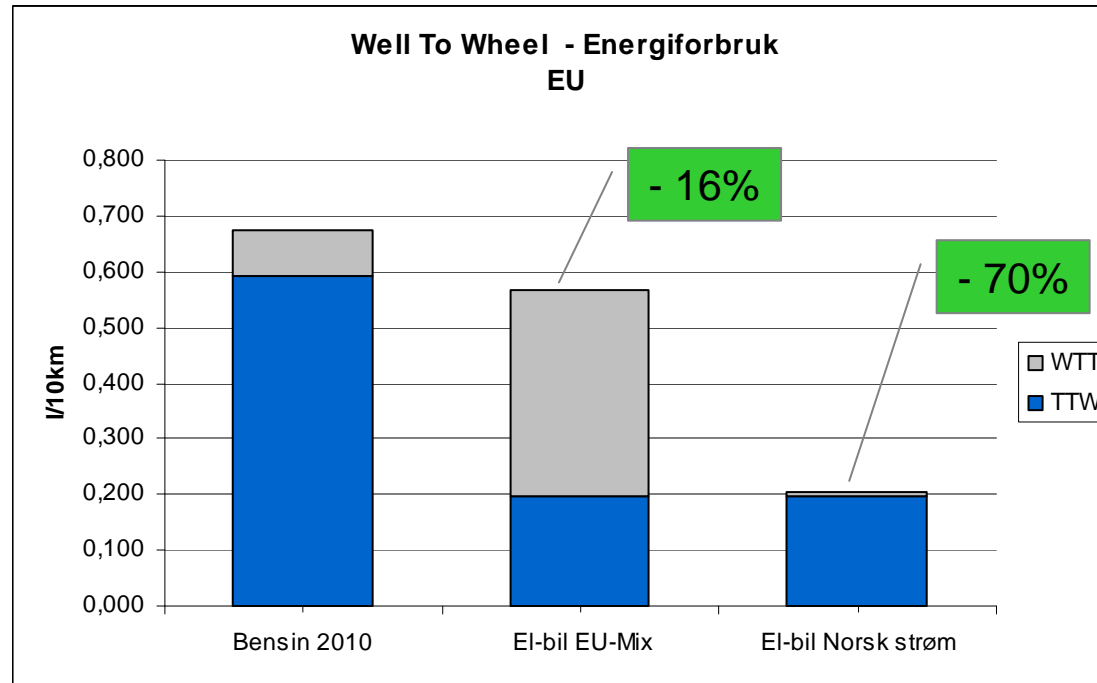


# Well To Wheel

Totalt energiforbruk og drivhusgassutslipp fra energiproduksjon til forbruk

EU-mix (2007)  
Electricity production:

- Nuclear (37.5 %)
- Coal (22.4 %)
- Oil (9.6 %)
- Gas (15.5 %)
- Hydro (12.4 %)
- Wind (0.4 %)
- Waste (1.8 %)
- Other renewable (0.3 %)



# Teknologisk utvikling av bilene



# Bil-Plattform Utviklingscykluser



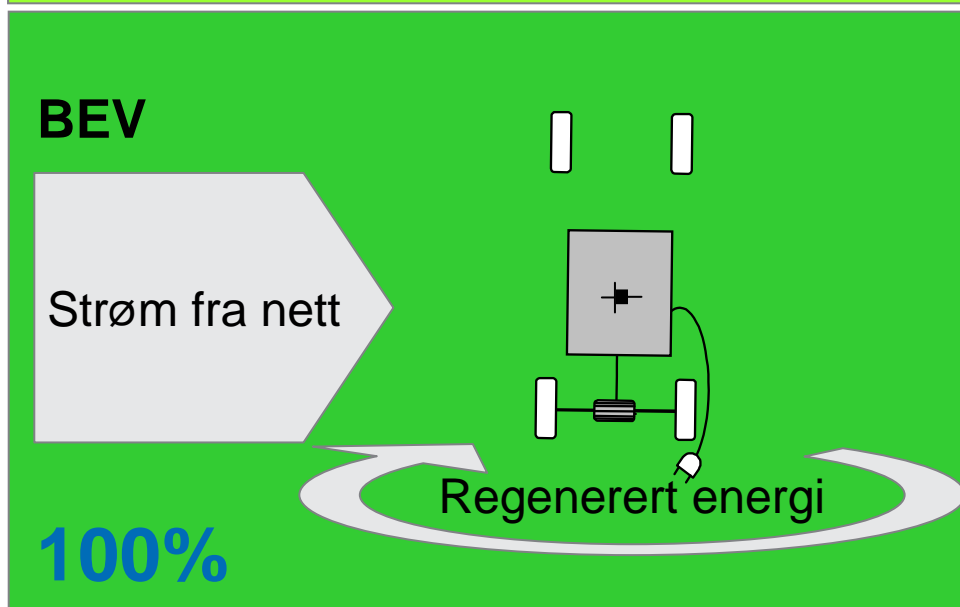
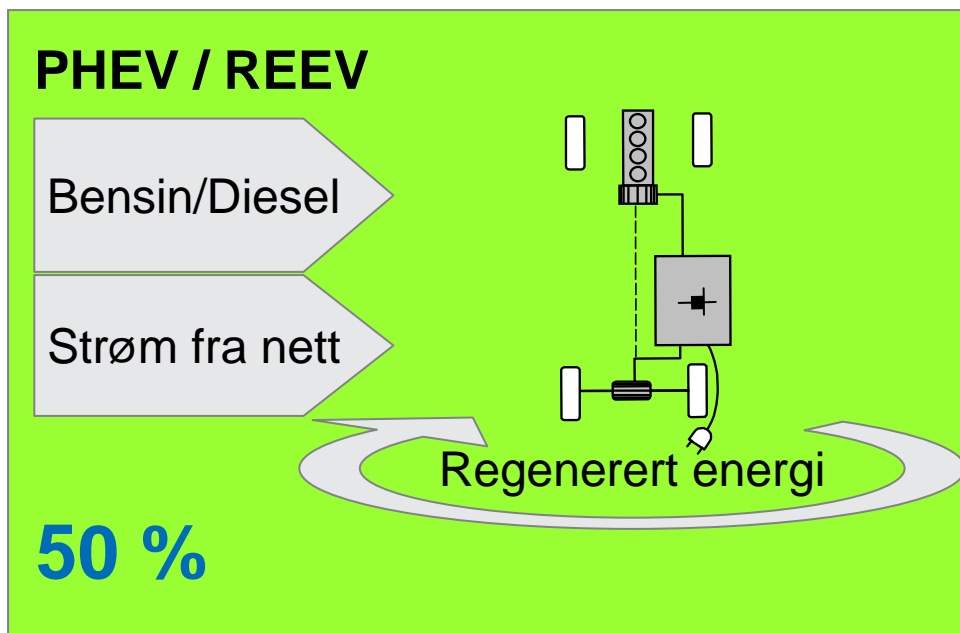
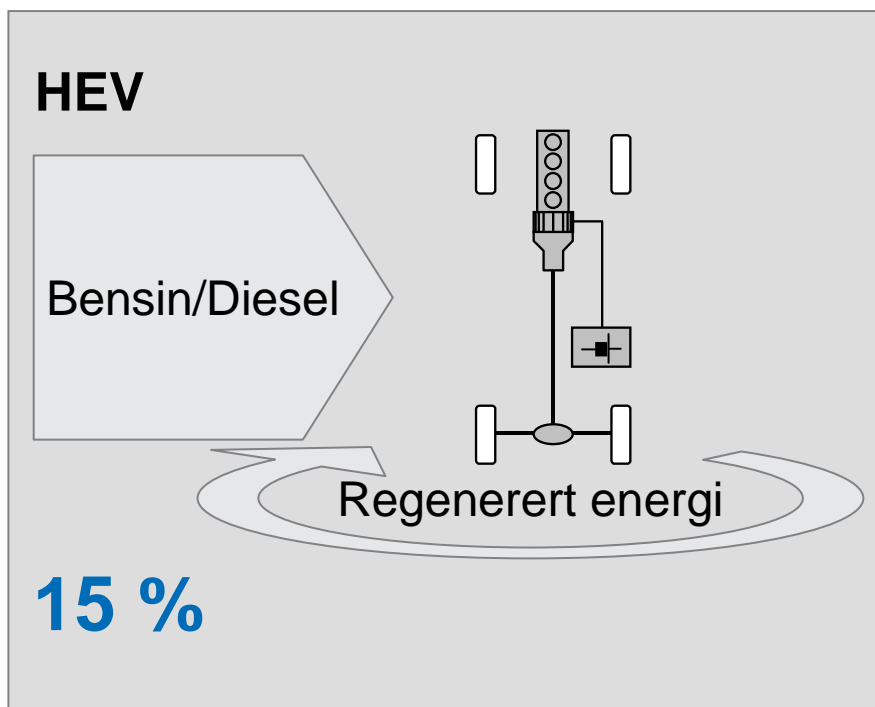
Periode med utprøving av system arkitektur / Lave volum



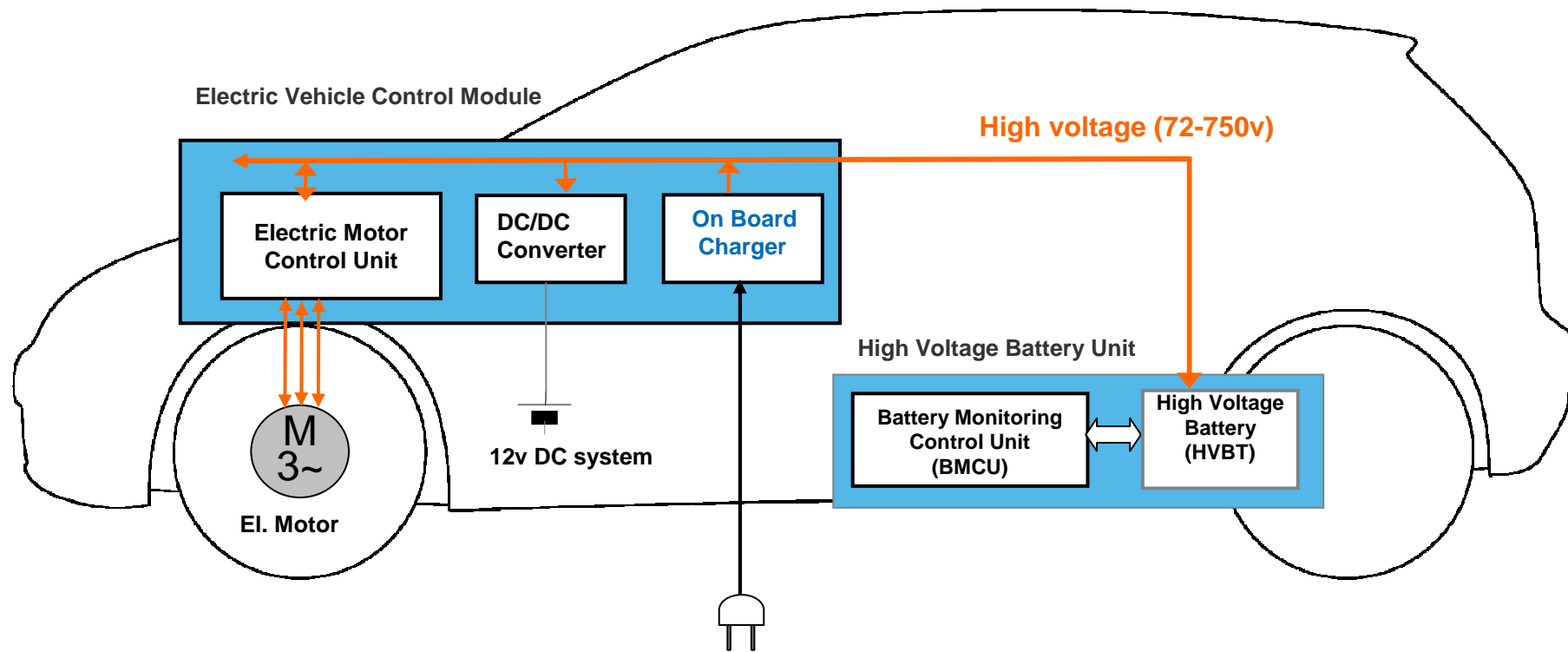
Standardisering/  
Høye volum



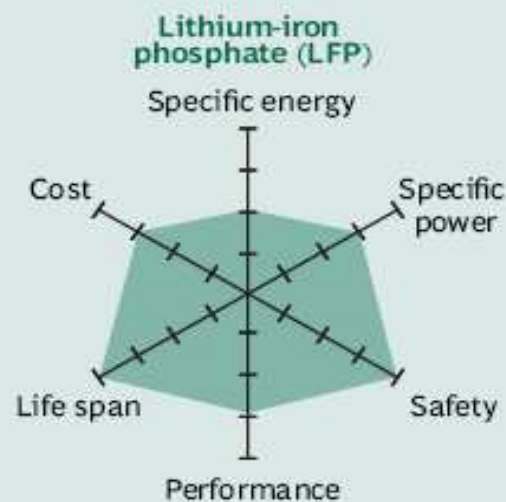
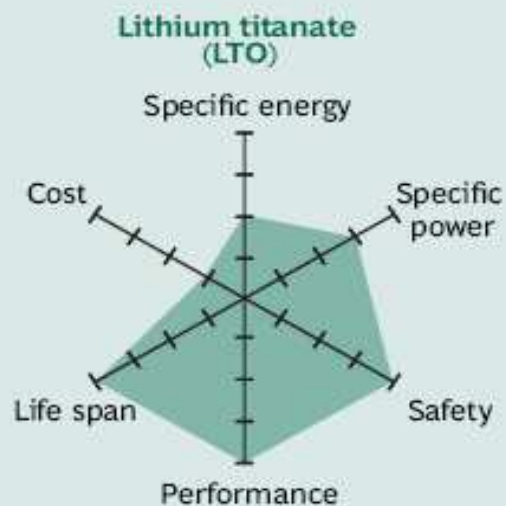
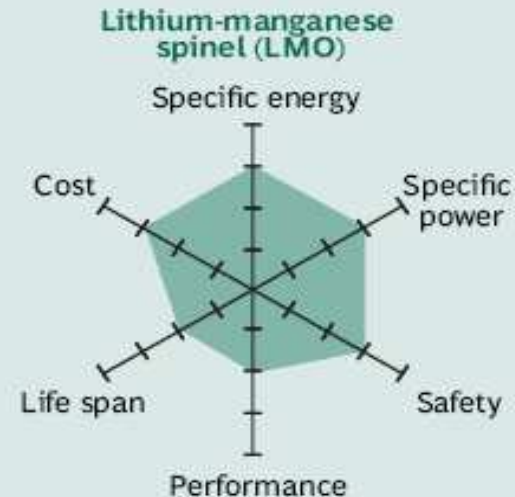
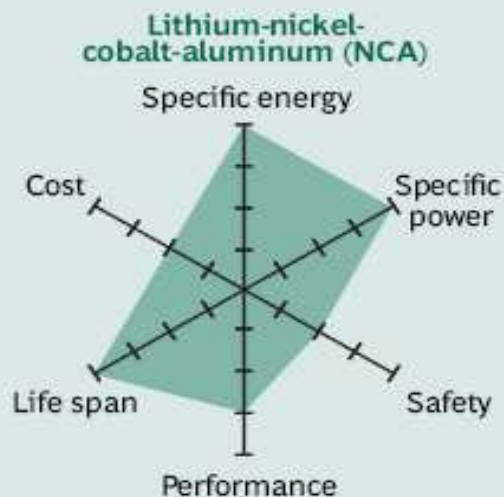
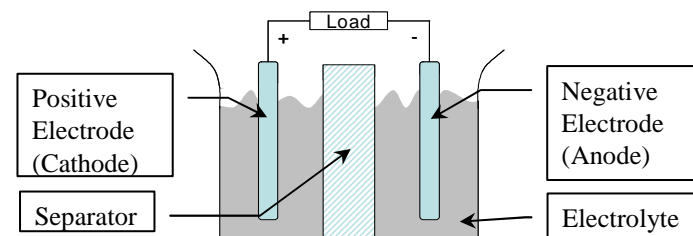
## Konfigurasjoner



# Hva består en BEV av?



# Det er mange typer Li-ion batterier (og ikke alle er like egnede)

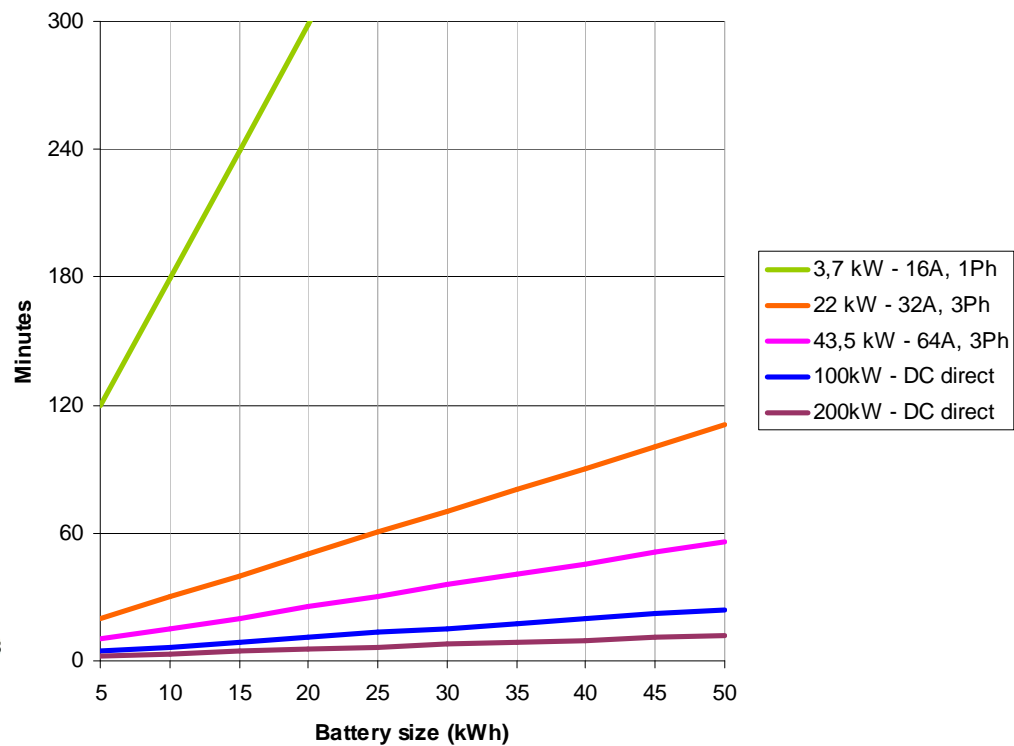


Source: BCG research.

Note: The farther the colored shape extends along a given axis, the better the performance along that dimension.

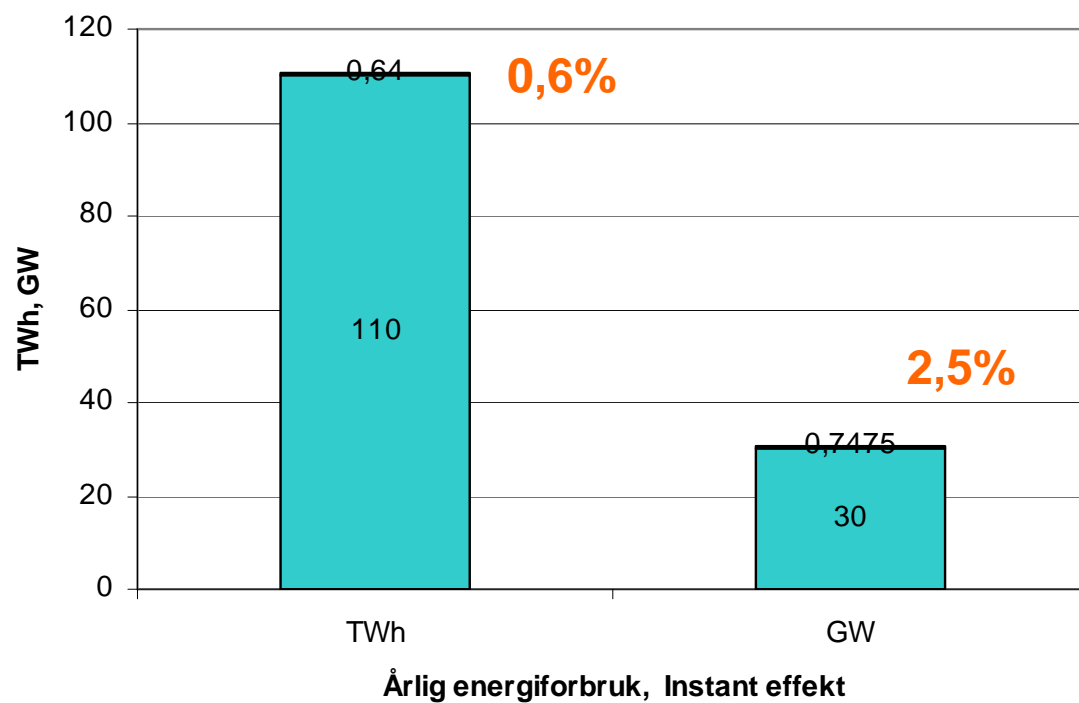
## Forskjellige typer lading

- ▶ **Normal lading**
  - 1-fas, 230v, 10 -16A (2 - 3,6kW)
- ▶ **Hurtiglading – nettstrøm**
  - 3-fas, 400v, opp til 64A (44kW)
- ▶ **Hurtiglading – likestrøm**
  - > 100kW



# Scenario ved 10% ladbare biler

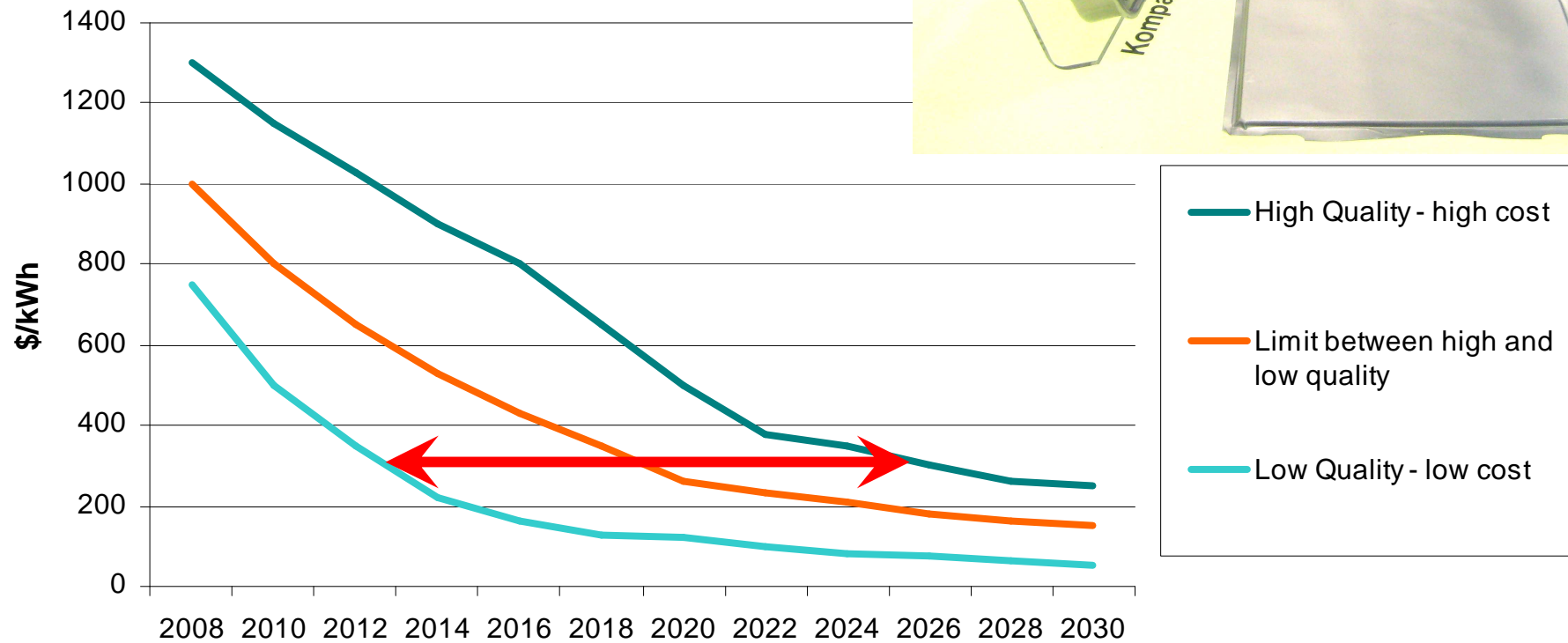
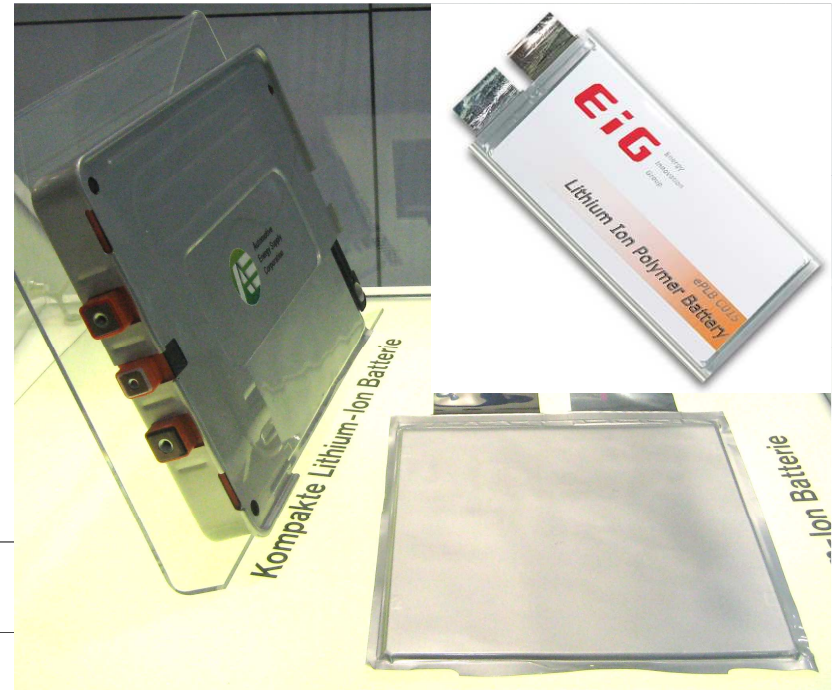
Hvis 10% av alle biler i Norge er PHEV/REEV/BEV-



# Utvikling av markedet

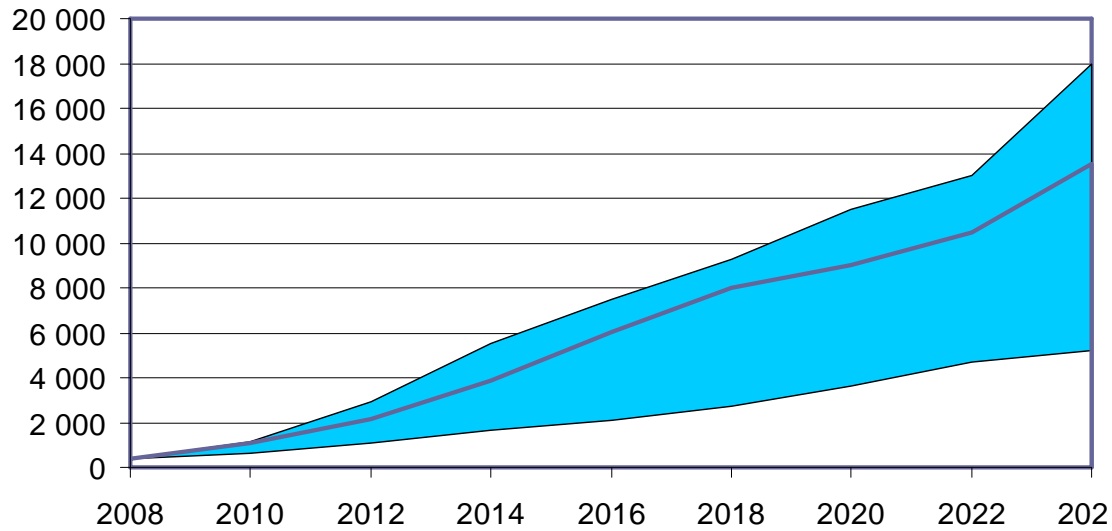


# Li-ion batteri CELLE kost utvikling



# Volume scenarioer - Hele verden

Volume Forecast Electric Vehicles(HEV/PHEV/REEV/BEV) [1000 vehicles]



## Etablerte KA kunde prosjekter – Grønne Prosjekter

### Eksempler:

- ▶ OnBoard Charger 3,3kW kombinert med 400 to 12 Volt DC/DC converter
- ▶ Startstrøms begrenser for micro hybrid
- ▶ Shift-by-Wire girskifter for batteri elektriske kjøretøyer
- ▶ Gir velger for stop/start system
- ▶ Gass-pedal for batteri elektrisk kjøretøy

