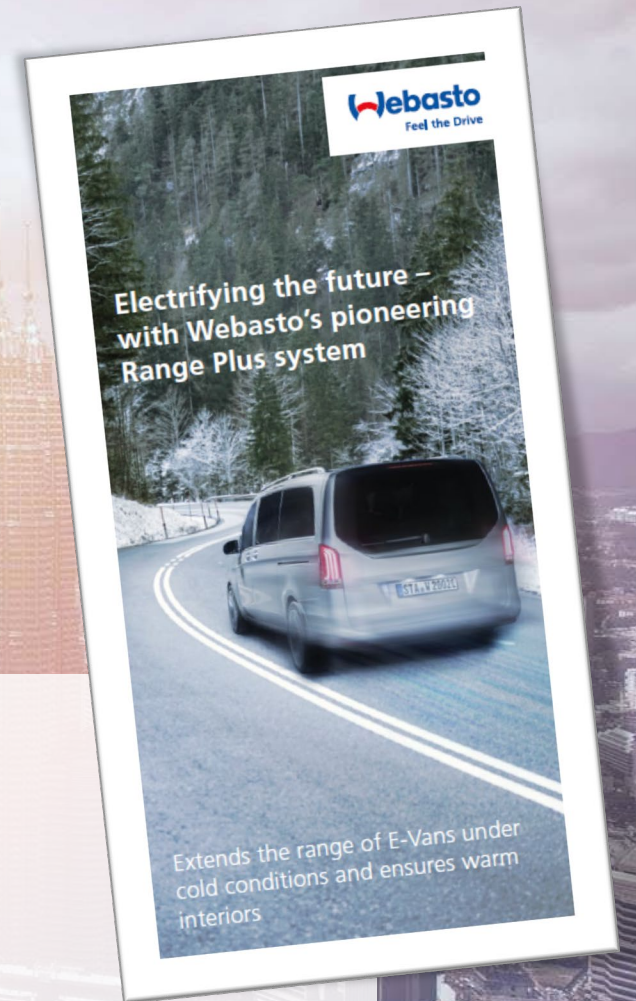


Range Plus Retrofit Solution for electric LCVs

CS R&D Car & PSM-H
Neubrandenburg, Gilching, August 2023





Agenda

- **Initial situation & question**
- **Range Plus: Idea**
- **Range Plus: Concept**
- **Range Plus: More range & warm interior**
- **Range Plus: Suitable for whom?**
- **Range Plus: Vehicle Applications**
- **Range Plus: Overview of Set**
- **Range Plus: Air Top 2000 STC**
- **Range Plus: Application HVO**
- **Range Plus: Installation Concept & Effort**
- **Range Plus: First Customers**
- **Range Plus: Next Steps**
- **Range Plus: FAQ**

Initial situation

Despite new generations of batteries & battery management the following obstacles are known:

1. Freezing of windshied from inside during car operation in conditions below -30°C (reported from Canada)
 2. Limited range of BEV's in Wintertime (up to 35% shortening)
 3. Car interior stays cold when doors are frequently opened during passenger transport / commuting purposes
 4. Transport of temperature sensitive goods have to be assured
- There is a growing niche market especially for LCV's to be covered
 - The study is taken with the latest generation of MB eVans



Initial situation

"... In everyday delivery work, this means that the eVito's tours are a maximum of around 70 kilometres, while the eSprinter's are around 90 kilometres long..." *

"... There are no e-vehicle specific failures, however we see that in winter the power consumption increases significantly due to heating and tours therefore have to be significantly shorter than in summer ..." *



* www.electrive.net, Interview with Daniel Kasack, Fleetmanager EU, Amazon – February 2021

Initial situation & question

“Despite **new generation battery** technologies & battery management systems, **heating the interiors of electric vehicles** during periods of **cold weather limits the range** per battery charge by **up to 35 percent.**”

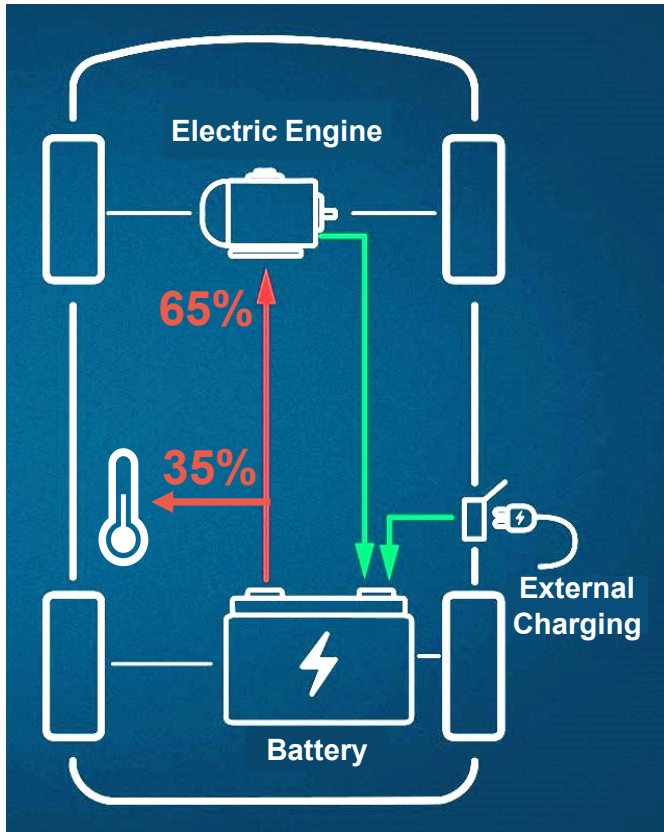
- LCV (Light Commercial Vehicles) **upfitting / conversion** has always been a **strong business** for Webasto CS (RSB & CSB)
- **Unmodified LCV** (utility van) are the preferred solution for Last-mile-delivery, Shuttle Services, Craftsman, ... while **LCVs / LCV Chassis** are the base for Ambulances, Recreational Vehicles, Mini-Busses, ...
- Production of **internal combustion engine LCVs** shall **shrink annually by -4% till 2032*** while **electrified LCVs** production is projected to **grow by 26% annually** in the next 10 years**

What can Webasto do to provide the **necessary interior temperatures** regardless of the **weather** without **limiting the range** of the vehicle?

Range Plus: Idea

Extend the range of BEV`s under cold conditions

BEV system

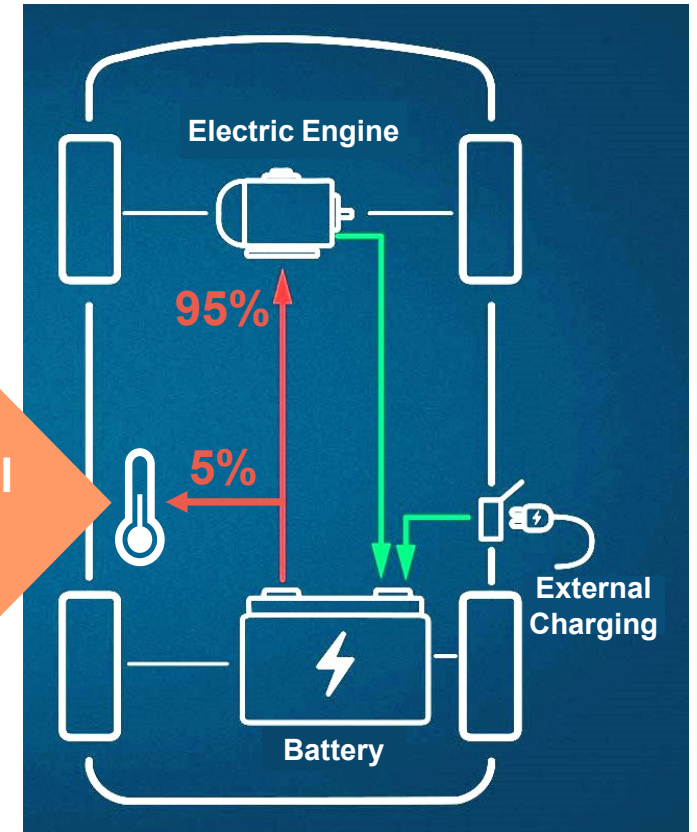


„Battery capacity is used for engine & heating of driver, passenger & cargo compartment“

BEV system + Range Plus

„Battery capacity is mostly used for engine; heating is provided via external chemical energy“

External Chemical Energy



Range Plus: Concept

Extend the range of BEV`s under cold conditions

Retrofit of:

- Heat source
- Heat control
- All necessary products, parts & components to run the heat source while parking & during driving

While not touching:

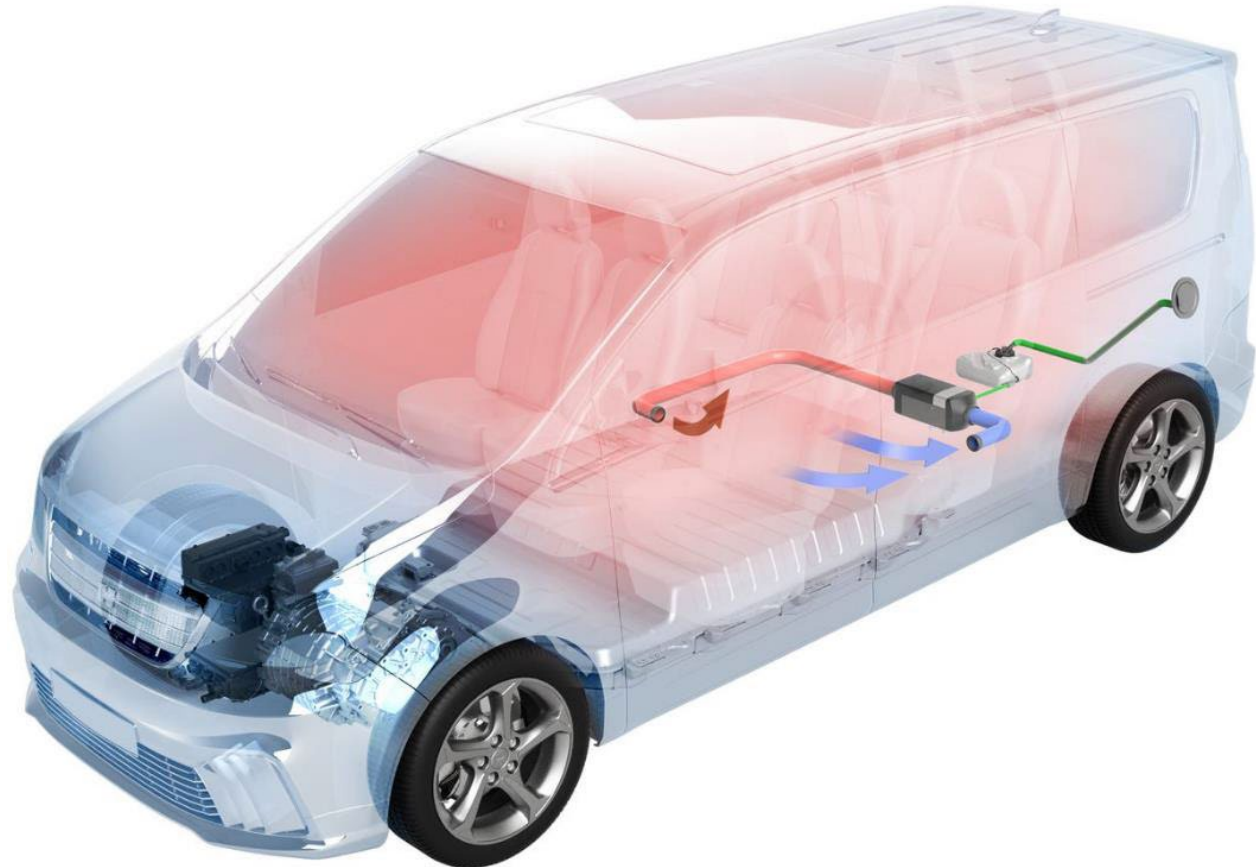
- High Voltage Network
- Type Approval

Technical release of solution:

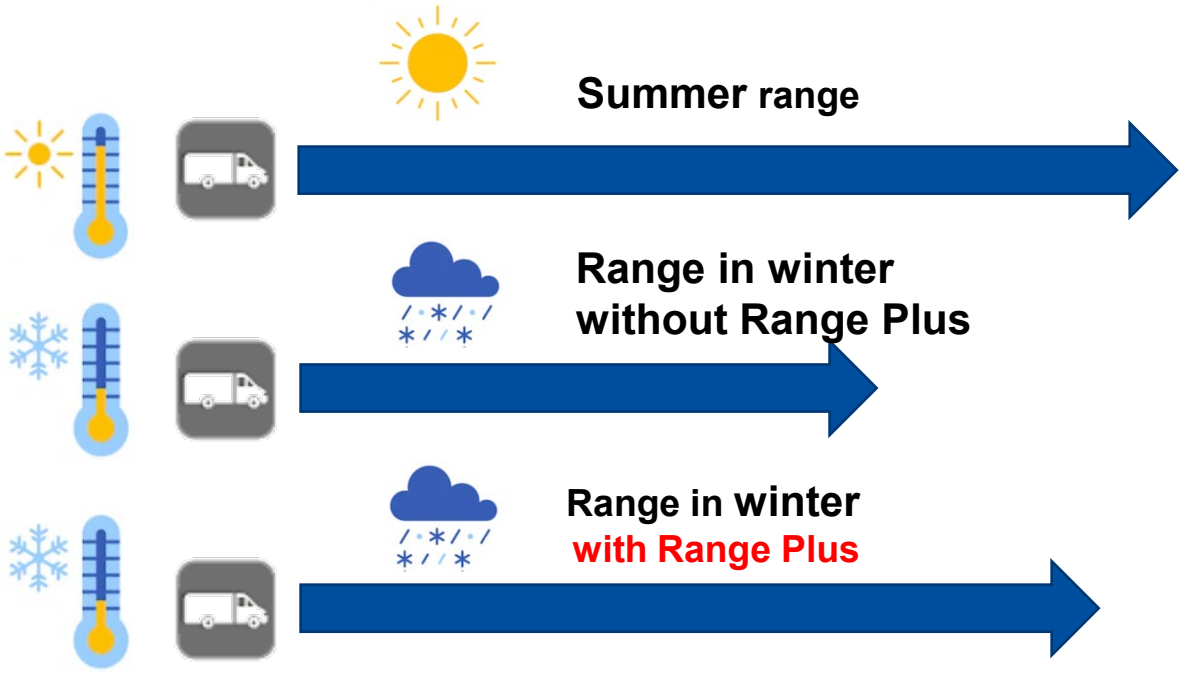
DEKRA (crash safety/rollover test)

Result of Range Plus:

- up to 80 km additional range at comfortable interior temperatures
- up to 50 h of additional heat



Range Plus: More range & warm interior



Range Plus: Suitable for whom?



Passenger transportation in taxi/shuttle bus, school transportation:

Longer waiting times and no loading facilities. Doors are frequently opened when exiting and entering the car.

Disabled or ambulance transport:

There are longer waiting times between trips and no loading facilities. The doors are frequently opened when getting off and on. In addition, passengers have an increased need for heat during the cold season due to their limited mobility.

Range Plus: Suitable for whom?

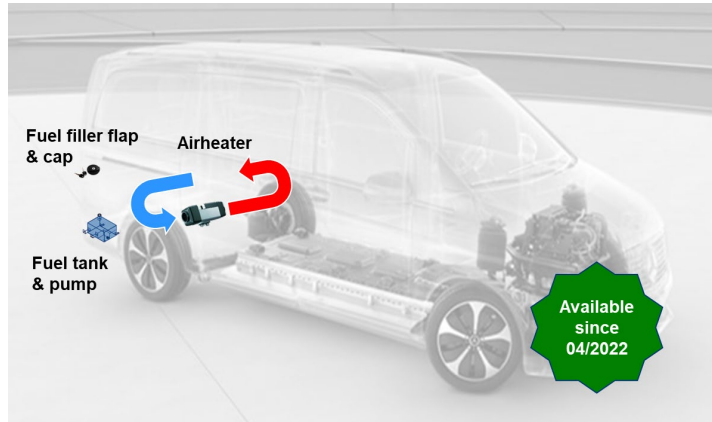


Mobile workplace:

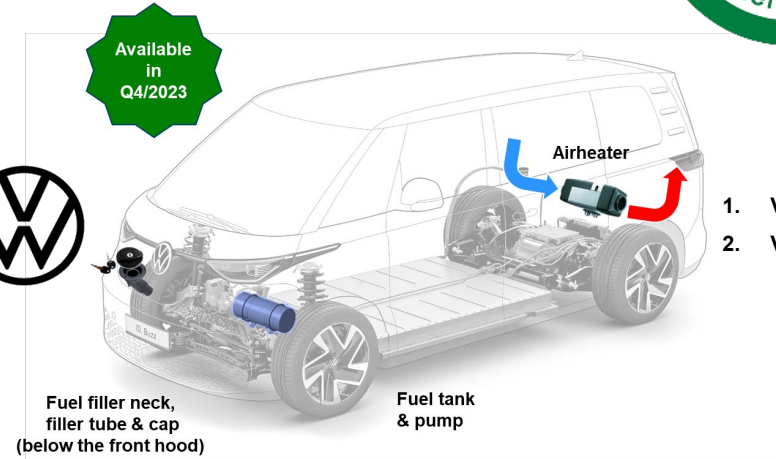
Workshop or office vehicle with long off-grid standby times e.g.: for monitoring activities or assembly work in the field, delivery services, delivery vehicles

Transport and storage of temperature-sensitive materials such as flowers, paints or medicines in environments where vehicle charging is not possible.

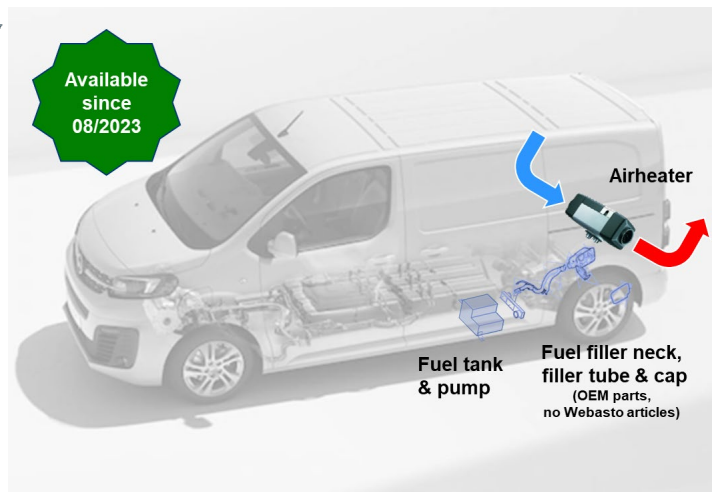
Range Plus: Vehicle Applications



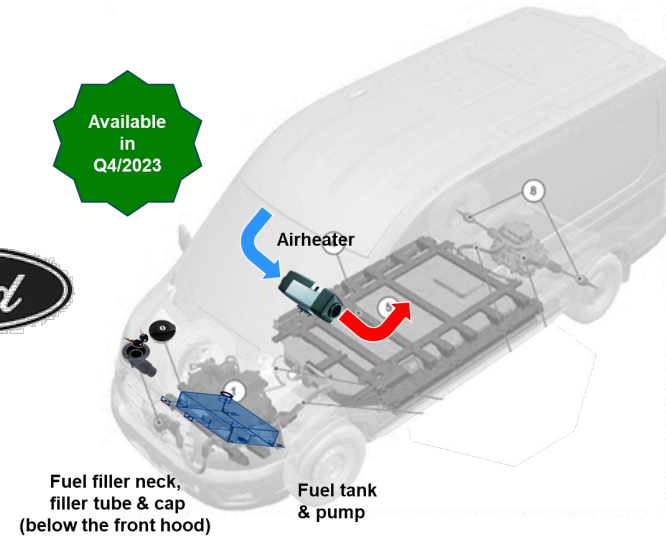
1. Mercedes EQV
2. Mercedes E-Vito Tourer



1. VW ID.Buzz Cargo
2. VW ID.Buzz Van



1. Opel / Vauxhall Vivaro-e Cargo
2. Opel / Vauxhall Zafira-e Life
3. Peugeot e-Expert
4. Peugeot e-Traveller
5. Citroen E-Jumpy Electric
6. Citroen E-Spacetourer Electric
7. Toyota Proace Electric
8. Toyota Proace Verso Electric
9. Fiat E-Scudo
10. Fiat E-Ulysse



1. Ford e-Transit

MB EQV / E-Vito:

(1329183A)

Vehicle:

- MB EQV / E-Vito (MY21)

Retrofit of:

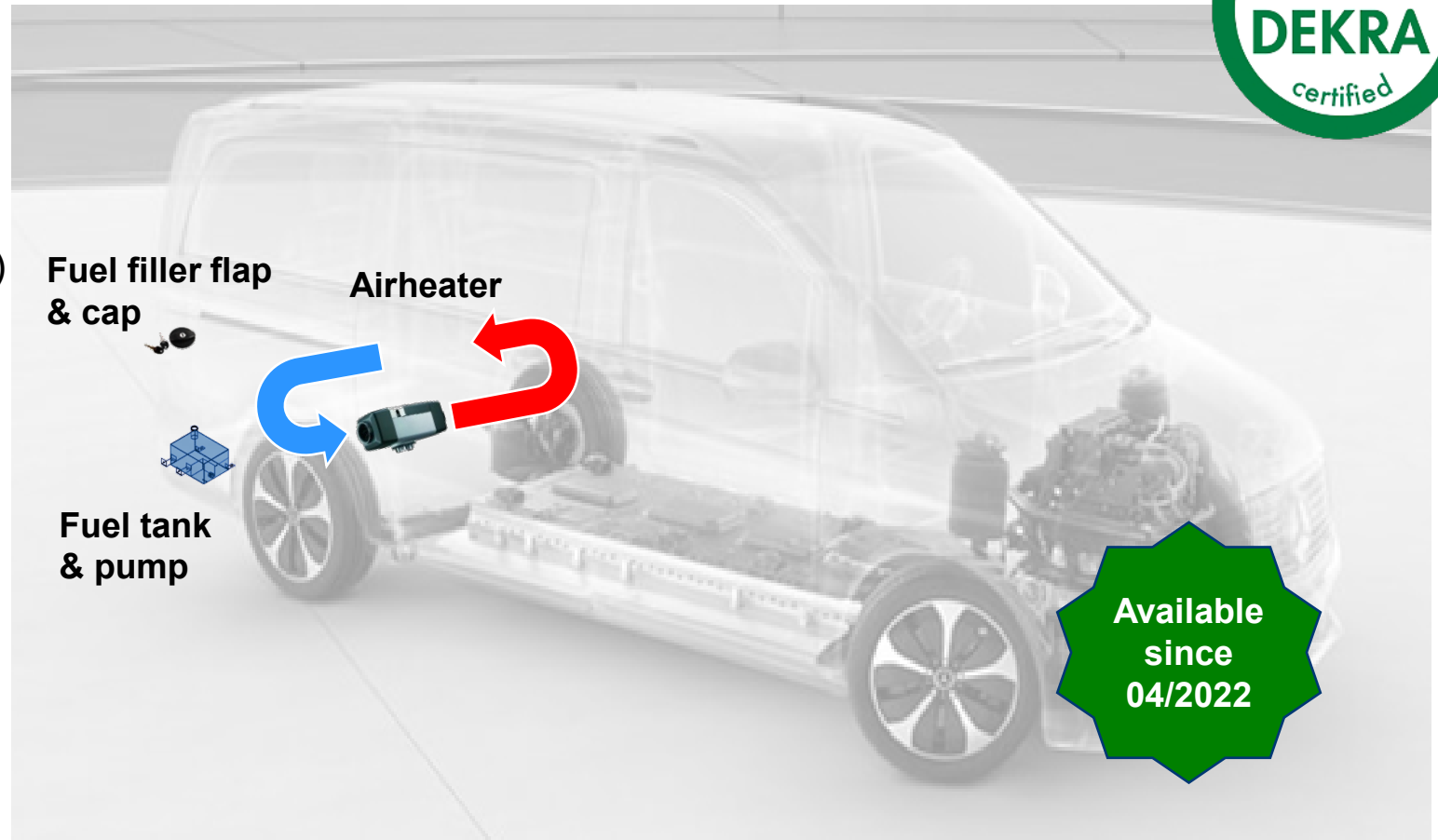
- Heat source (Air Top 2000 STC)
- Heater control (MultiControl HD / TCon2)
- Air distribution (in- / outlet)
- Fuel supply (8l fuel tank, refuel nozzle)
- Tank level indicator

Technical release of solution:

- DEKRA (crash safety/rollover test)

Result of Range Plus:

- up to 80 km additional range at comfortable interior temperatures
- up to 50 h of additional heat



Stellantis / Toyota K0 platform:

(1329439A)

Vehicle:

- Stellantis / Toyota K0 platform (MY23)

Retrofit of:

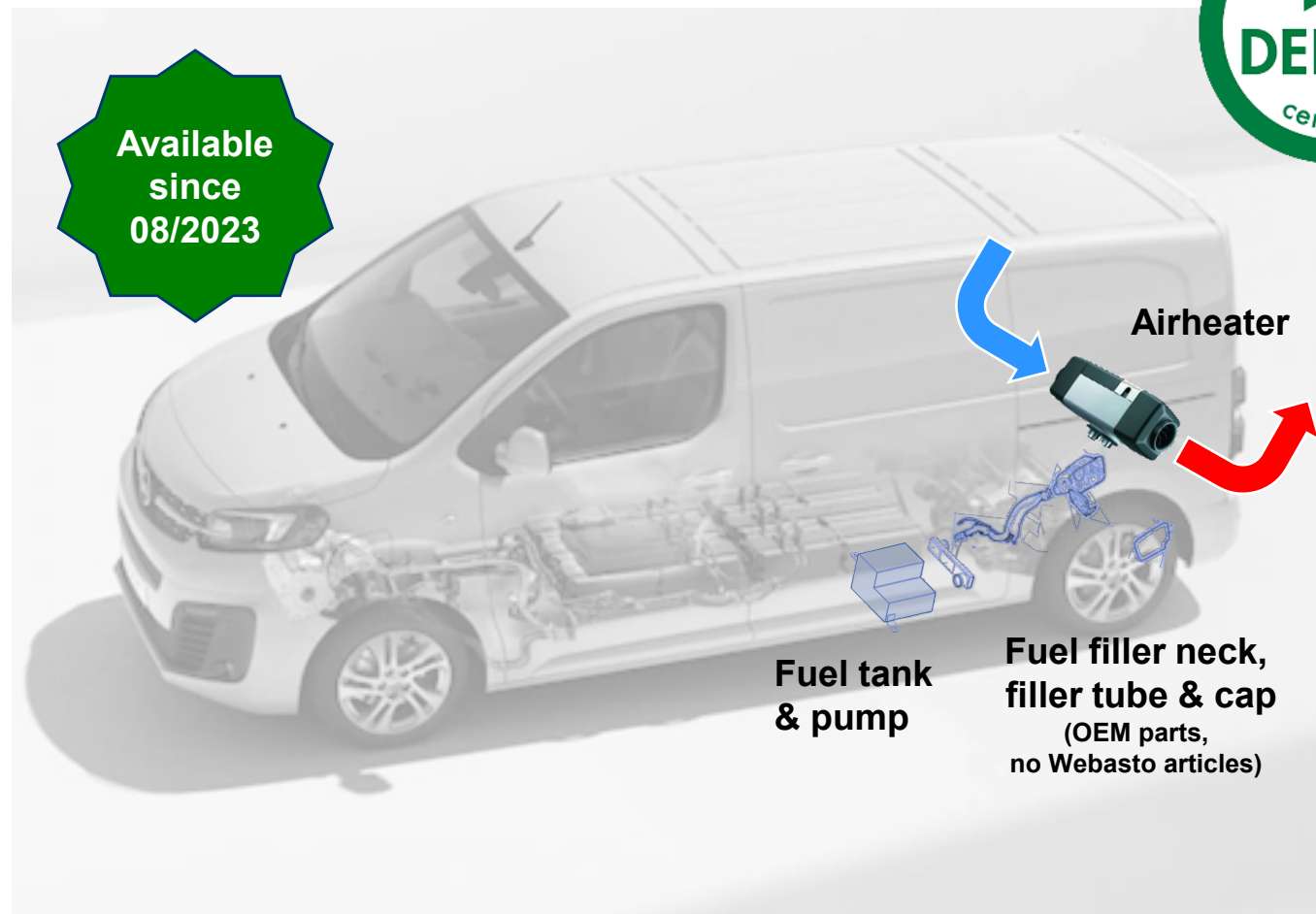
- Heat source (Air Top 2000 STC)
- Heater control (MultiControl HD / TCon2)
- Air distribution (in- / outlet)
- Fuel supply (7l fuel tank, refuel nozzle)
- Tank level indicator

Technical release of solution:

- DEKRA (crash safety/rollover test)

Result of Range Plus:

- up to 80 km additional range at comfortable interior temperatures
- up to 50 h of additional heat



Range Plus ID.Buzz:

(1329823A/1329821A)

Vehicle:

- ID.Buzz (MY23)

Retrofit of:

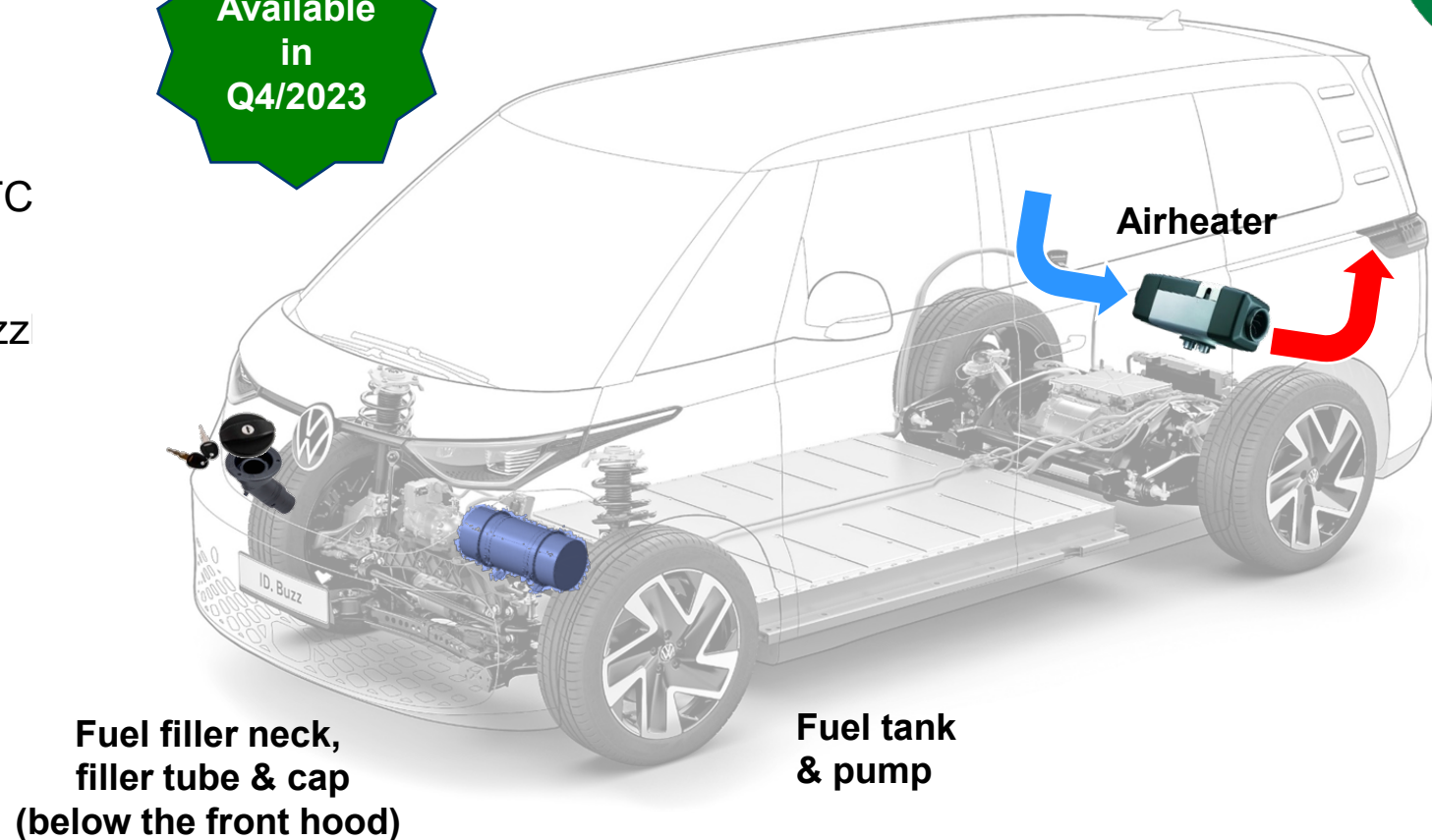
- Heat source (Air Top 2000 STC)
- Heater control (MultiControl HD / TC)
- Air distribution (in- / outlet)
- Fuel supply (7l fuel tank, refuel nozzle)
- Tank level indicator

Technical release of solution:

- DEKRA (crash safety/rollover test)

Result of Range Plus:

- up to 80 km additional range at comfortable interior temperatures
- up to 50 h of additional heat



Ford eTransit:

(1329846A/1329848A)

Vehicle:

- Ford eTransit (MY22)

Retrofit of:

- Heat source (Air Top 2000 STC / AT Evo 40)
- Heater control (MultiControl HD / TCon2)
- Air distribution (in- / outlet)
- Fuel supply (12l fuel tank, refuel nozzle)
- Tank level indicator

Technical release of solution:

- DEKRA (crash safety/rollover test)

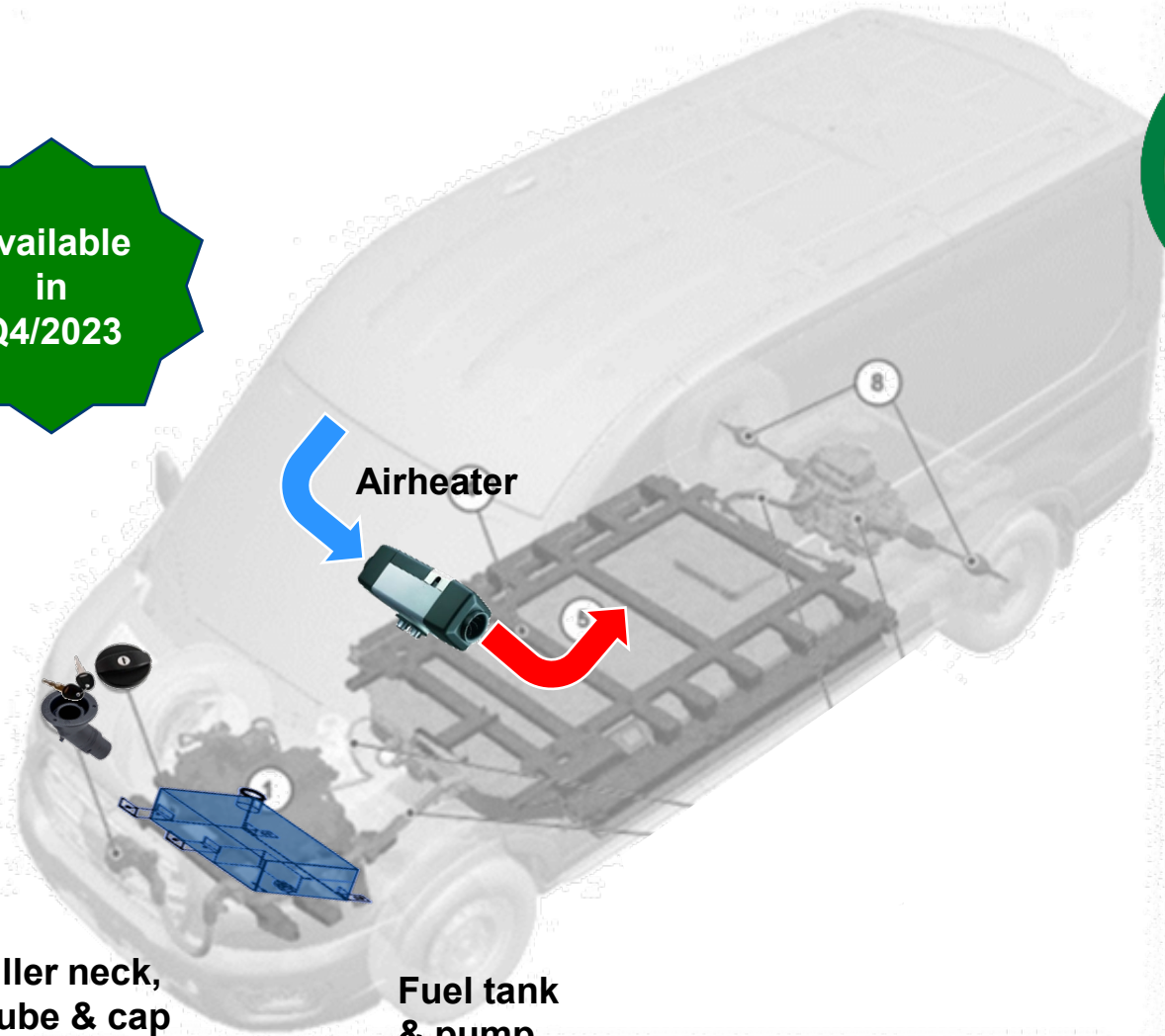
Result of Range Plus:

- up to 80 km additional range at comfortable interior temperatures
- up to 50 h of additional heat

Available
in
Q4/2023

Fuel filler neck,
filler tube & cap
(below the front hood)

Fuel tank
& pump



Range Plus: Parts, Availability & Pricing (1)

(plus control element ThermoConnect or MultiControl HD)

ID	Description	Vehicle	Production Plant / Type	SOP	GRP 2023
1329183B	Set MB eVito_EQV AT2000STC D 12V	Mercedes Benz: eVito, eVito Tourer, EQV [MY21]	NBB CDC / MTO	04/2022	EUR 1.890,-*

Set includes:

- 9032228B – SOD AT2000STC D 12V Basic (Heater)
- 9032244A – Kit AT2000STC Standard (Standard installation kit)
- 1328961A – EBK eVito_EQV MJ21 AT2000STC (Vehicle specific installation kit)
 - Air in-/outlet, air routing, external temp sensor, heater bracket, wiring harness extension, ...
- 1329085B – ZSK MB eVito_Tourer_EQV (Vehicle specific tank / refueling)
 - Fuel tank, tank level sensor, tank level indicator (LED), refuel nozzle & cap, ...



* Heater controls are not included and available on customer request. Installation may vary based on hourly rates of the service partner and is not included

Range Plus: Parts, Availability & Pricing (2)

(plus control element ThermoConnect or MultiControl HD)

ID	Description	Vehicle	Production Plant / Type	SOP	GRP 2023
1329439A	LU Stellantis Toyota K0 BEV AT2000STC	<ol style="list-style-type: none"> 1. Opel Vivaro / Zafira, 2. Toyota Proace II / Proace Verso, 3. Peugeot Traveller / Expert, 4. Citroen Jumpy / Spacetourer, 5. Fiat Ulysse / Scudo 	NBB CDC / MTO	08/2023	EUR 2.249,00 € *

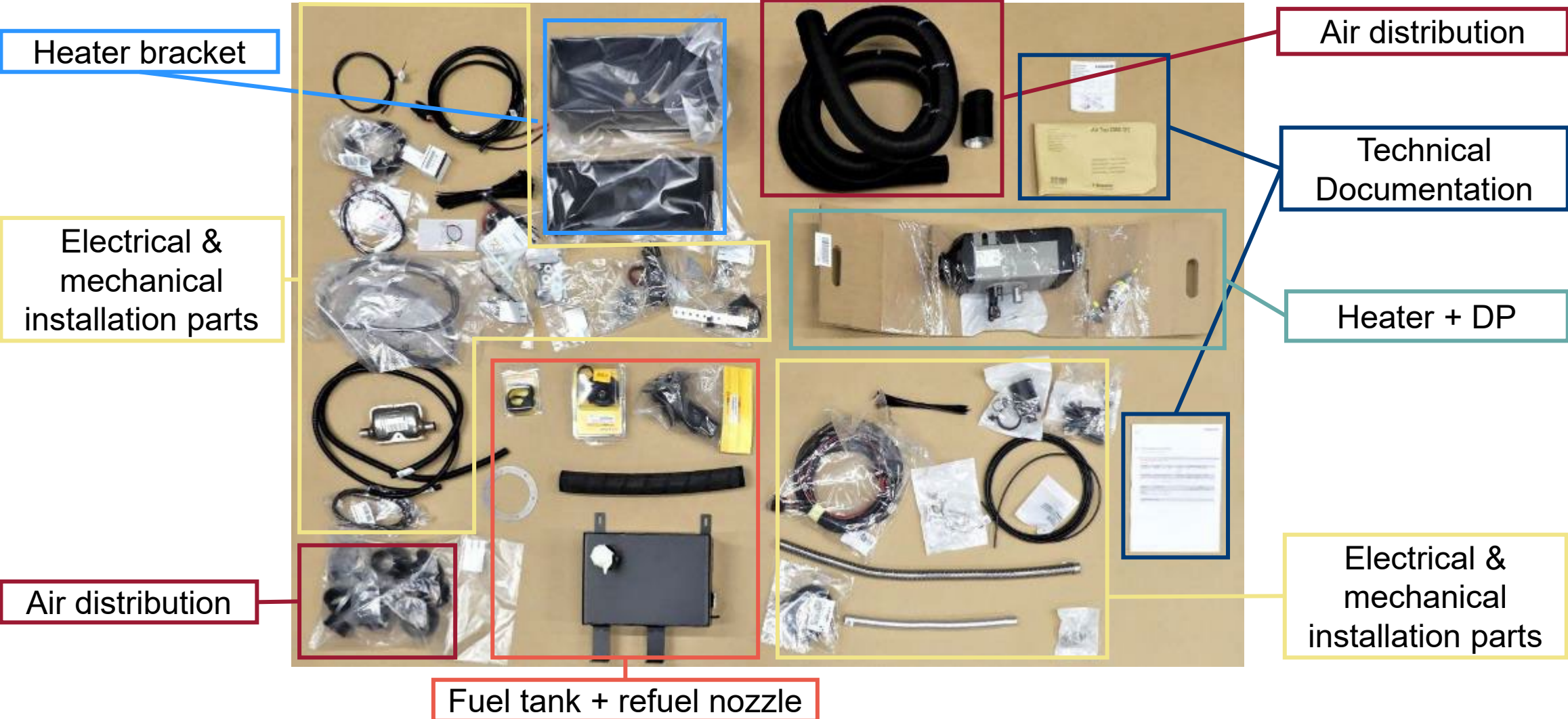
Set includes:

- 9032228B – SOD AT2000STC D 12V Basic (Heater)
- 1328961A – ZSK Kleinteile K0 BEV AT 2000 STC (Vehicle specific installation kit)
 - Air in-/outlet, air routing, external temp sensor, heater bracket, wiring harness extension, ...
- 1329542A – Tank kpl. PSA K0 electric AT 2000 STC (Vehicle specific tank / refueling)
 - Fuel tank, tank level sensor, tank level indicator (LED), ...



* Heater controls are not included and available on customer request. Installation may vary based on hourly rates of the service partner and is not included. Only for the K0 you need additional items from the accessories program of Stellantis / Toyota.

Range Plus: Overview of Set, Example MB E-Vito



Range Plus: Air Top 2000 STC

Technical Data	
Heating capacity, control range	0.9 – 2.0 kW
Fuel consumption	0.12 – 0.24 l/h
Nominal voltage	12 V
Rated power consumption	15 – 30 W
Heating air volume flow against 0.5 mbar	93 m ³ / h
Fuels*	Paraffinic Fuel (HVO/GTL) DIN EN 15940 Diesel DIN EN 590 B100 FAME DIN EN 14214
Operating temperature range	-40 to +40 °C
Dimensions L x W x H	310 x 120 x 118 mm
Weight	2.6 kg



Attention: Air Top 2000 STC gasoline can not be used for the Mercedes Benz EQV / E-Vito installation instructions shown.

→ Air Top 2000 STC Gasoline can not be mounted in a tilted position!













Range Plus: Deployment HVO



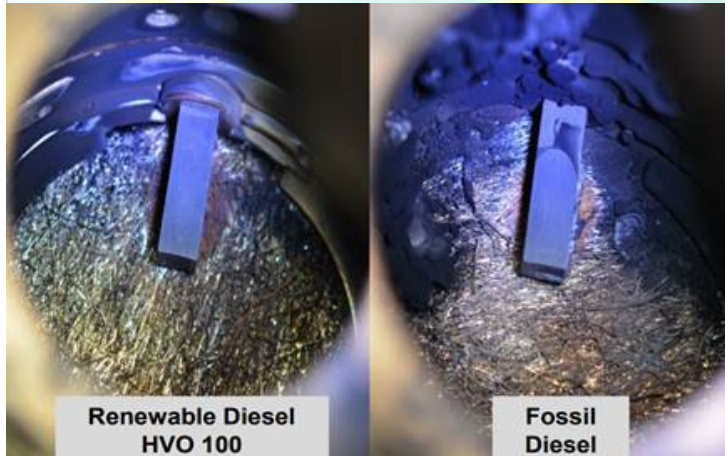
HVO (hydrotreated vegetable oil) is a fully renewable diesel alternative based on vegetable oils, fat waste or residues from the food industry and agriculture. When you fill up with HVO fuel, you can reduce CO₂ emissions by up to 90% compared to conventional diesel.

The cetane number for HVO100 Renewable Diesel is between 70-90, which is significantly higher than 50-60 for fossil diesel. This provides additional power and more efficient and cleaner combustion, reducing soot in the combustion chamber and exhaust system.

HVO100 Renewable Diesel biofuel complies with the EN15940 specification and the EN 590 diesel fuel standard, with the exception of being approximately 7% less dense. It works seamlessly in all modern diesel engines in buses, trucks, construction machinery and also in Webasto parking heaters.

	Hyperion HVO Diesel	Bio-Diesel	Fossiler Diesel
Nachhaltigkeit	 Gut	 Nahrungsmittel- konkurrenz	 Ungenügend
Abgasverhalten	 Gut	 Gut	 Gefährlich
Haltbarkeit	 Sehr Gut	 Eingeschränkt (Dieselpest)	 Eingeschränkt (Dieselpest)
Umweltgefahr	 Nicht „umwelt- gefährlich“ (GHS)	 Nicht „umwelt- gefährlich“ (GHS)	 „Umweltgefähr- lich“ (GHS)

Range Plus: Deployment HVO



Reduction of environmentally relevant emissions compared to fossil diesel with the following average values:

- 35% less particulate matter
- 9% less nitrogen oxides (NOx)
- 30% less hydrocarbons (HC)
- 24% less carbon monoxide (CO)
- Up to 92% less greenhouse gas emissions over the entire product life cycle
- Very good low-temperature resistance (down to min. -20°C)



Range Plus: Installation concept & effort, Example ME E-Vito

Installation concept & effort:

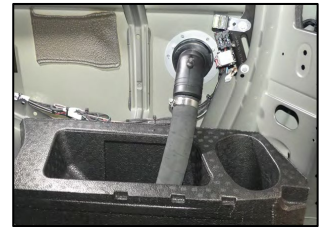
- Heater, control element & air distribution: Installation concept / effort is comparable to traditional LCVs
- Fuel tank & filler nozzle: Installation concept / effort for the fuel supply is higher

Example installation time for Air Top 2000 STC:

- Traditional, mounted under driver seat: Mercedes Benz V-Class [MY 2020]: 7,5h
- Electric, mounted underfloor: Mercedes Benz EQV [MY 2021]: 10,0h

Individual approval by technical service:

- For Germany, an individual approval according to §21 StVZO for the fuel tank is required after installation. The necessary test protocol for the fuel tank is part of the installation instructions (DEKRA ID: D062135000211). Please check your local regulations with your technical service.
- For the air heater installation is as usual no additional approval by the technical service required.



Range Plus: First customers, examples



Germany:

- Handover of an installed solution to Glaevke Pflanzen & Gärten GmbH & Co. KG
- Handover of an installed solution to Filderstadtwerke
- Commissioning of an ambulance vehicle DRK Berlin

Norway:

- Workshop vehicles for route control of highways
- Vehicles for the Norwegian Post

Sweden:

- Vehicles for shuttle transport

Finland:

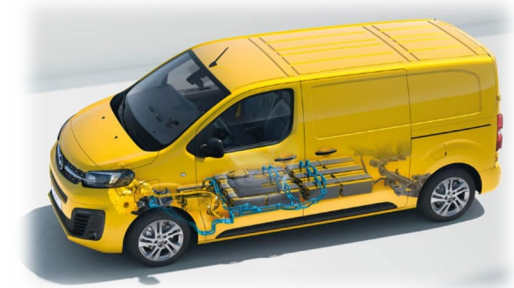
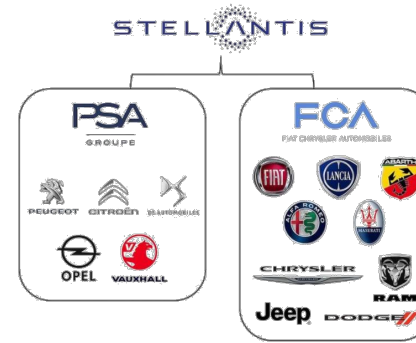
- Vehicles for school transport



Range Plus: Next steps

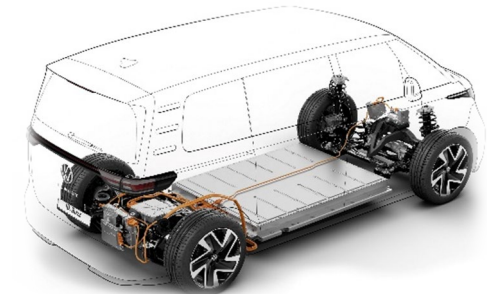
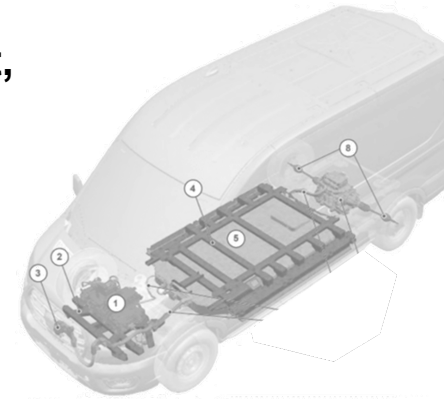
1. SOP for Stellantis K0 platform: August 2023

- Opel/Vauxhall: Vivaro-e Cargo / Zafira-e Life
- Peugeot: e-Traveller / e-Expert
- Citroen: E-Spacetourer Electric / E-Jumpy Electric
- Toyota: Proace Electric / Proace Verso Electric
- Fiat: E-Ulysse / E-Scudo



2. Development VW ID.Buzz and Ford eTransit at the moment, SOP planned for Q4/2023

3. Development of further Range Plus Solutions (other brands & vehicle types like eSprinter / E-Ducato / e-Crafter / ... & Air Top Evo 40/55) on request



Range Plus: FAQ – 1



How does the CO² balance of my vehicle change by Range Plus?

- If the heater is operated with diesel, the CO² balance of the vehicle will increase according to the usage of diesel.
- If the heater is operated with paraffinic fuels (e.g. HVO) the additional CO² impact can be reduced to a minimum (depending on production process & supplier).

I don't want to drive my EV to a gas station. Can I also operate the heater with a portable tank (e.g. motorboat) in the trunk?

- German Law: In general, you can also use a transportable tank, but it must be secured accordingly. If there is no partition between the driver's cab and the tank position, the tank must be removed from the vehicle for filling.
- Please check your local regulations.

Does the Range Plus affect my manufacturer's warranty?

- The manufacturer's warranty is not affected because the manufacturer's installation guidelines are followed, identical to combustion engine vehicles.
- The installation must be carried out by appropriate qualified personnel and tools.

Range Plus: FAQ – 2



Is Range Plus also possible for leased vehicle?

- This question can be only answered by the leasing company.
- Generally, it is okay to retrofit a heater if it can be dismantled without leaving any traces, for Range Plus only possible with significant effort.

Why is the GRP of Range Plus that high compared to a vehicle specific set for combustion engine LCVs?

- The set contains all products & components required for the installation beside of the control element.
- For each vehicle, an own tank & fuel nozzle solution needs to be designed / produced to fit perfectly without lowering ground clearance while also being crash save.

Do I need special maintenance for Range Plus?

- No special maintenance needed; it is recommended to run the heater once a month (also in summer) for 20 min to ensure readiness.

Range Plus: FAQ – 3



Will installation suggestions with various air ducts available for different vehicle use-cases?

- With air ducting we focus 1st on the “Passenger Car” version. All other use-cases are strongly depending on the interior design (e.g., utility van with van racks / camper with kitchen installation) and must be individually bespoke with customer.
- Fuel tank & heater position shall fit to all vehicle versions.



Range Plus: FAQ – 4



Does the company actually need a technician with an HV certificate?

Trained specialists (with a degree in a motor vehicle technical profession) are considered electrical specialists for motor vehicles in the "low voltage" sector. These persons are allowed to carry out the installation of the Range Plus system, but before starting work they must be instructed about the HV hazards and where HV components and cables are located on the vehicle. This instruction and the observance of the safety regulations according to DIN VDE 0105 are the responsibility of a qualified electrician who can prove that he is qualified to work on HV systems. The "high-voltage" range starts at 30 V AC or 60 V DC.



Range Plus: FAQ – 5



Whom to contact if I need further vehicle variants of Range Plus or have questions?

- For Range Plus questions & vehicle variants: [Uwe Trettin](#) [R&D Car]
- For air heater related questions: [Jan Philipp Lehmann](#) [PSM-Heating]
- For media & press related questions: [Alice Roehler](#) [RMC EU]

Website: <https://www.webasto-comfort.com/de-de/rangeplus/>



**Thank you
for your
cooperation!**