

*LF Diesel-Electric Hybrid
– understanding the benefits*

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Carbon emissions...

Global warming recognised as a major issue and road transport a significant contributor

But...

Consumers want wider a variety of goods in bigger numbers - smaller delivered quantities

The environmental challenge...



CO₂

Fuel consumption and CO₂ emissions are directly proportional

1 litre burnt diesel = 2.63 kg CO₂



The environmental challenge...



CO₂

Burn less diesel!

Alternative technologies...

- 1980s...
 - Electric, Hybrid, CVT trials to electric companies
- 1990s...
 - DAF hybrid @ 17 tonnes
 - Lead acid battery pack – 3 tonnes!
- Issues...
 - Range, payload, battery life, cost...



Alternative technologies

Hybrid development...

- USA – Kenworth & Peterbilt

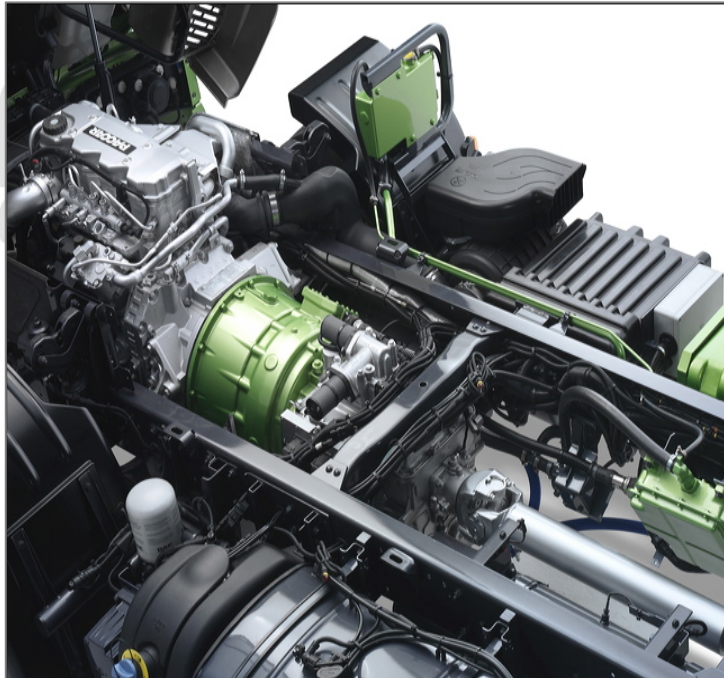


DAF LF hybrid...



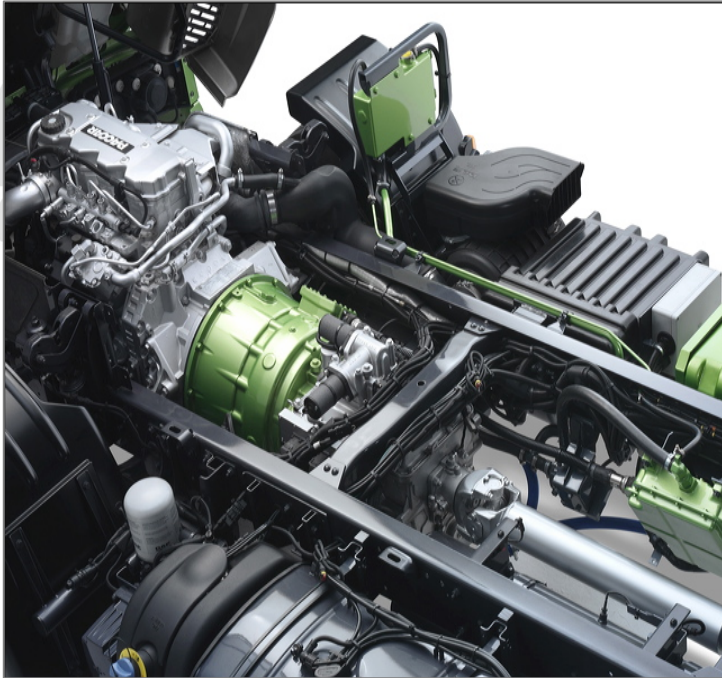
DAF LF hybrid...

- 160hp 4 cyl. Euro 5 EEV



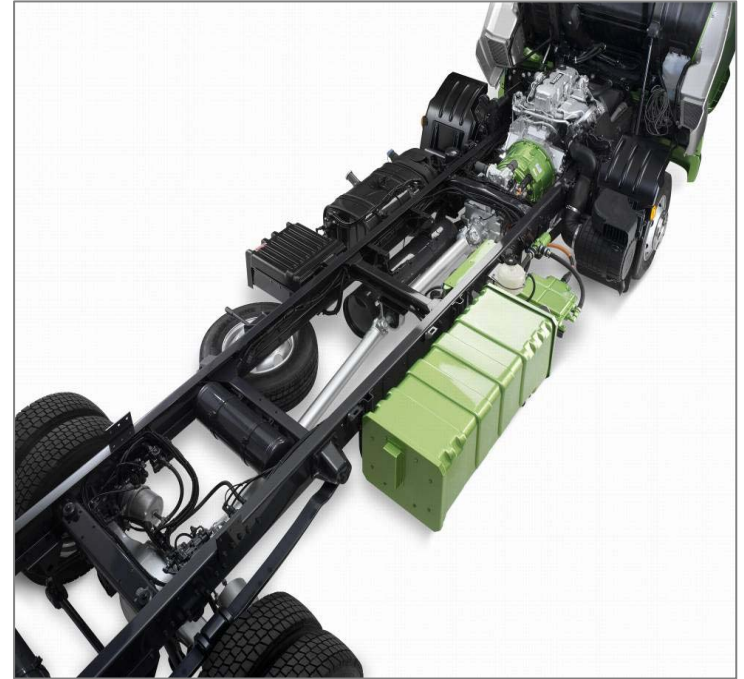
DAF LF hybrid...

- 160hp 4 cyl. Euro 5 EEV
- 44kW electric motor/generator



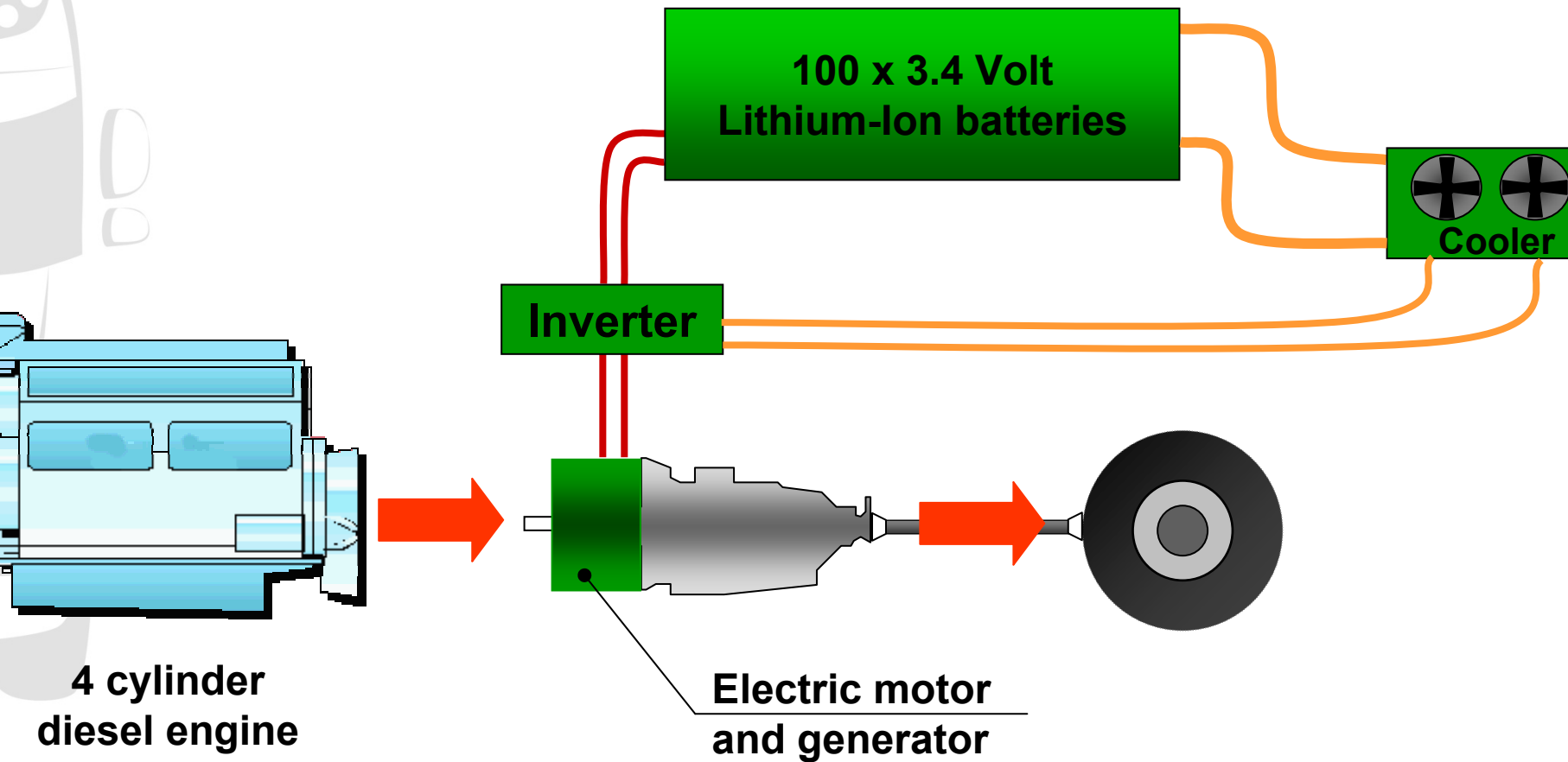
DAF LF hybrid...

- 100 x 3.4 volt battery pack
- 6 speed automated gearbox



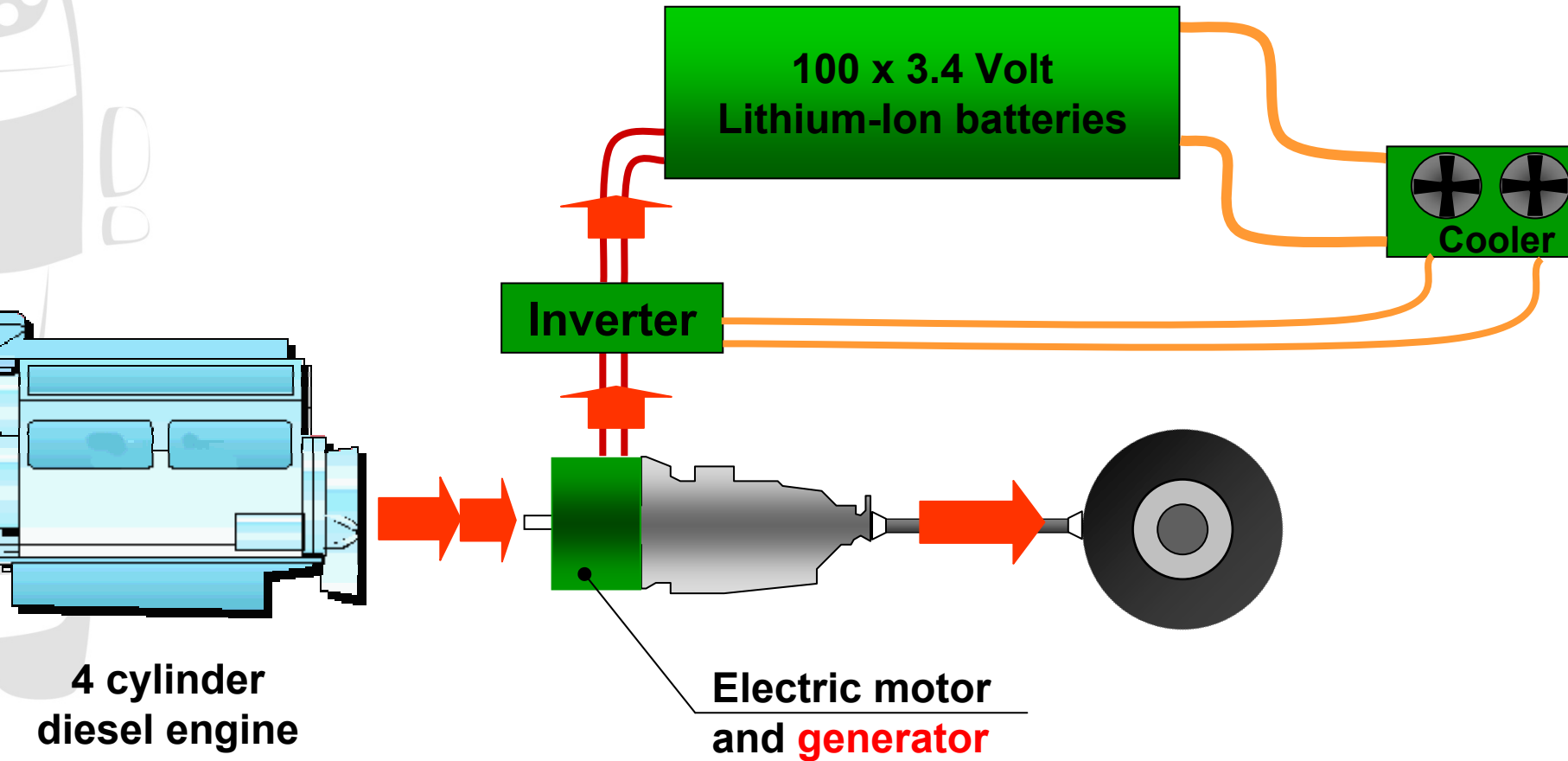
DAF LF hybrid...

- Diesel engine drive...



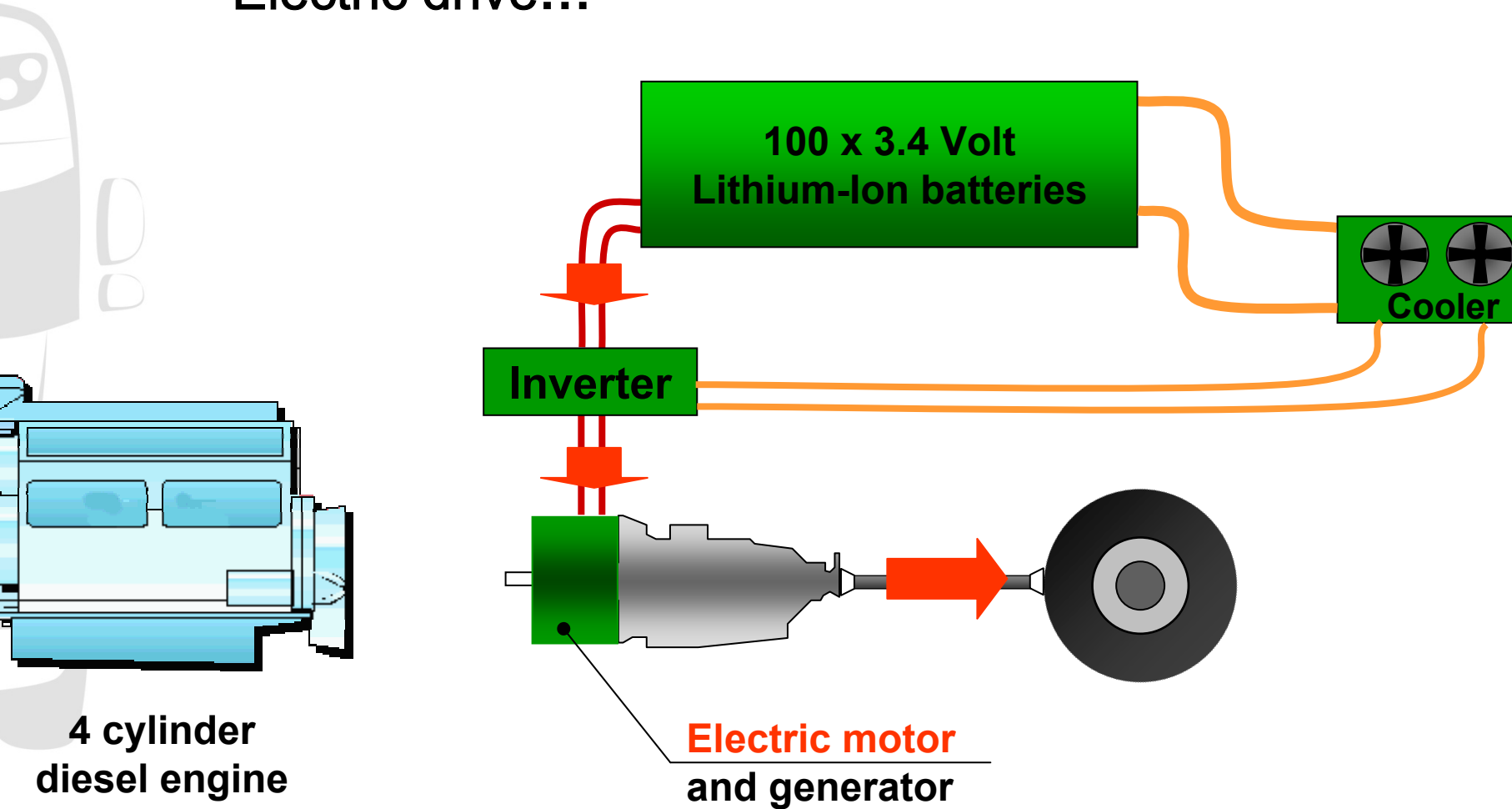
DAF LF hybrid...

- Diesel engine drive, battery charging...



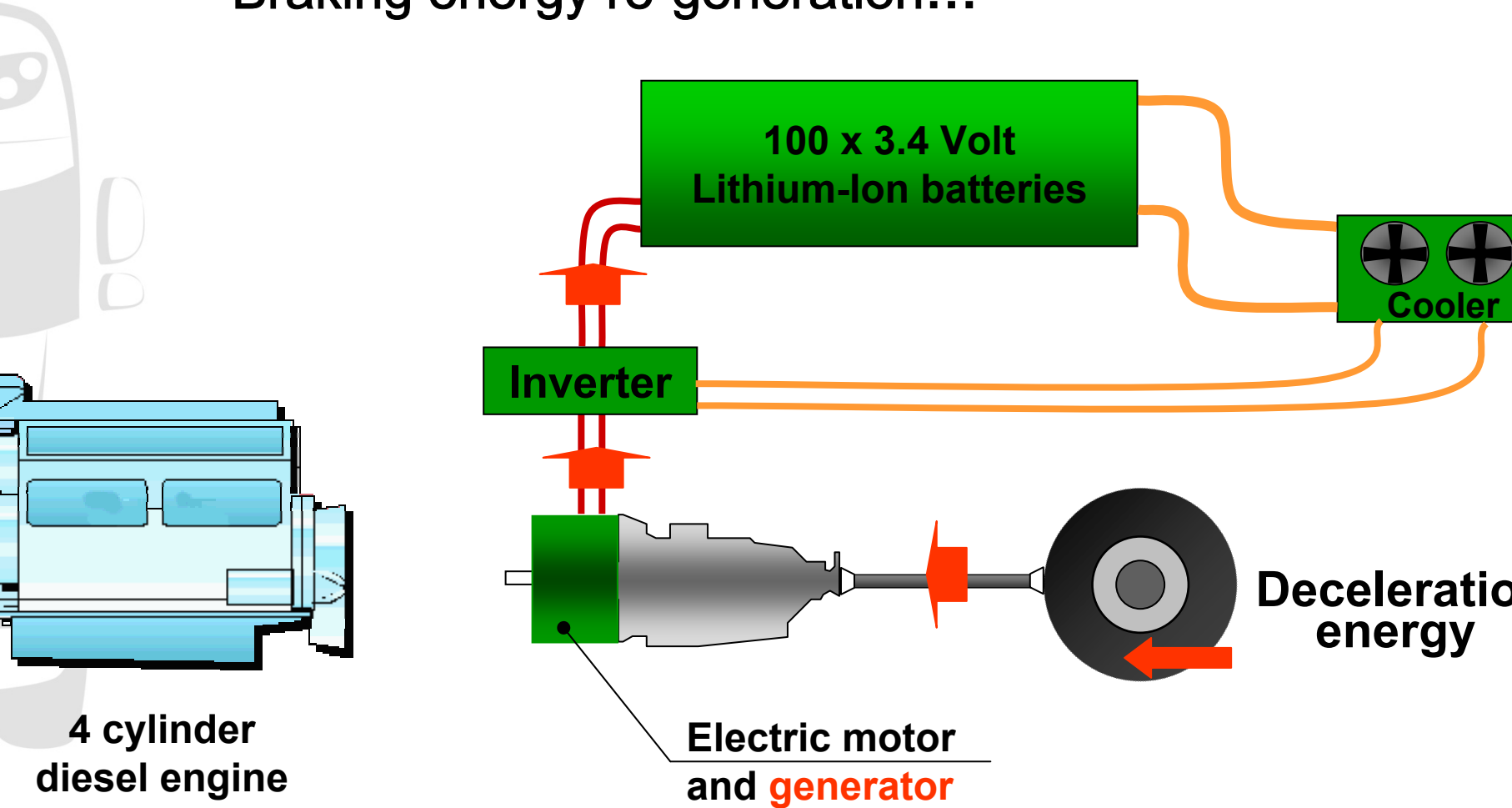
DAF LF hybrid...

- Electric drive...



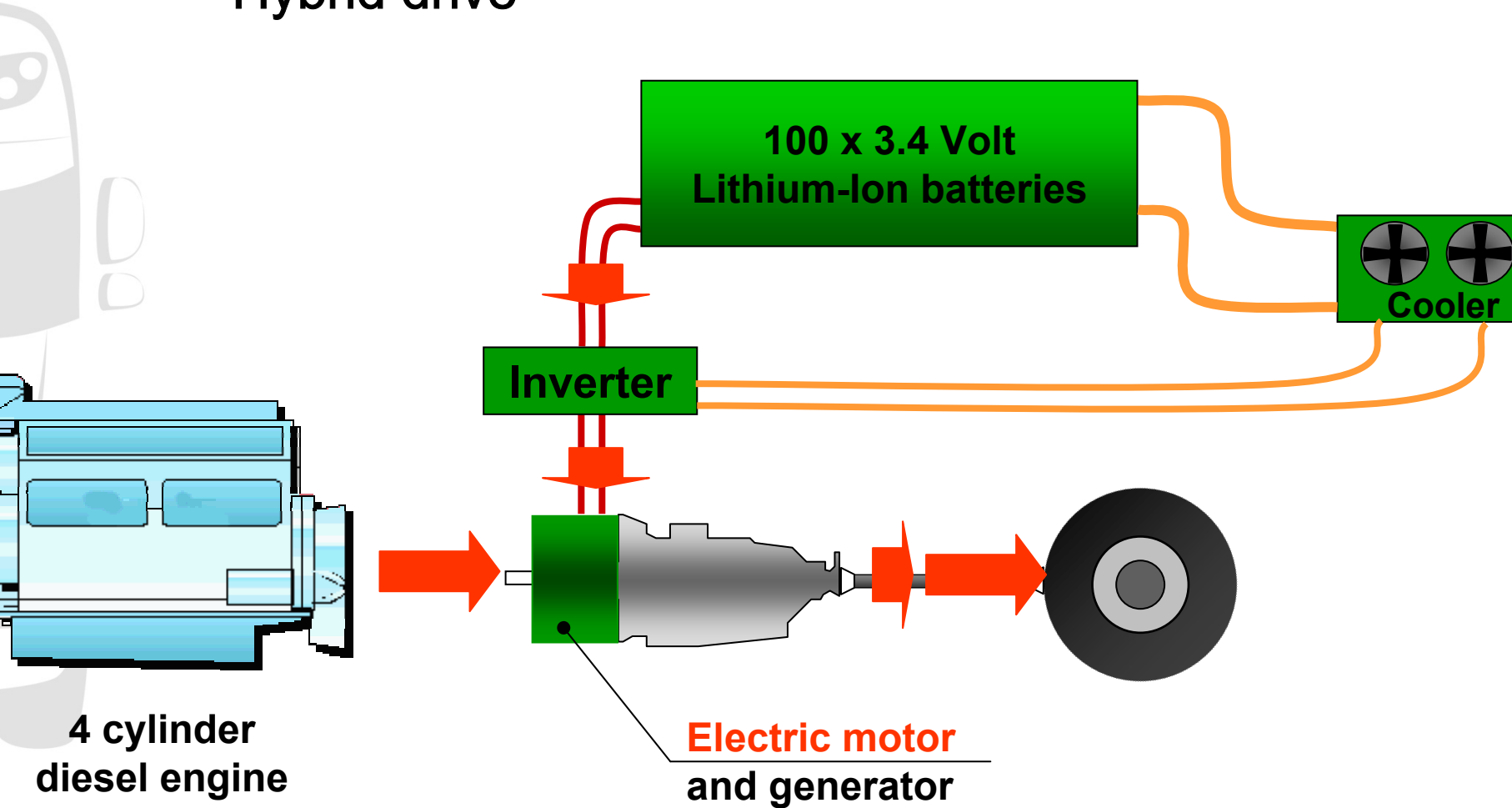
DAF LF hybrid...

- Braking energy re-generation...



DAF LF hybrid...

- Hybrid drive



Field trials...

- DAF & operators want to understand hybrids
 - Benefits
 - What works / what doesn't
 - Limitations – e.g., operating range, performance, maintenance, driver training
 - Reliability



Field trials...

- 10 trial vehicles
 - City/Urban
 - 50 to 200 miles per day
 - 7.5 tonnes
- Reference vehicles
 - Close scrutiny of data essential
- Data loggers
 - Monitoring hybrid modes and system errors
- Operational data
- Driver reviews
 - Tight schedules & pressure to finish

Results so far...

- 420,000 km (14,000 – 130,000km)
- Fuel economy – 12 to 25% improvement,
- Biggest % benefit at lowest average speed
 - Not necessarily the biggest £ benefit
- Operator & driver acceptance
 - No special knowledge required, but operational appreciation improves savings

Hybrid development...

Issues...

- Cost
- Battery life
- Servicing infrastructure



Hybrid Opportunity...

- Hybrids ideally suited for city/urban operations
 - e.g. stop/start, recycling, home deliveries
- Hybrids good on reliability/flexibility...
 - Does not require special electric infrastructure
 - Still operates with no battery power
 - Not depot/route specific



Opportunity for the UK...

- Consumer perception
- Putting a value on CO₂
- Diesel price
- Incentives & restrictions
- Local – London congestion charge
- National - Government support
 - US Federal funding support for low carbon vehicles
 - Diesel Emissions Reduction Act (DERA)
 - Grants available for up to \$12,000

