

**IRTEENZ**

**Certification Impacts for the  
Future Heavy Vehicle Fleet**

**November 2022**

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# Current state of zero emissions heavy vehicles



- Only limited OE options available for zero emission heavy vehicles
  - OE manufactures will focus on the needs of the biggest markets
  - There is a current and ongoing need to convert heavy vehicles to electric drive in NZ
  - On going need to adapt HV to be productive in the NZ market
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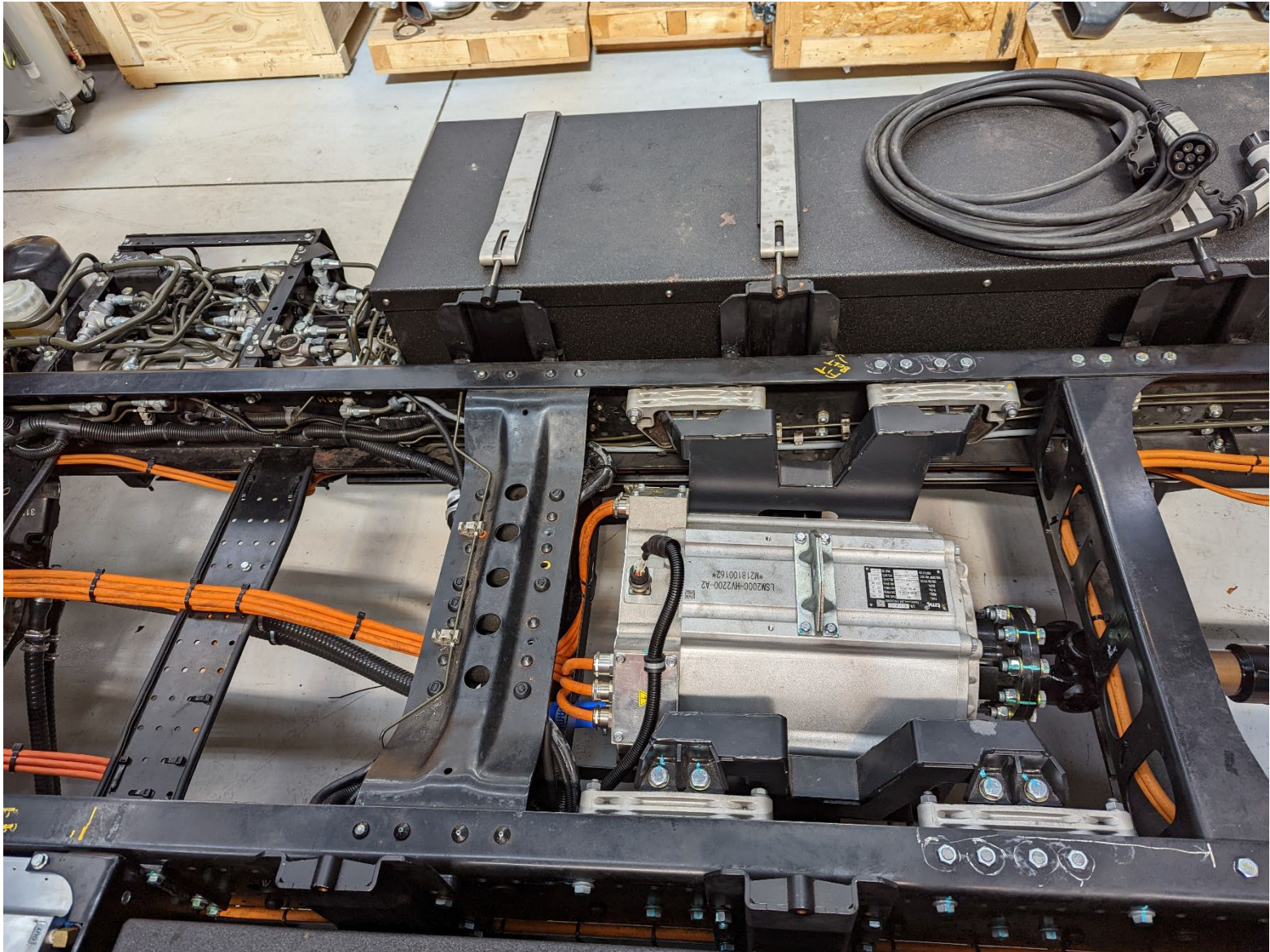
# Electric Vehicle Conversions – what's happening now



# Electric Vehicle Conversions



# Electric Vehicle Conversions





- EV conversions affect:
  - Braking system
  - Steering system
  - Integrated safety systems
    - ESC, AEB, LDW etc
  - Gross Combination Mass
  - Startability /Gradeability
  - Heating/demisting

# Electric Vehicle Conversions – what is next



## eTrailer

The first prototype for trailers that holistically integrates the brake-, stability, and e-traction controls of both truck and trailer, significantly reduces CO2 emissions and fuel consumption.



The trailer EBS analyses battery charging status and controls the e-drive to perform the recuperation and propulsion process.

Recuperates the largest possible share of kinetic energy for reuse during acceleration, providing potential fuel savings of up to 16% on short haul and up to 7% on long haul transport.

# Electric Vehicle Conversions



## SAF TRAKr / TRAKe technology



- 1 Gearbox unit**
- General design: 1-speed with differential
  - Gearbox is part of the axle structure
  - Specially designed and developed for SAF-HOLLAND
  - SAF TRAKr: Ratio  $i = 1 : 14.0$
  - SAF TRAKe: Ratio  $i = 1 : 12.08$

- 7 Axle**
- Half axles with one central gearbox unit and e-machine
  - Can be combined with INTRA or MODUL air suspension
  - SAF TRAKr: Additional weight incl. generator: approx. +150 kg
  - SAF TRAKe: Additional weight incl. e-machine: approx. +300 kg

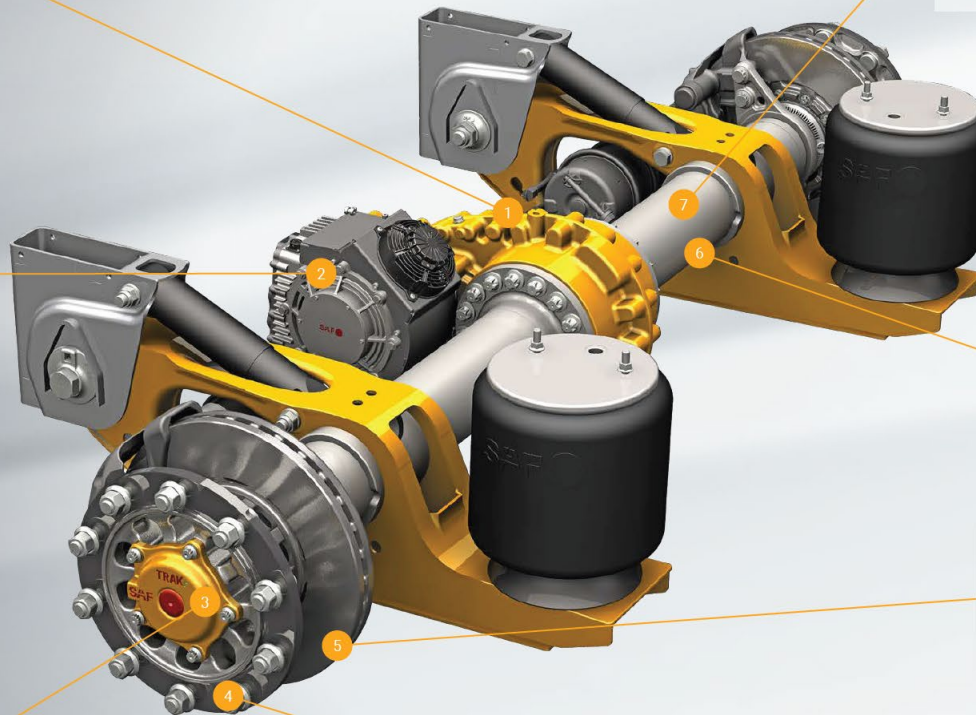
- 2 E-machine (SAF TRAKr & TRAKe)**
- SAF TRAKr:**
- Air-cooled switched reluctance motor (SRM)
  - Max. power: 20 kW peak, 17 kW cont. (at 20 °C ambient temperature)
- SAF TRAKe:**
- Liquid-cooled permanent magnet synchronous motor (PSM)
  - Max. power: 120 kW peak / 60 kW cont.
  - Max. torque: 320 Nm peak -> 1,933 Nm per wheel

- 6 Axle load**
- INTRA: max. 9.0 t
  - MODUL: max. 10.0 t

- 5 Disc brakes**
- 19.5" and 22.5" disc brakes identical to those in non-electrified axles
  - Spare parts (pads, rotors etc.) identical to those for non-electrified axles
  - Identical test reports

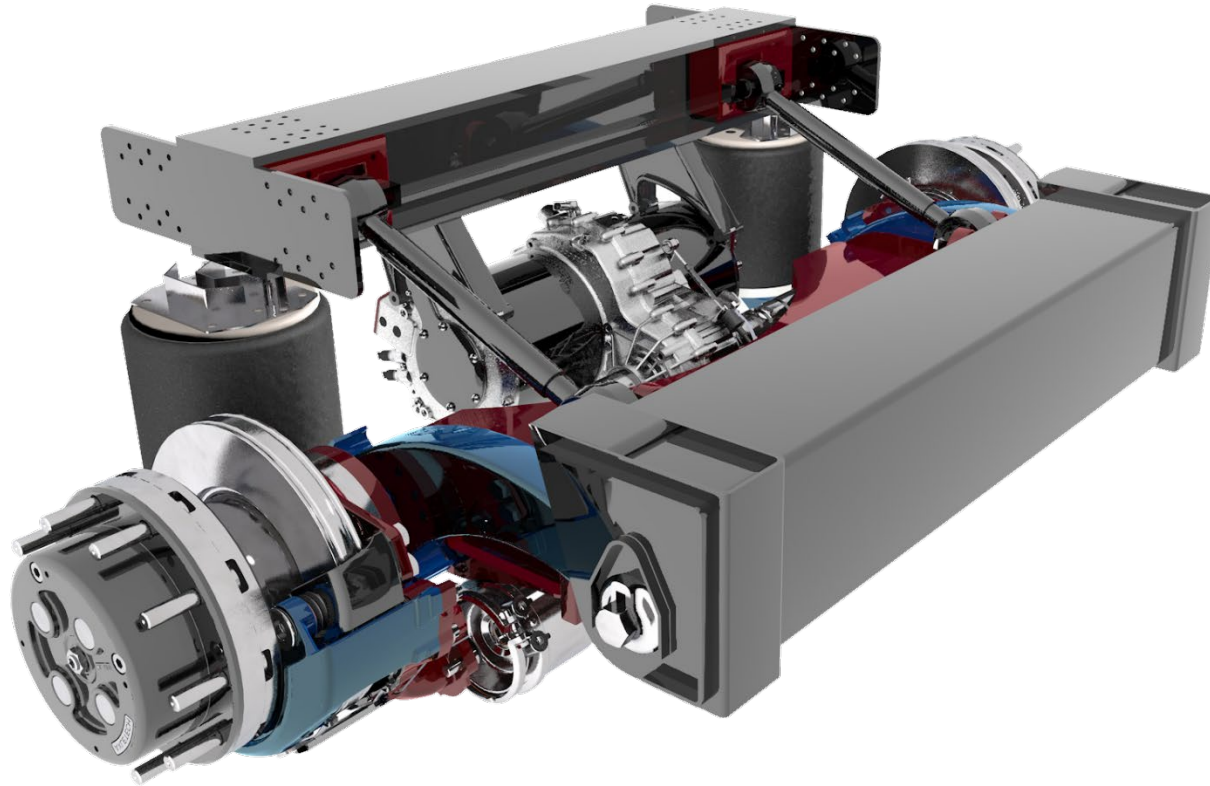
- 3 Wheel head**
- Maintenance-free wheel bearing technology identical to that in non-electrified axles
  - $\varnothing 335$  10-hole offset depth 120 or  $\varnothing 275$  8-hole offset depth 0

- 4 Axle types**
- SAF TRAKr: BIR9 -... / BIR10 -... / ZIR9 -... / ZIR10
  - SAF TRAKe: BIE9 -... / BIE10 -... / ZIE9 -... / ZIE10

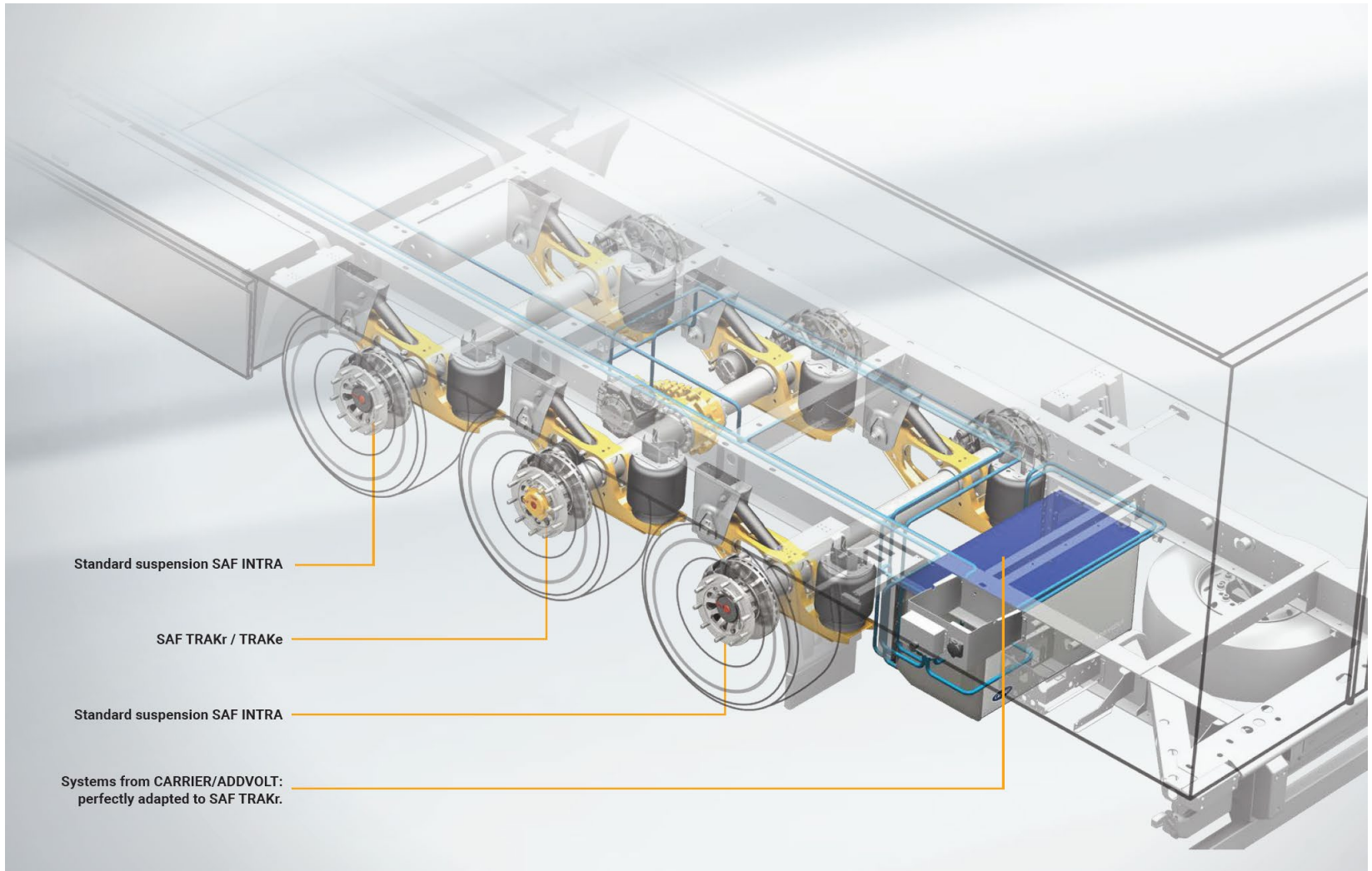




# Electric Vehicle Conversions



# Electric Vehicle Conversions



Standard suspension SAF INTRA

SAF TRAKr / TRAKe

Standard suspension SAF INTRA

Systems from CARRIER/ADDVOLT:  
perfectly adapted to SAF TRAKr.

# Powered trailers – EU Regulations



## Consolidated Resolution RE.3

*Paragraph 1.5:*

“1.5. "Trailer" means any **non-self propelled** vehicle, which is designed and constructed to be towed by a power driven vehicle and includes semi-trailers.”

A trailer with a driven axle has a kind of propulsion independent from the motor vehicle and may self propelled but furthermore towed

*Paragraph 1.8:*

“1.8. "Road tractor" means road motor vehicle designed, exclusively or primarily, to haul other road vehicles **which are not power-driven** (mainly semi-trailers).”

A trailer with a driven axle is power-driven although not with the same power as the motor vehicle

*Paragraphs 2.4.5.1 to 2.4.5.3:*

“2.4.5.1. "Semi-trailer": A towed vehicle, in which the axle(s) is (are) positioned behind the centre of gravity of the vehicle (when uniformly loaded), and which is equipped with a connecting device permitting horizontal and vertical forces to be transmitted to the towing vehicle. One or more of the axles may be driven **by the towing vehicle**.

A driven axle in a trailer (e.g. electric axles) operates independent from the towing vehicle as a separate device without force transmission from the tractors engine.

“2.4.5.2. and 2.4.5.3. ... similar to 2.4.5.1.



**Trailer** means a vehicle without motive power that is capable of being drawn or propelled by a motor vehicle from which it is readily detachable; but does not include:

- (a) a side car attached to a motor cycle; or
  - (b) a vehicle normally propelled by mechanical power while it is being temporarily towed without the use of its own power.
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## **6.2 Modification affecting engine and transmission**

- 6.2(1) A modification to a vehicle must not result in the vehicle's engine or transmission becoming unsuitable for the conditions of loading and operation for which the vehicle is modified.
  - 6.2(2) A modification to a vehicle must not adversely affect the performance of the vehicle's engine or transmission.
  - 6.2(3) A modification to a vehicle that affects the performance of the vehicle's driveshaft must not result in the driveshaft manufacturer's specified limits being exceeded.
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- The promise of Land Transport Rules has not delivered
    - They are not being updated to be keep current
    - They are not being aligned to international regulations
  - The people involved in the development of the Land Transport Rules never envisaged the type of modifications we are now making
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