

# The rise of smart and cleaner aerial lifts

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*IPAF Elevation day, Coventry, 2019 November 27<sup>th</sup>*









# An example of change : the future of diesel

Many countries have announced the **banishment of diesel and/or gasoline engine** for new on-road vehicle production.

UK : gasoline and diesel ban, by 2040

France : gasoline and diesel ban, by 2040

Germany : all diesel cars ban (soon)

India : all diesel cars ban, by 2030

Norway : all cars zero emission, by 2025

China : gasoline and diesel ban, date undisclosed yet.

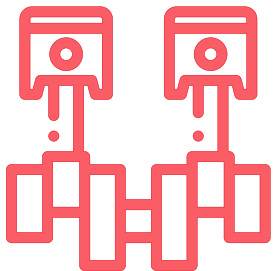
Taiwan : gasoline and diesel ban, by 2040

Japan : currently working with local vehicles manufacturers to stop diesel.

2018 worldwide rental **MEWPS** fleet : **1,47** million units (Ipaf market report 2019)



**75 %** of the **MEWPS** are **electric** (internal estimate)



**25% (360k+)** are powered by IC engines (diesel...)

# PULSEO GENERATION

« Electric rough terrain lifts »



# Electricity as energy

Creates new opportunities

- ✓ Clean performance
- ✓ Indoor and outdoor work
- ✓ Better working conditions



## Electricity as energy

Brings new challenges on the table

- ✓ Develop technologies to power big machines
- ✓ Design machines for the rental business (TCO)
- ✓ Design machines operators can work with
- ✓ Change habits with operators & rentals



# Developing an electric machine

❑ TCO (batteries)

❑ Machine performance

❑ Work on any job site

Advanced energy  
management  
system



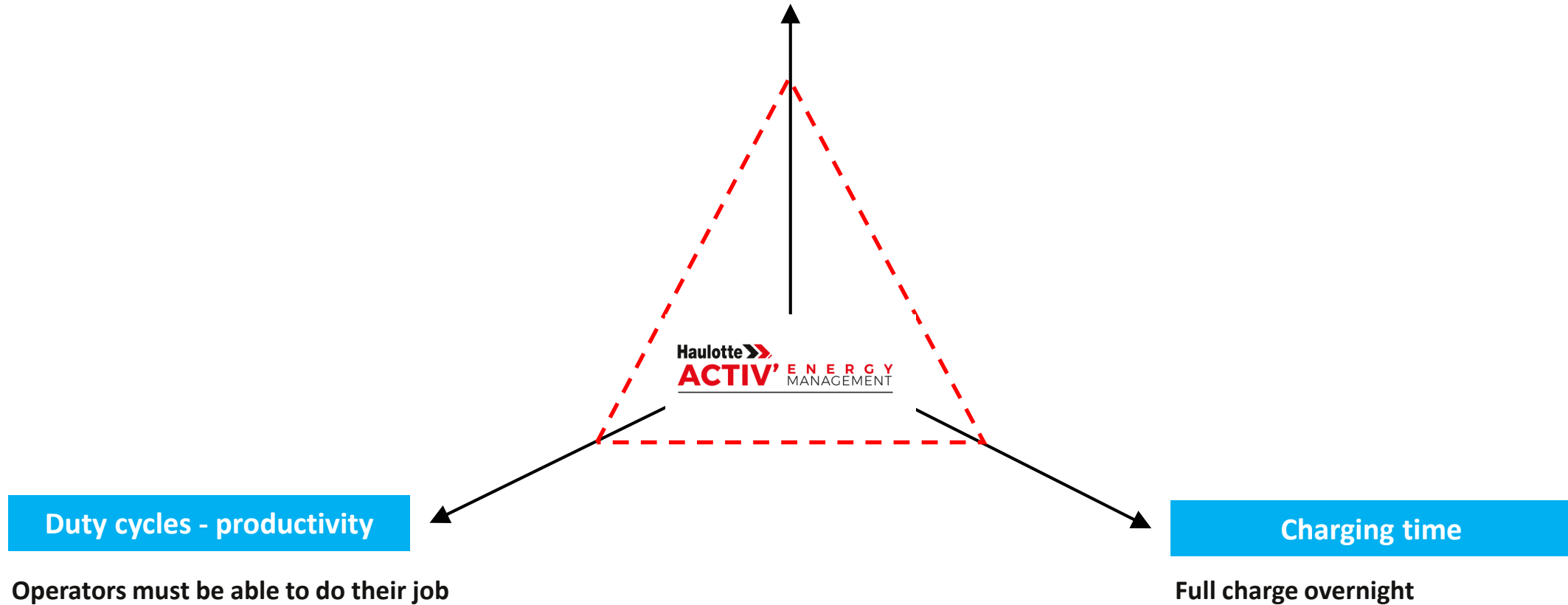
Range extender  
+ Smart energy  
modes



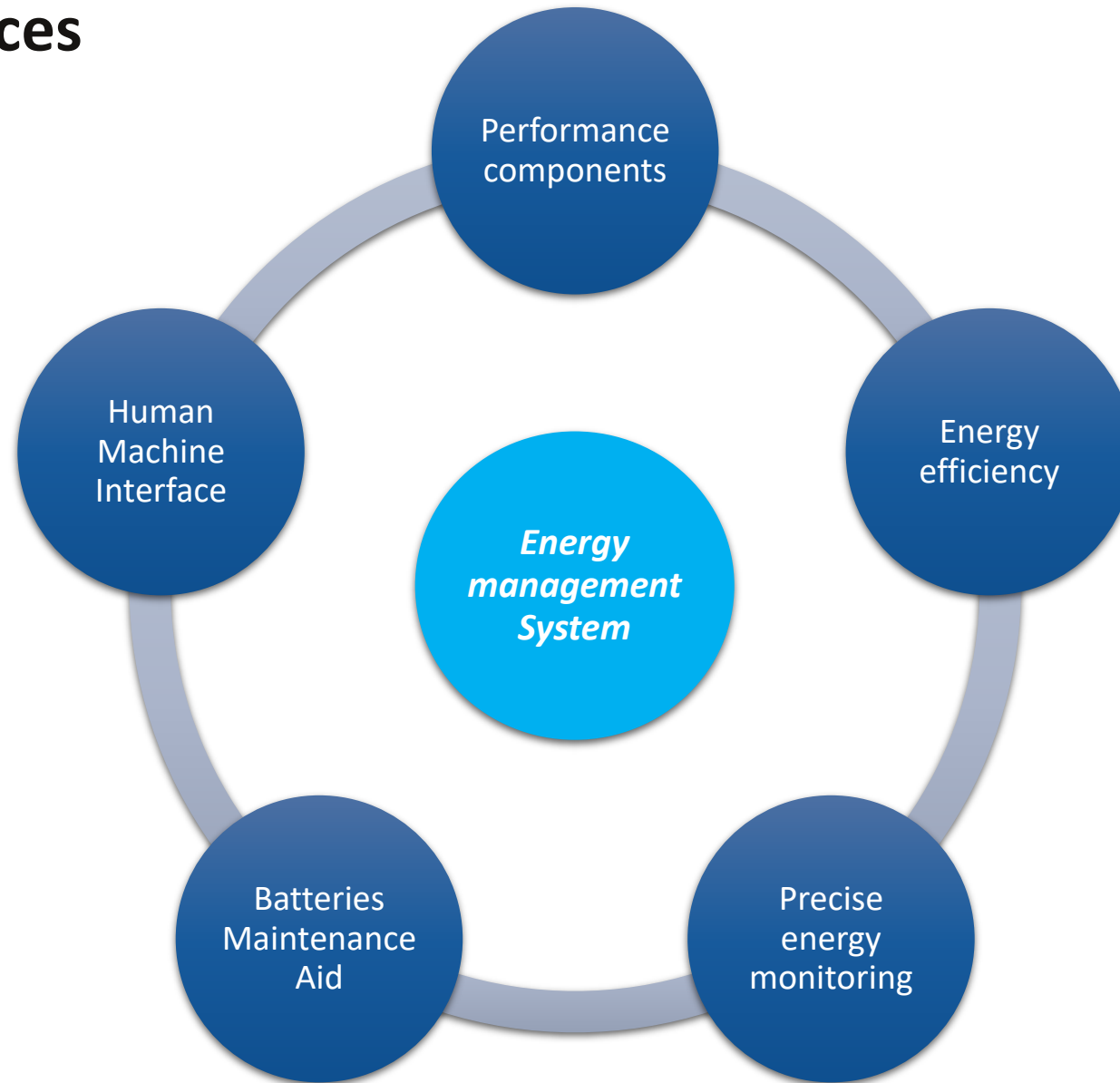
# TCO & performances

Operate an appropriate maintenance  
Avoid any abuse of the battery

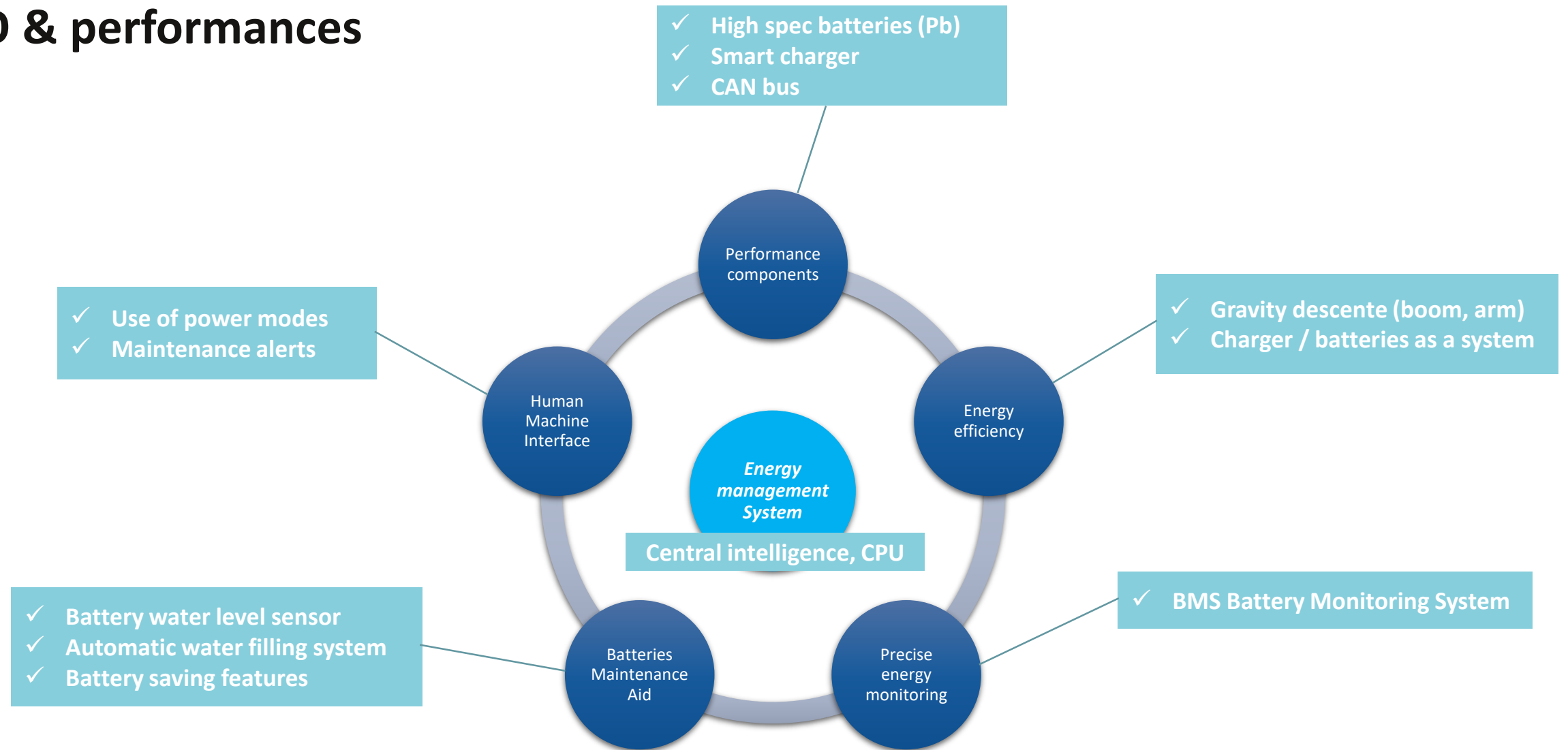
## Batteries Lifespan



# TCO & performances



# TCO & performances



# Smart energy modes

*« I want to work without emission, indoor or outdoor, I can recharge the machine plugged into the mains »*



## NO EMISSION

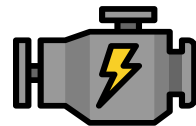
- **FULL ELECTRIC mode (default mode)**
- **Full performance available**

*« I want to work on a job site, in a cleaner and cost effective way, with no access to the mains overnight »*



## LOW EMISSION

- **AUTO mode**
- **Full performance available**
- No need to plug the machine into the mains (work on the diesel tank)
- **SMART** eco management : REX on / off depending on power demand and battery State Of Charge (SOC)
- No waste of energy, better efficiency
- **55% diesel savings**, measured on job site (and so emissions savings)



**PULSEO equipped with a range extender (REX) : small diesel engine, current generator**



# Lead acid batteries : advantages



01

## Technical performance

- Significant recent technical advances have dramatically improved the performance of lead batteries.



02

## Cost

- Lead batteries are the lowest cost option compared with other battery technologies, in terms of upfront cost and over the lifetime of the system.



03

## Safety

- Lead batteries are the safest battery technology. Other technologies have many issues due to the flammable nature of the materials used, combined with their high energy density.



04

## Recycling

- Lead batteries have the highest recycling rate compared to other battery technologies.



05

## Reliability

- Lead batteries' proven track record and unrivalled reliability mean that they are the back-up batteries of choice in many essential applications.



**Battery weight is more an asset than an issue for MEWPs!**

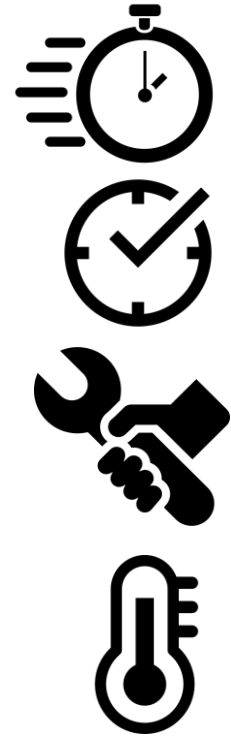


# Cost : Lead vs lithium

	Lead batteries	Lithium batteries
<b>CAPEX</b> (battery only) Initial investment costs	\$150-200/kWh	\$600-\$800/kWh
<b>End of Life Cost</b>	\$600/tonne net CREDIT	\$4,000/tonne disposal COST

# Lithium : advantages

- **CHARGING SPEED** (Reduced by 70%)
- **LIFESPAN** (Multiplied by 2)
- **EASY MAINTENANCE** (Do not need to be refilled with water)
- **TEMPERATURE SENSITIVITY** (Better resistance to high temperature difference)



**But it remains an expensive solution on big rough terrain lifts**

- New challenges ahead
- The beginning of an exciting new era
- Cleaner is better for everyone

# Thanks for your attention !