

Battery-electric and Fuel-cell Powertrains for Heavy Vehicles

November 30th, 2022
Forum Elektromobilität SH , Kiel, Germany

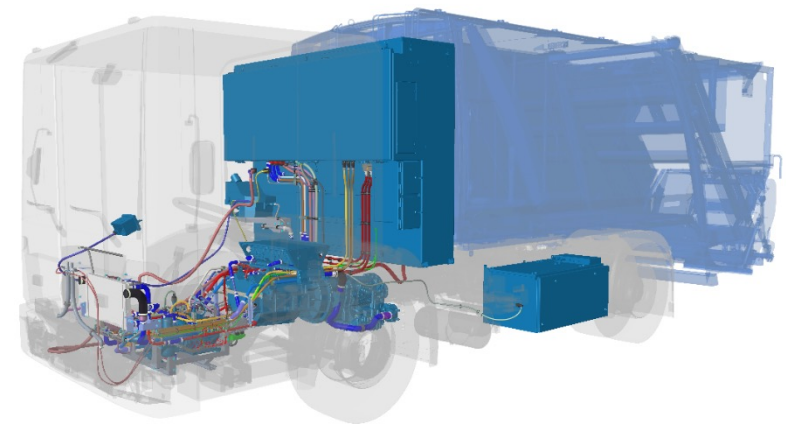
The logo for Banke, featuring the word "Banke" in a bold, sans-serif font. The letters "Banke" are in a dark grey color, and the letter "k" is highlighted in a bright blue color.

CONFIDENTIAL

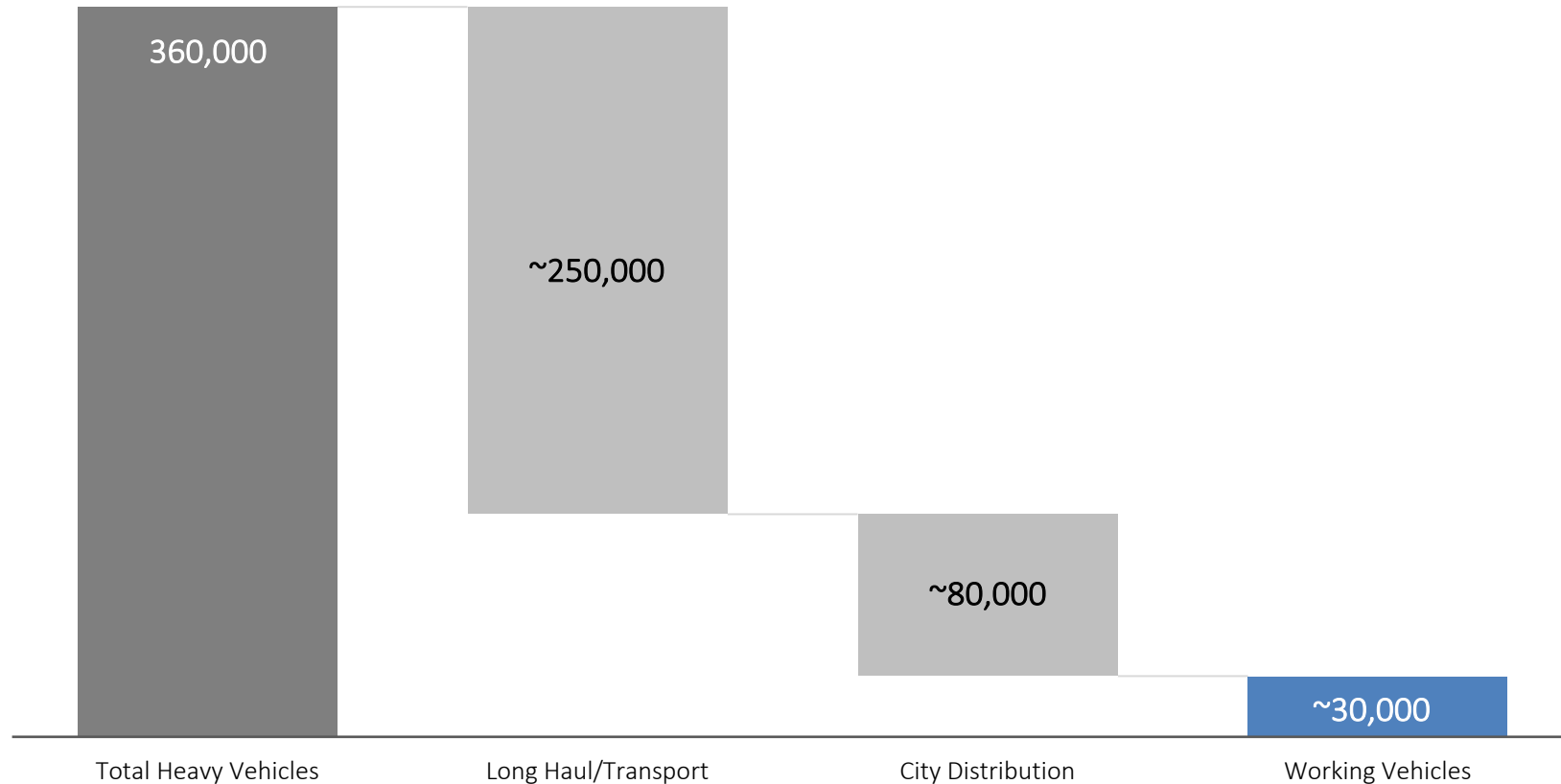
No part of this material may be circulated, quoted, or reproduced for distribution without prior written approval from Banke ApS.
Any use of this material without specific permission of Banke ApS is strictly prohibited.

Agenda

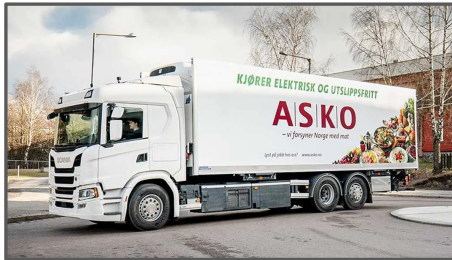
1. Working vehicles are a niche in the market
2. Offerings from truck OEMs
3. What customers need but can't get
4. Banke's Powertrain solution



Around 360,000 trucks are delivered in Europe every year. Working vehicles are a small niche.



Every truck OEM has an electrification strategy, but their approaches are quite different.



Scania Battery Electric



Daimler eActros



DAF LF electric



Volvo FE

Great products!

There is a broad range of customer requirements which will not be met by standard OEM vehicles



Battery capacity up to 400kWh ...



Short wheelbase and space between axles for equipment



Narrow vehicles down to 2000mm

Who can provide a 386kWh powertrain for a 3450mm wheelbase?

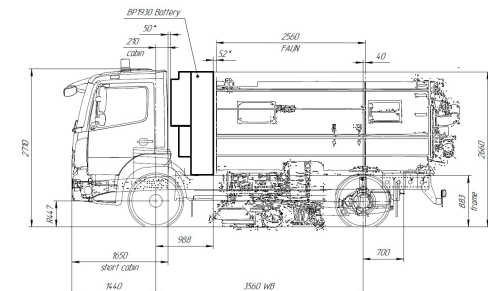
And there are hundreds of used diesel/CNG trucks which could be re-powered to full-electric operation



New full-electric vehicle	DKK3.0m
Powertrain conversion from Banke	DKK1.5m

Banke's Powertrain solution addresses the niche and re-power markets

- ▶ We have the capability to electrify more or less any vehicle ...
- ▶ ... though our focus is firmly on working vehicles
- ▶ We are an experienced systems integrator ...
- ▶ ... and our model is to provide kits to body builder and driveline integrators

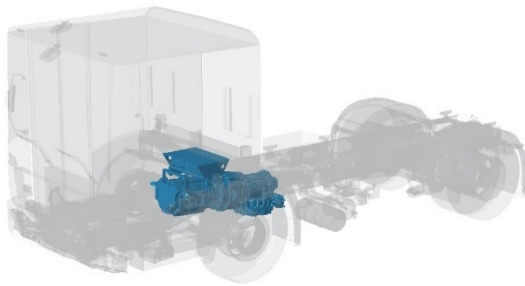


Banke's Powertrain solution addresses the niche and re-power markets

Banke



The components and subsystems are designed with working vehicle driveline integrators in mind.



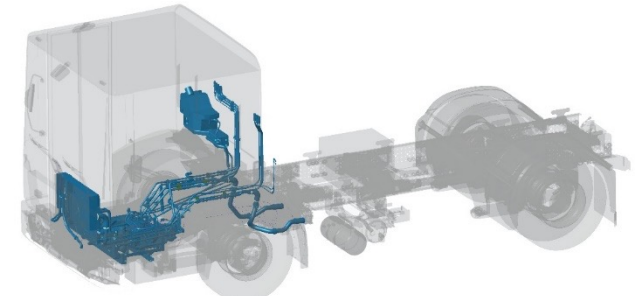
Driveline

- › 190 kW nominal, 255 kW peak
- › Standard automatic transmission without any modification
- › Automatic transmission cooling system integrated with water heating system of the cabin



Compressed air system

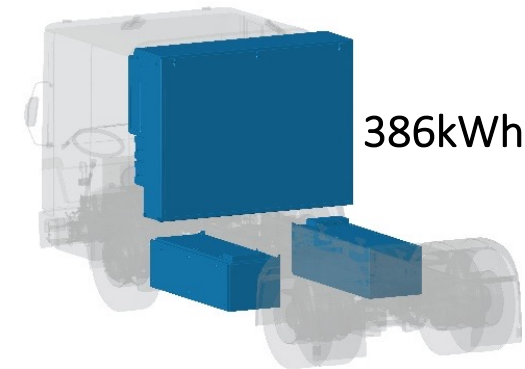
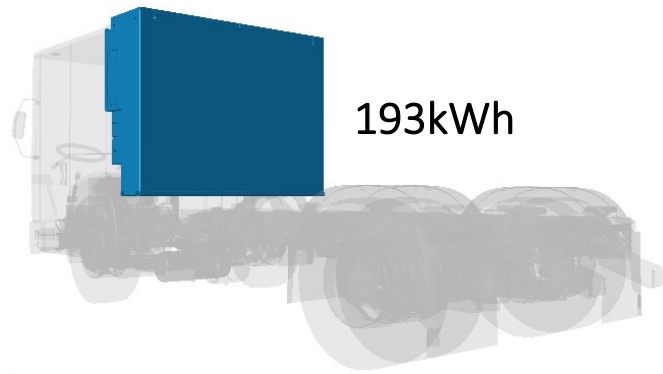
- › The original compressor is replaced with an electrical one
- › Air system does not require re-certification, as the original truck's system is preserved



Cooling system

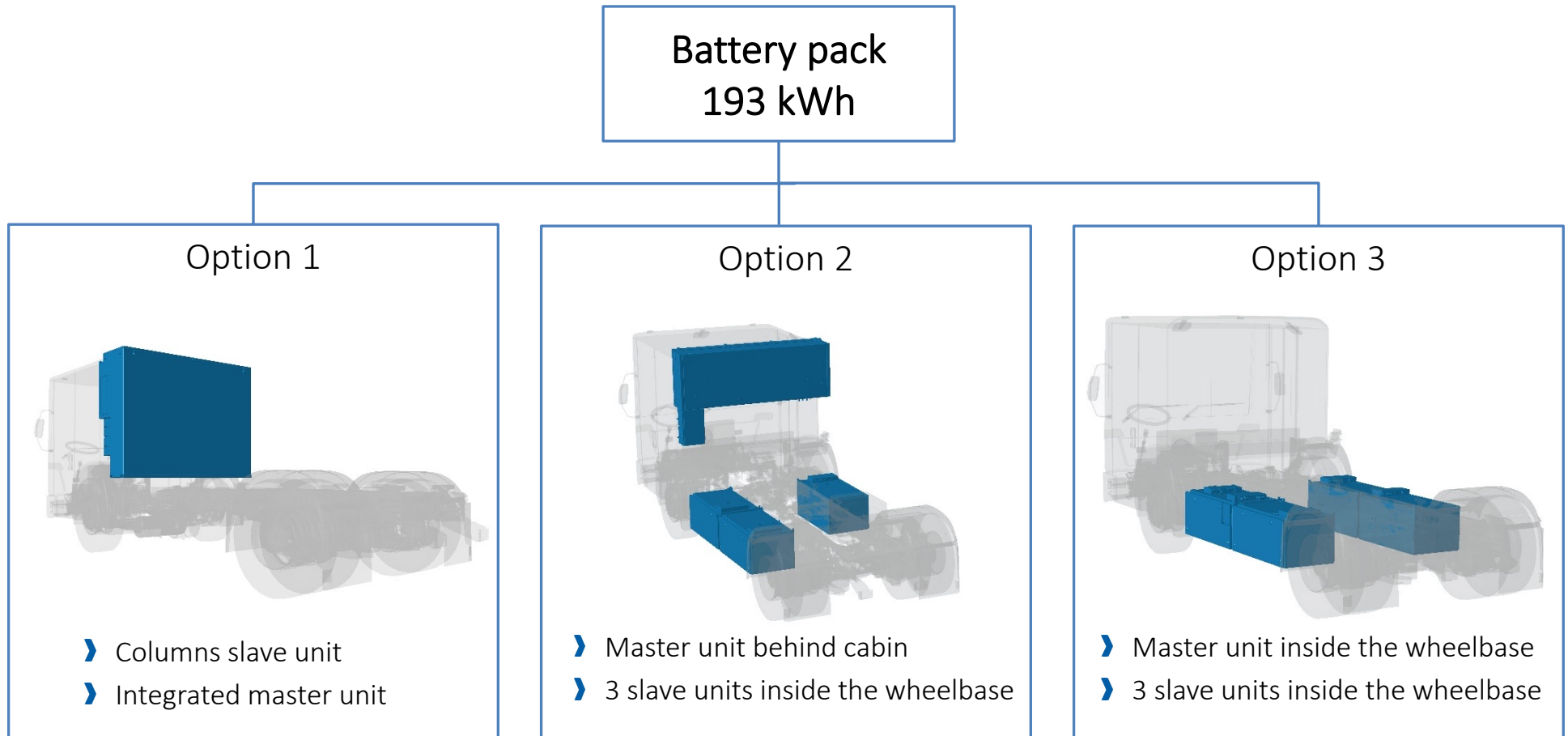
- › Cooling Circuit 1 cools the traction motor, inverter, charger, DC/DC converters and the air compressor pump
- › Cooling Circuit 2 cools the automatic transmission and heats the cab

Banke's Powertrain comes with 193kWh as standard and up to 386kWh of capacity



	BP1930	BP2570	BP3860
Weight	1700kg	2260kg	3380kg
Total system capacity	193 kWh	257 kWh	386 kWh
Nominal voltage	620 Vdc		
Chemistry of battery cells	LiFePO ₄		
On-board AC charging	22 kW, type 2		
DC charging	CCS2 (200A max)		

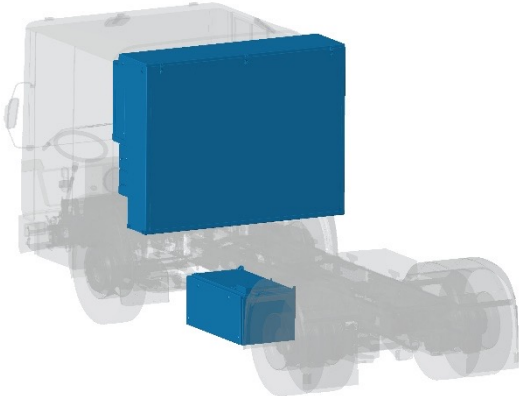
Banke offers multiple configuration options for each battery pack solution (1/3)



Banke offers multiple configuration options for each battery pack solution (2/3)

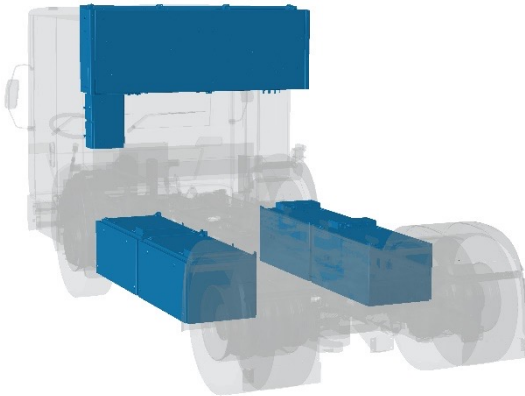
Battery pack
257 kWh

Option 1



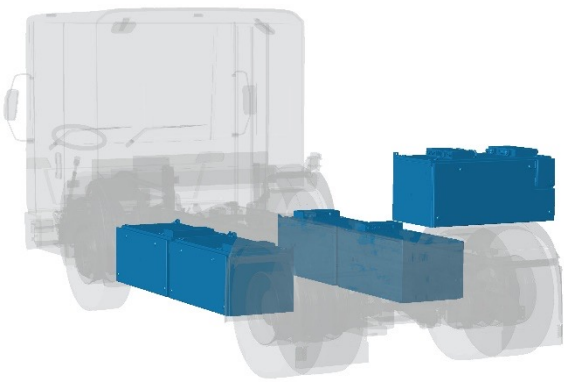
- › Columns slave unit
- › Integrated master unit
- › 1 slave units inside the wheelbase

Option 2



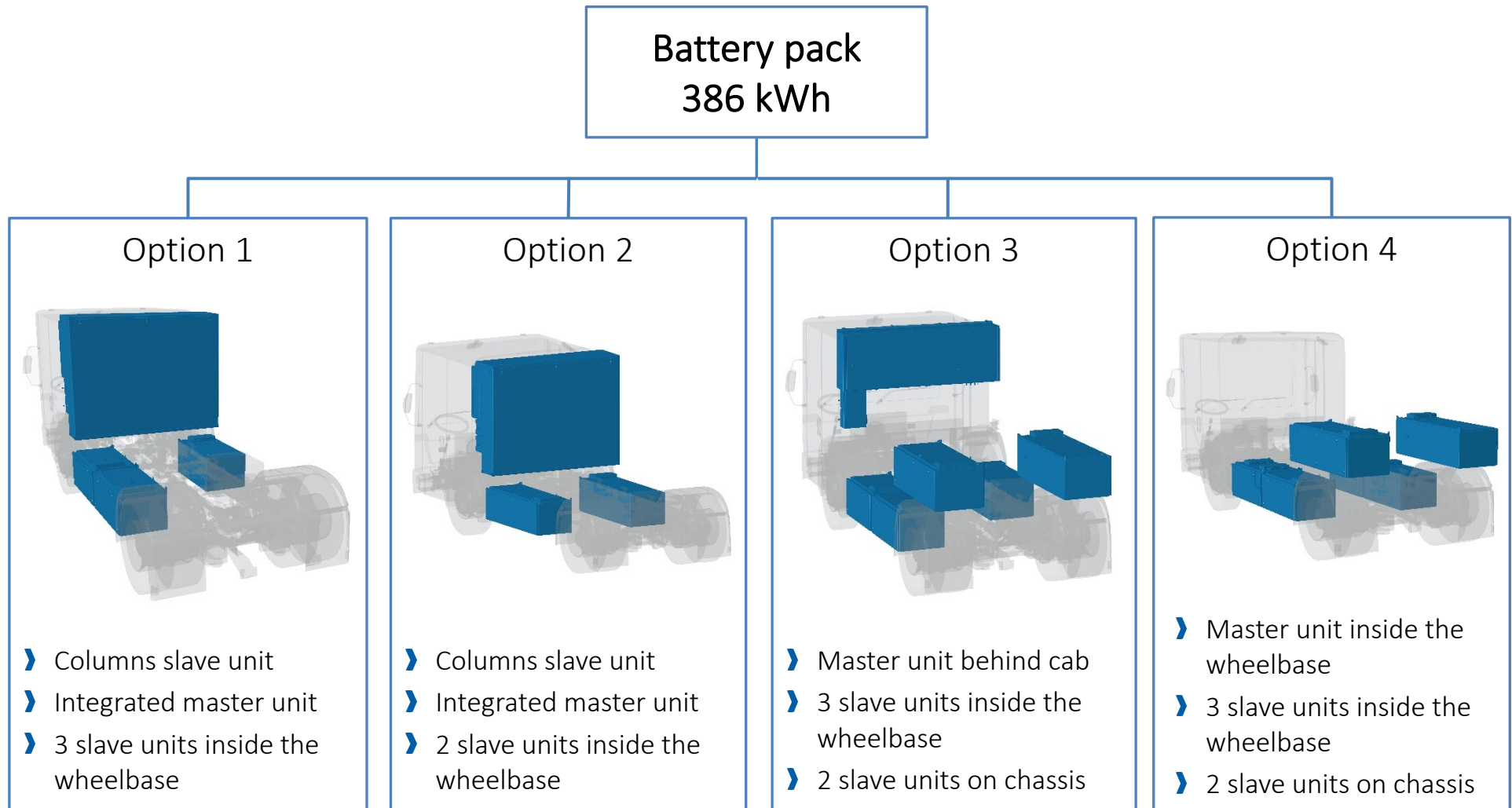
- › Master unit behind cabin
- › 4 slave units inside the wheelbase

Option 3

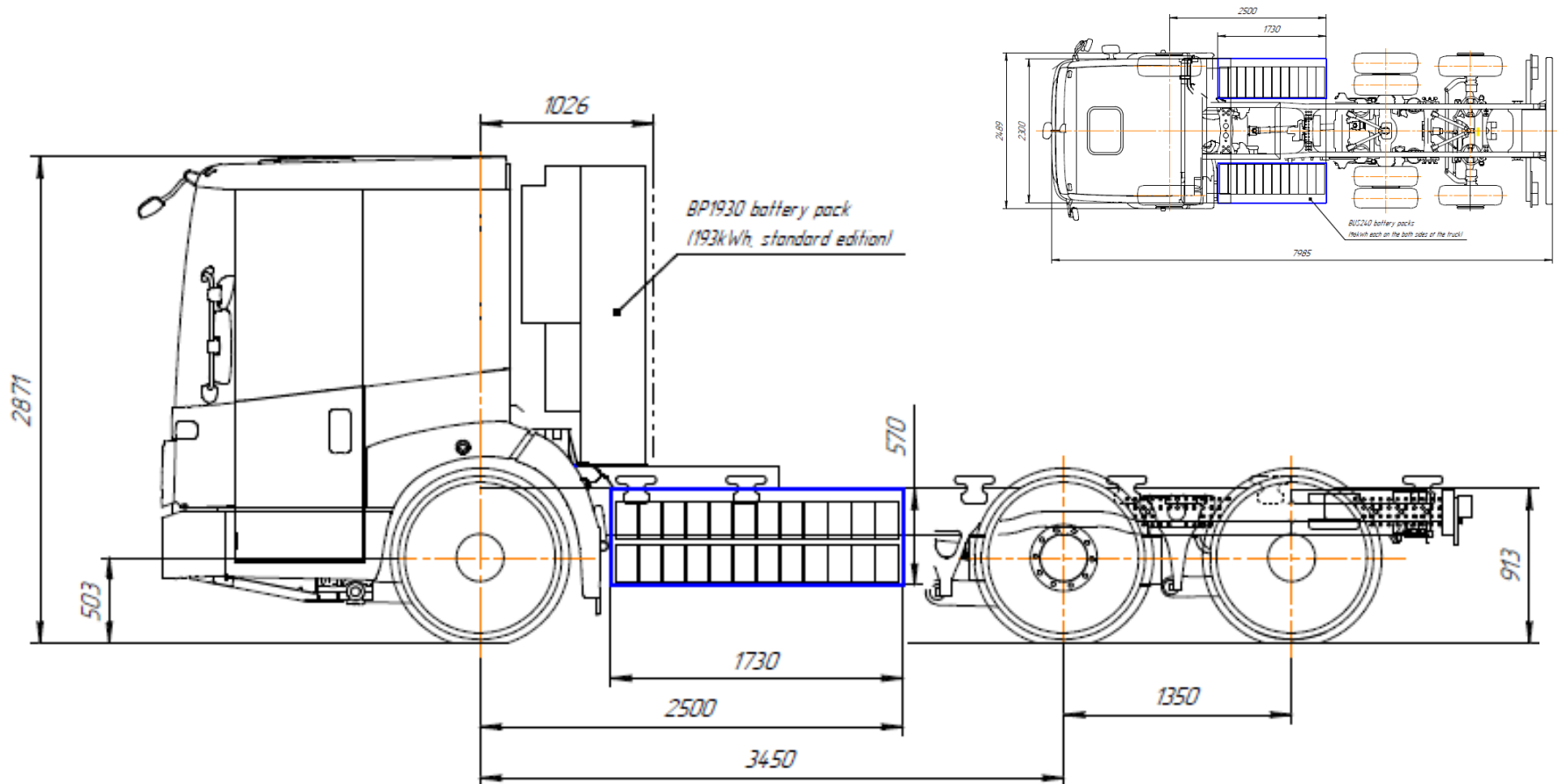


- › Master unit inside the wheelbase
- › 3 slave units inside the wheelbase
- › 1 slave unit on the chassis

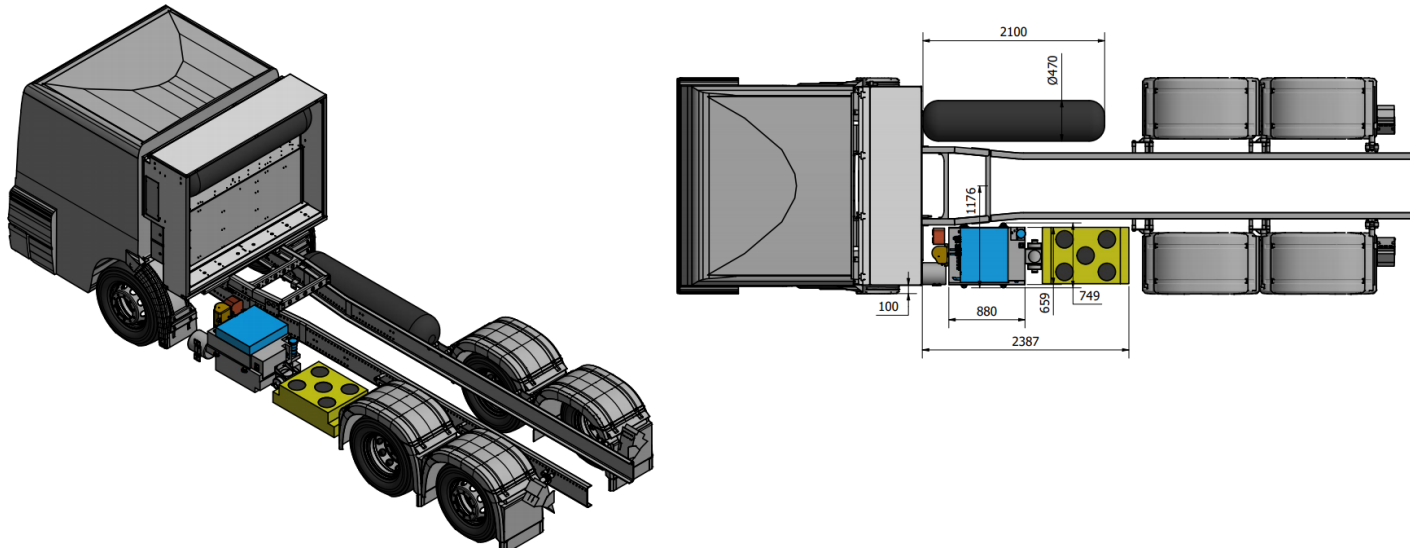
Banke offers multiple configuration options for each battery pack solution (3/3)



The Banke Powertrain can provide 386kWh on a 3450mm wheelbase chassis!

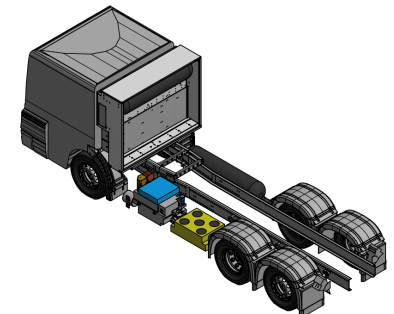
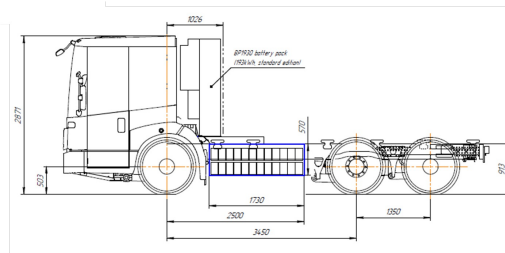


We are also able to offer a hybrid fuel-cell option to those customers that need it



Unit architecture	<ul style="list-style-type: none">• Master unit with batteries behind the cabin• Fuel cell pack inside the wheelbase
Energy capacity	<ul style="list-style-type: none">• 193 kWh battery• 8kg hydrogen tank

- Electric heavy vehicles are here
- But there are many niches that are not served
- We are ready to hear from municipalities who can't get what they need from truck OEMs
- Banke has developed solutions specifically for these niches ...
- ... and which are also ideal for the re-power market too



Bank**e**