

# Welcome

Wilkommen | Welkom | Bienvenue  
Bienvenido | Välkommen



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# Evolution of trucks engines

Summary of Euro norm:

Year	#	CO	Nox	PM
1992	Euro 1	4.5	8.0	0.36
1996	Euro 2	4	7.0	0.25
2000	Euro 3	2.1	5.0	0.10
2005	Euro 4	1.5	3.5	0.02
2008	Euro 5	1.5	2.5	0.02
2013	Euro 6	1.5	0.4	0.01

Efficiency and savings are stretched to the limits having arrived at Euro 6

Next step is full Electric vehicles with or without range extender

# Low Emission / Clean Air Zones



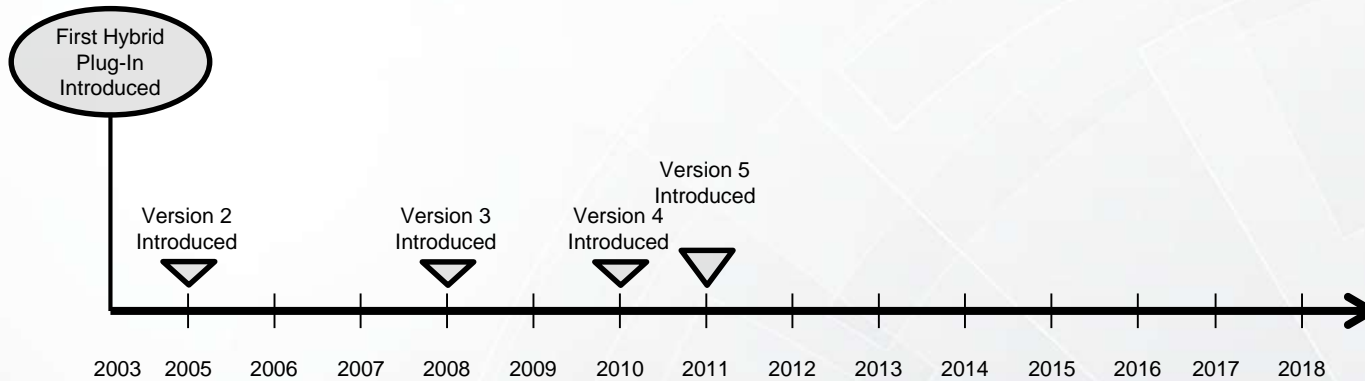
**2008 – London - LEZ Introduced**

**2019 – London - Ultra LEZ (brought forward a year from 2020)**

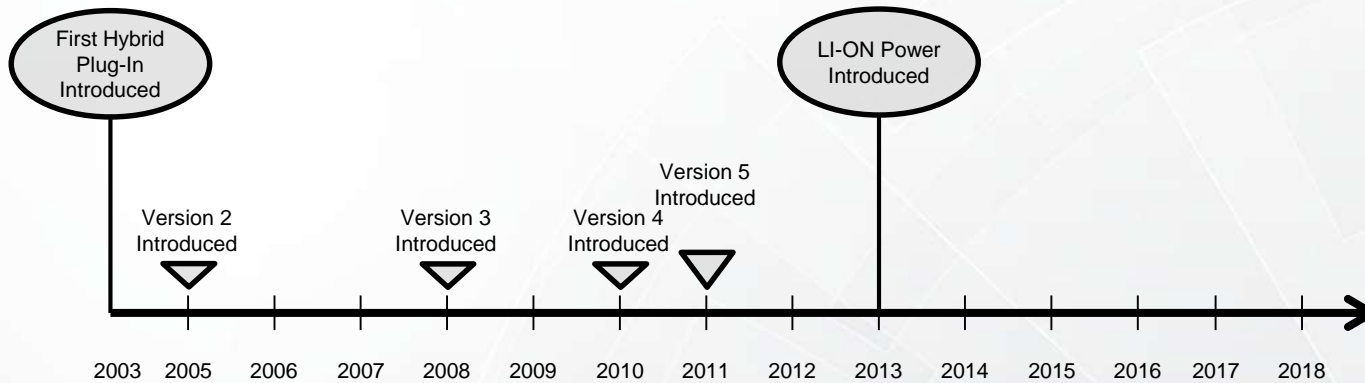
**2020 – Clean Air Zones (CAZ) in Birmingham, Leeds,  
Nottingham, Derby and Southampton**

**220 Cities and Towns in 14 European Countries operate or are preparing to introduce LEZ's**

## Hybrid Technology Timeline



## Hybrid Technology Timeline

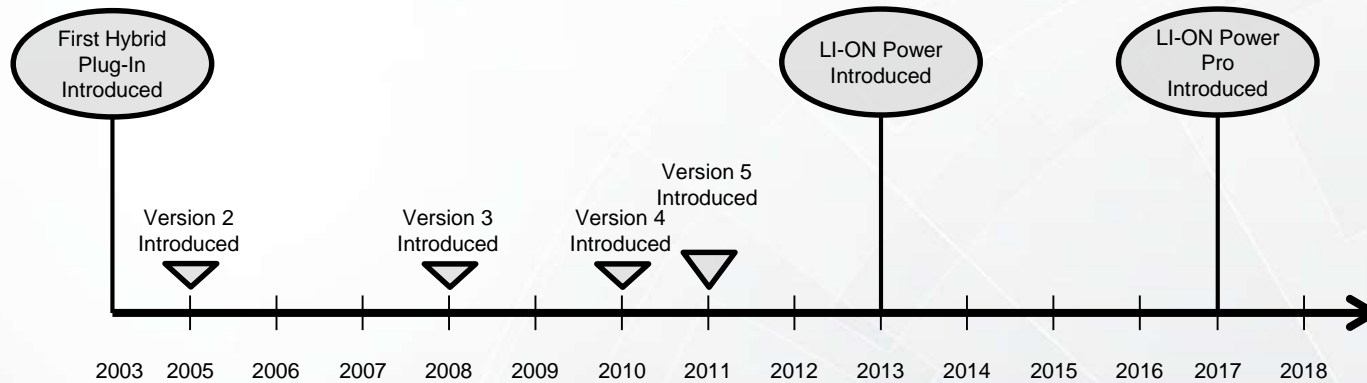




**LI-ON Power Pro**

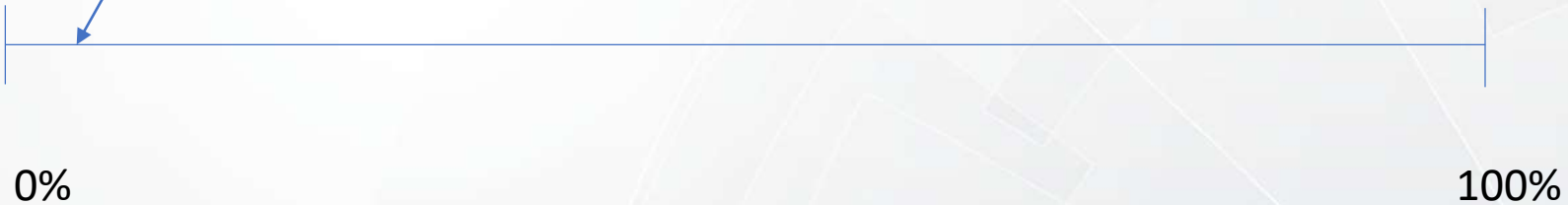
Full Electric RCV

**Hybrid Technology  
Timeline**



# Evolution of trucks engines

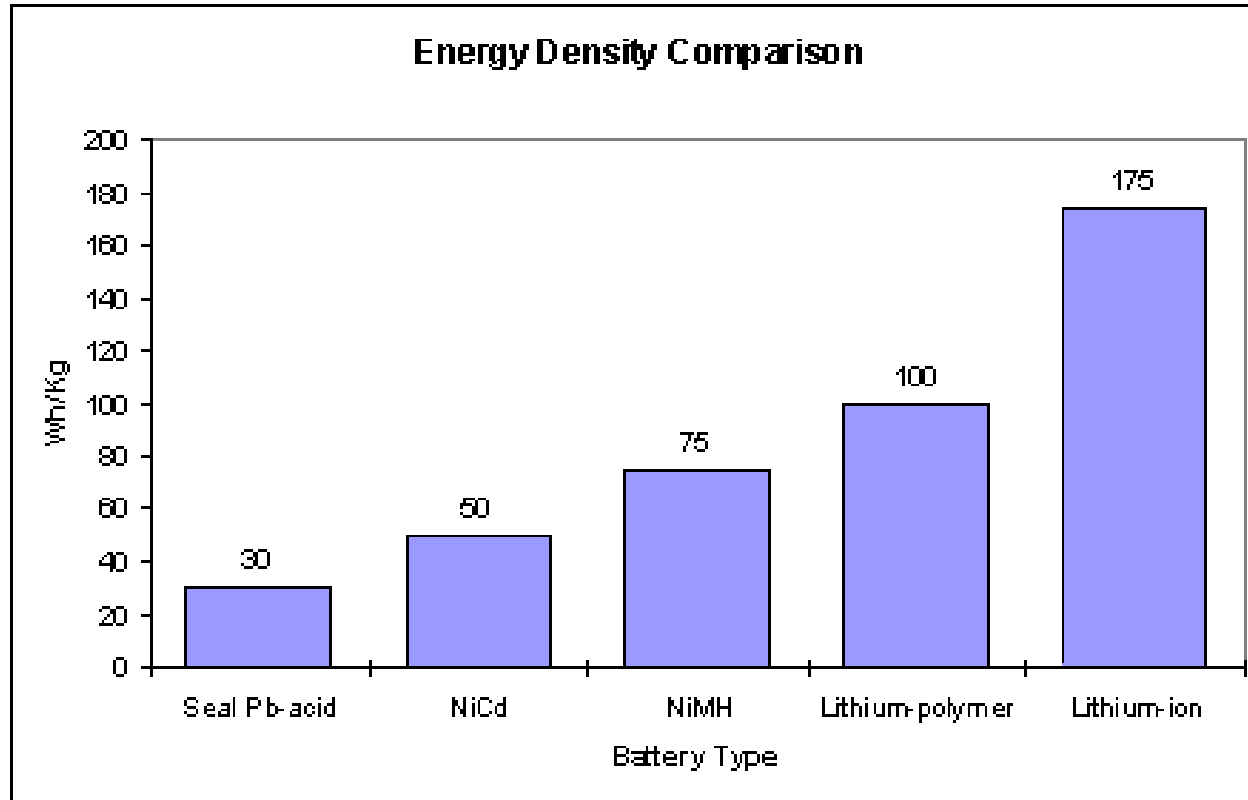
Where are we at this moment in time with development FULL Electric Trucks?



Challenge is the size, capacity and weight of batteries

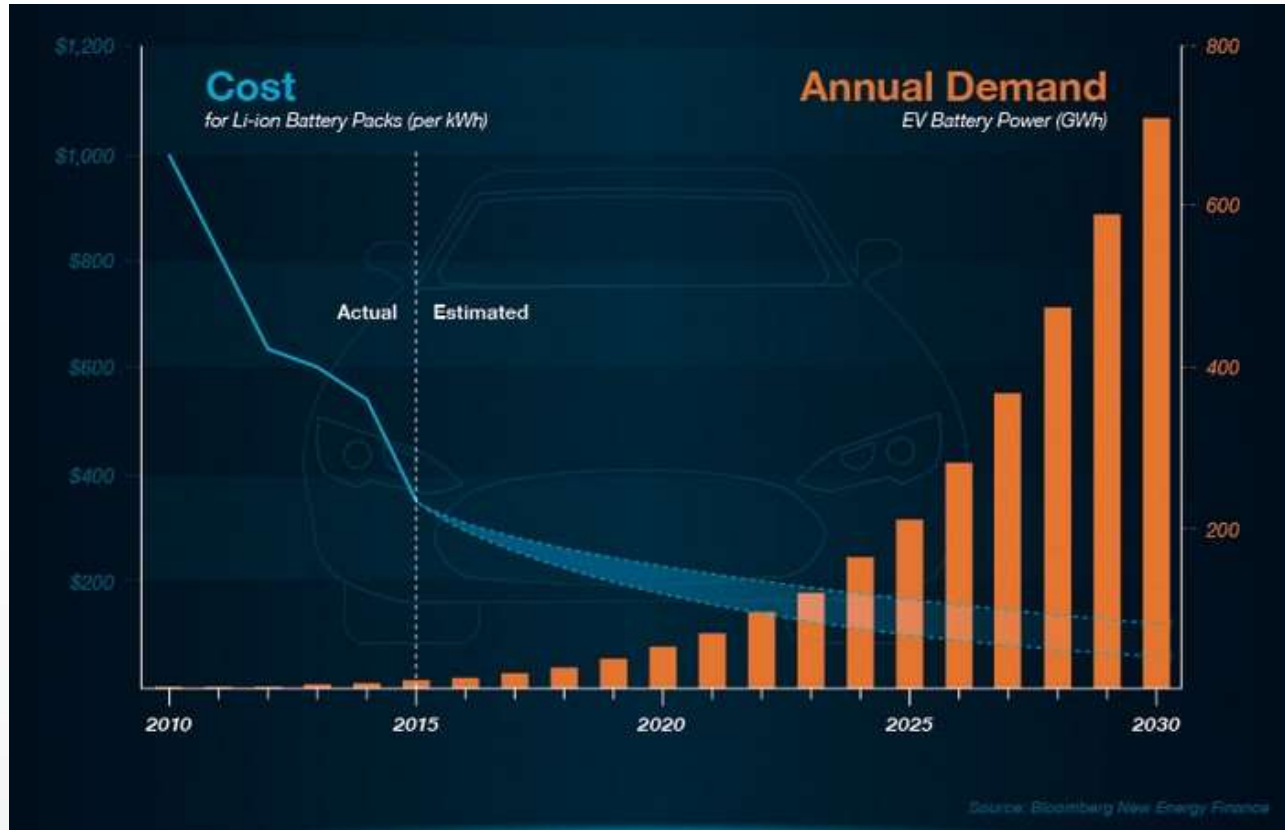
# Evolution of trucks engines

The keyword is “energy density”





# Evolution of trucks engines



# LION POWER PRO, the Geesinknorba total solution



Where can I find it?

What is a LION POWER PRO?

What does it do?

Why would I choose for a LION POWER Pro solution?

# LION POWER PRO, the Geesinknorba total solution



## LION POWER PRO



GN Body

Full Electric Chassis

# LION POWER PRO, the Geesinknorba total solution



Interface between body and Chassis

Consists of:

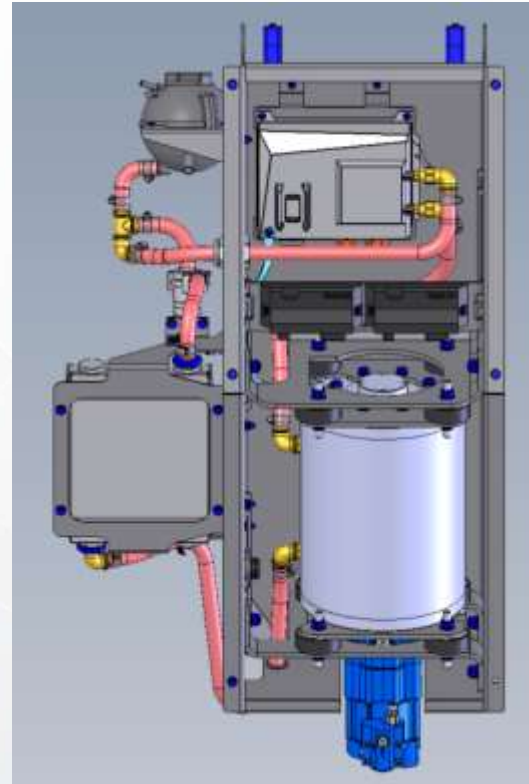
Hydraulic variable displacement pump

Electric Motor

Speed controller

Main controller

Cooling system



# LION POWER PRO, the Geesinknorba total solution



What does A LION POWER PRO do?

Provides body, tailgate and lift of oil and pressure

Delivers only what is asked, from the tiniest demand up to heavy duty compaction

Therefore optimum flowrate and pressure

Uses Power supply source of the Chassis.

# LION POWER PRO, the Geesinknorba total solution



Why choose a Geesinknorba Lion Power Pro?

- Over 15 years experience in electric control of body, tailgate and lift
- Accurate control of body and tailgate.
- In combination with GN tailgate and lift, extreme energy-efficient
- Chassis independant, GN remains in control.
- Built for heavy duty.
- Possible to control Third Party Hoist as well.
- Flexible
- Silent
- Clear separation between unit and chassis



# Electric RCV in Local Authority Operation

- Average 1.5 kW per kilometer
- Average 1.4 kW per ton waste collected
- Battery packs vary from 150 kWh to 400 kWh
- Charging options from normal workshop 3 phase wall socket charging up to ultra fast DC charging (1 hour for 300Kw)
- Batteries made for 3000 full charging cycles. Over 9.5 years life when charged 6 times per week.
- When using batteries suitable for DC charging, batteries will last 12000 full charging cycles.



**ELECTRIC  
Garbage Truck**

Zero Emissions  
(CO<sub>2</sub>=**0t**; CO=**0kg**; NO<sub>x</sub>=**0kg**  
yearly)



100-120 kWh daily



approx. 10 €/day



Lower operating noise during  
maximum performance



**TRADITIONAL DIESEL  
Garbage Truck**



Greenhouse gases  
(CO<sub>2</sub>=**52t**; CO=**160kg**; NO<sub>x</sub>=**380 kg**  
yearly)



60-80 liter gasoline



approx. 90-100 €/day



Compared to our EV it generates  
twice as much noise during  
maximum performance

**Thank you for your time.**

