



# We move your business!

Energy and Data  
Management Systems

Electrification of Port  
Equipment

# Electrification of Port Equipment

Spot the difference



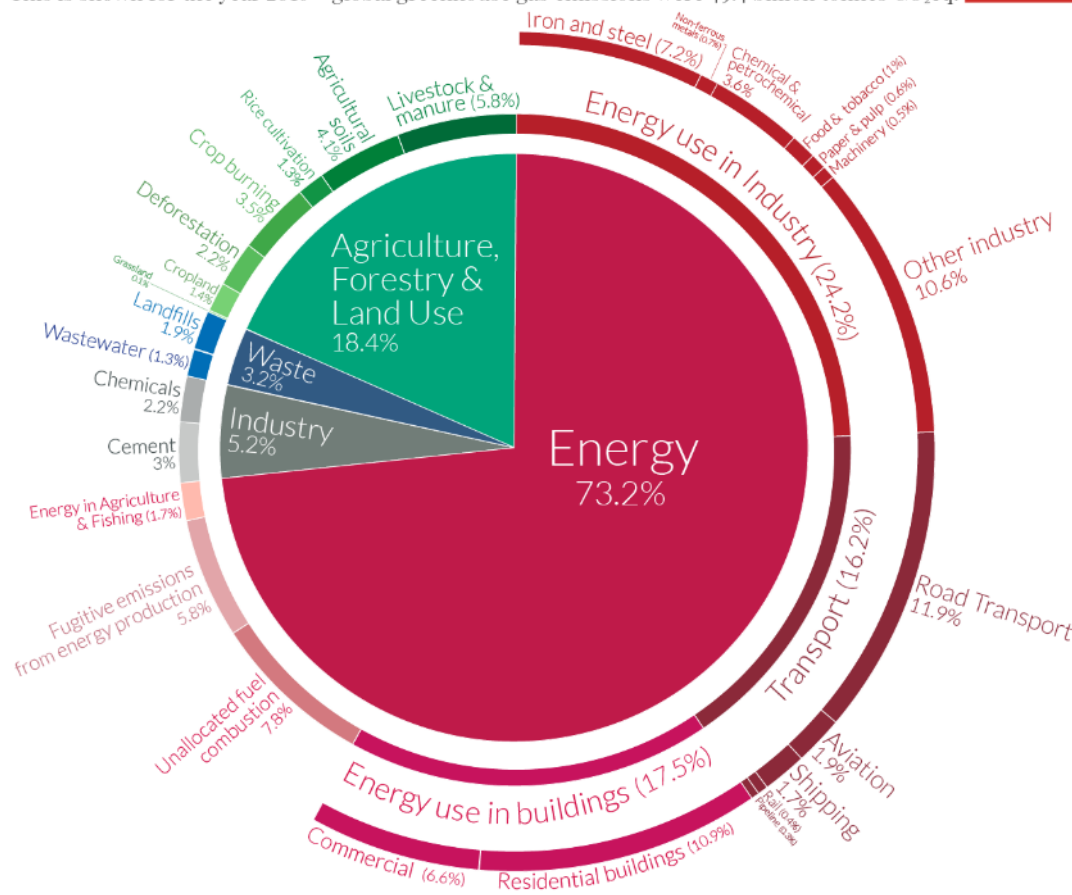
# Electrification of Port Equipment

## Overview - Global Emissions

### Global greenhouse gas emissions by sector

This is shown for the year 2016 – global greenhouse gas emissions were 49.4 billion tonnes CO<sub>2</sub>eq.

Our World in Data



**73%** from energy consumption

**16%** from transport which incl. shipping

OurWorldinData.org – Research and data to make progress against the world’s largest problems.  
 Source: Climate Watch, the World Resources Institute (2020). Licensed under CC-BY by the author Hannah Ritchie (2020).

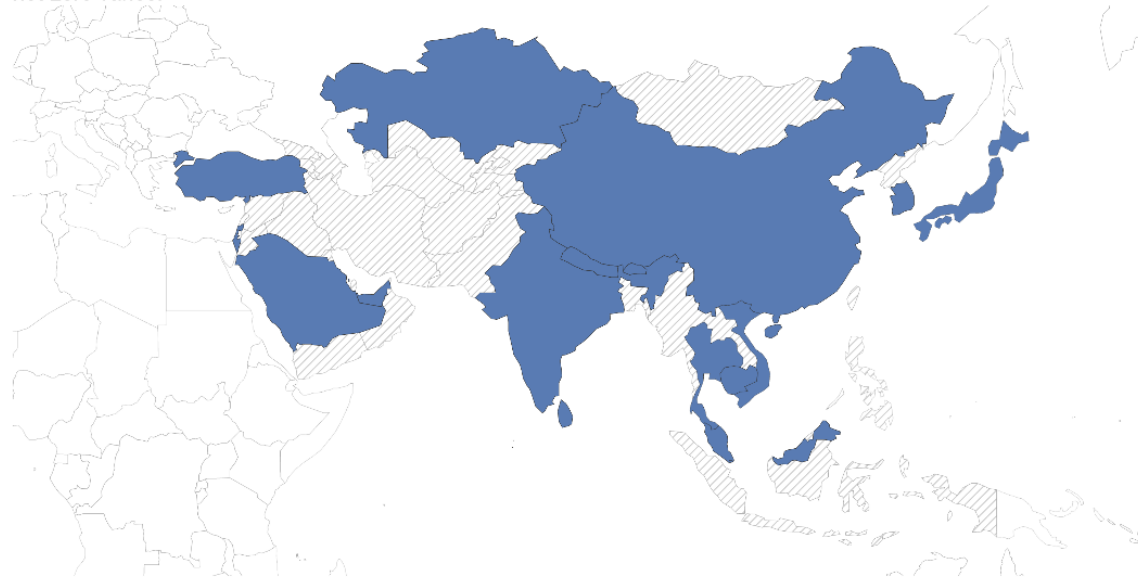
# Electrification of Port Equipment

## Decarbonization - How about Vietnam?

### Which countries have set a net-zero emissions target?

Countries are shown as having a net-zero emissions target if they have: achieved net-zero already; have it written in law; in their policy document or have made a public pledge. The year for which countries have pledged to achieve net-zero varies.

Our World  
in Data



■ Net-zero achieved or pledged    ▨ Not pledged

Source: Net Zero Tracker. Energy and Climate Intelligence Unit, Data-Driven EnviroLab, NewClimate Institute, Oxford Net Zero. Last updated: 2nd November 2021.

[OurWorldInData.org/co2-and-other-greenhouse-gas-emissions](https://OurWorldInData.org/co2-and-other-greenhouse-gas-emissions) • CC BY

## Net-zero emission target is pledged for 2050

# Electrification of Port Equipment

CO2 emissions in Ports – Case: RTG crane

Fuel consumption examples:



| Conventional RTG       | Ecological RTG         | Hybrid RTG            | Electrified RTG |
|------------------------|------------------------|-----------------------|-----------------|
| ~ 21 l/h<br>= 55Kg CO2 | ~ 13 l/h<br>= 34Kg CO2 | ~ 7 l/h<br>= 18Kg CO2 | ~ 40 kWh / h    |

## ➤ ELECTRIFICATION:

- Fuel reduction
- Maintenance reduction
- Emissions reduction

# Electrification of Port Equipment

## Specialists in RTG Electrification



### Motorized Cable Reels Solutions



Manual or automatic cable connection to grid power

~ 400 cranes globally

### Conductor Rails Solutions



Manual or automatic cable connection to grid power

~ 2700 cranes globally

### Hybrid Solutions



Hybrid with a big battery pack and a small onboard genset

~ 100 cranes globally

### Zero Emission Solutions

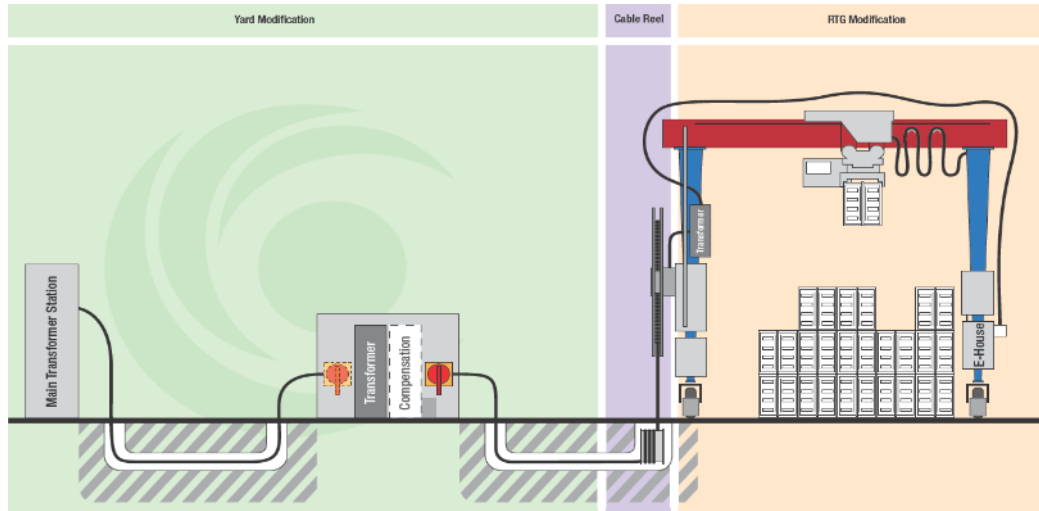


BatteryPack BE  
BatteryPack FE

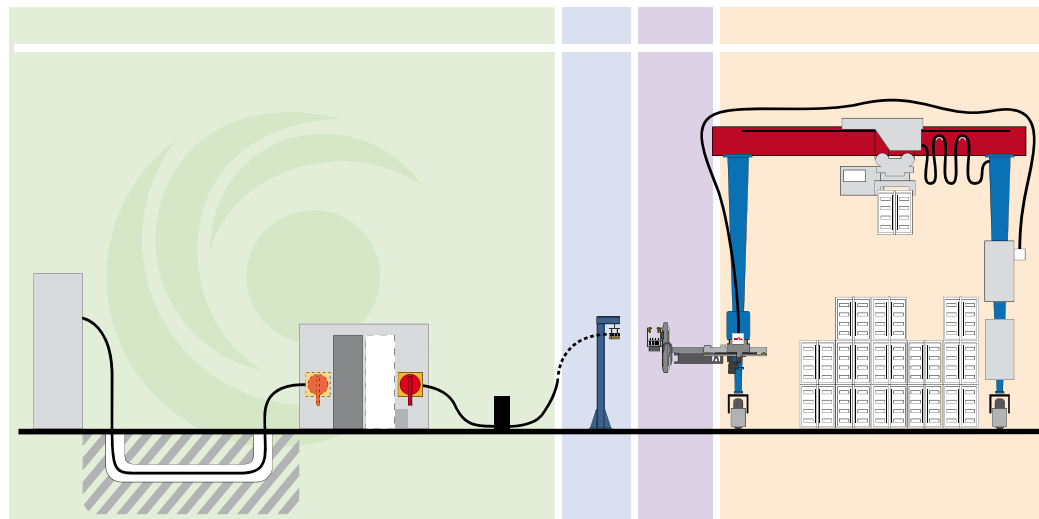
~ 70 cranes globally

# Electrification of Port Equipment

## Electrified RTGs



- Long distances
- Minimum infrastructure
- Unlimited data rates



- High flexibility
- Quick block changes
- Less weight on the crane

# Electrification of Port Equipment

## Battery Solutions

### BatteryPack Hybrid



- Battery Package  
100-150 kWh

### BatteryPack BE



- Battery Package  
~220 kWh

### BatteryPack FE



- Battery Package  
~30 kWh



# Electrification of Port Equipment

## Electrified + Hybrid RTGs – Savings?



|        | Conventional RTG consumption | Hybrid RTG consumption | Savings % |
|--------|------------------------------|------------------------|-----------|
| Case 1 | 20.17 l / hr                 | 7.98 l / hr            | 60%       |
| Case 2 | 13 l / hr                    | 5.4 l / hr             | 60%       |

Price per liter Diesel Vietnam 1.02 USD / l \*

Potential annual savings on a 16 hr / day utilized conventional RTG converted to **Hybrid RTG**

$$\rightarrow 16 \text{ hr} \times 12.19 \text{ l} \times 1.02 \text{ USD / l} \times 365 = \mathbf{72.613 \text{ USD / year}}$$

Potential annual savings on a 16 hr / day utilized conventional RTG converted to **Zero Emission RTG**

$$\rightarrow 16 \text{ hr} \times 20.17 \text{ l} \times 1.02 \text{ USD / l} \times 365 = \mathbf{120.148 \text{ USD / year}}$$

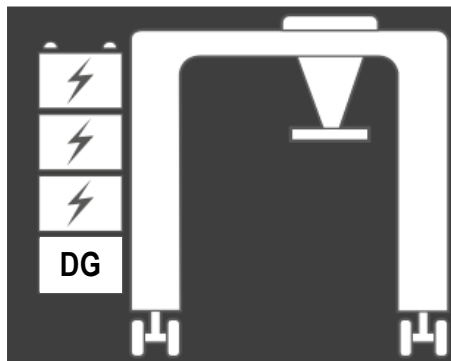
# Electrification of Port Equipment

## CO2 savings!



1 liter Diesel = ~ 2.65 Kg CO2

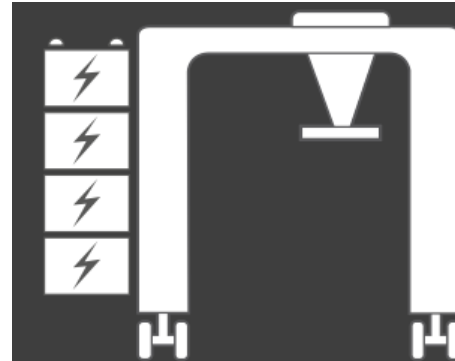
### BatteryPack Hybrid



16 hrs / day  
365 days / year  
12 l / hr

**= 124t CO2 savings**

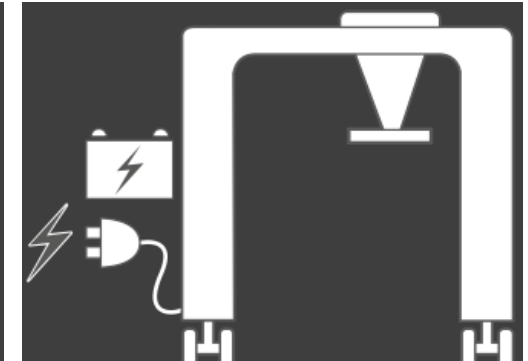
### BatteryPack BE



16 hrs / day  
365 days / year  
21 l / hr

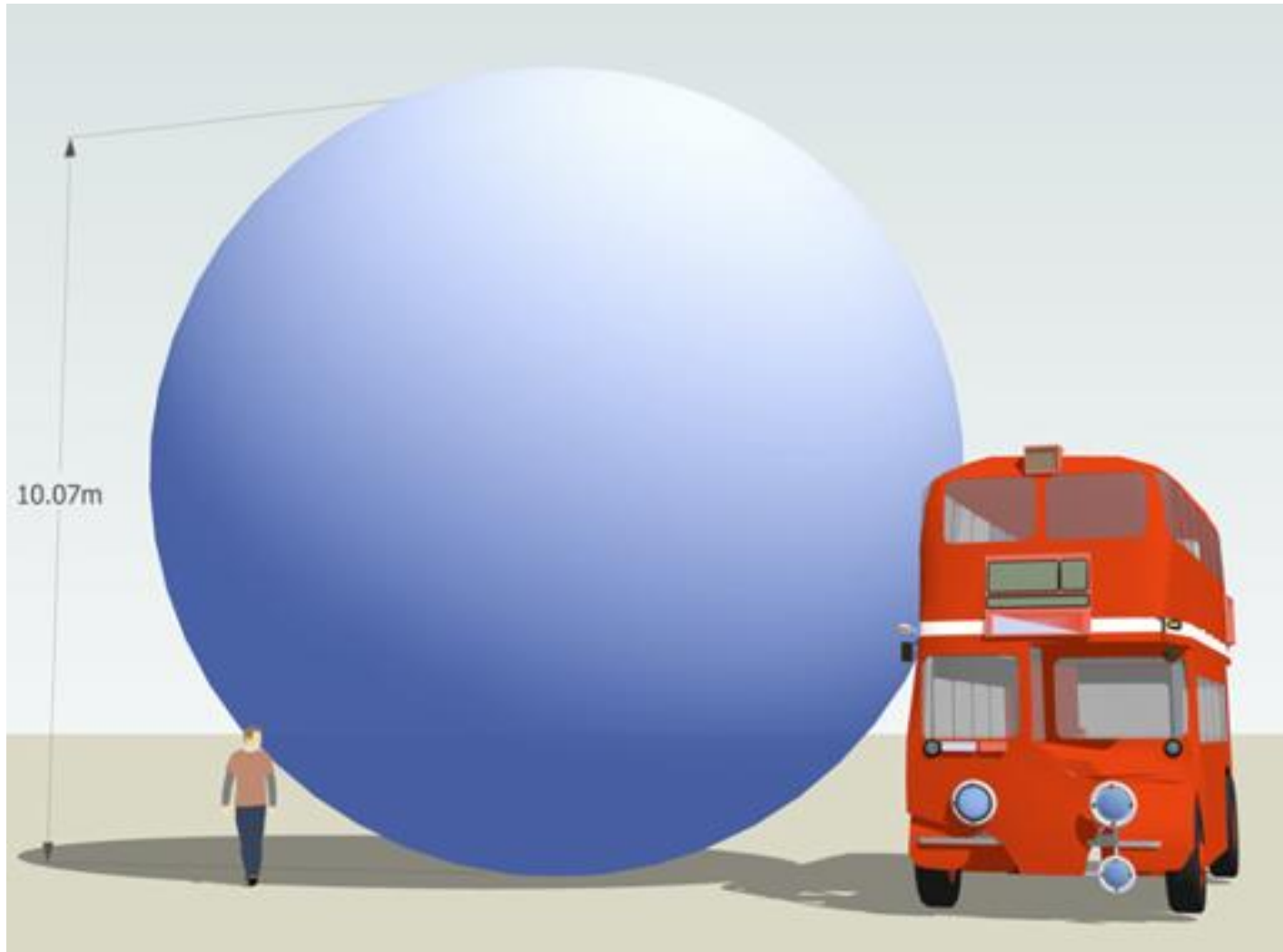
**= 325t CO2 savings**

### BatteryPack FE



# Electrification of Port Equipment

## Size matters



**1 ton of CO<sub>2</sub>**

**324t per RTG  
per year**

**How big is  
your fleet?**

**We move  
your business!**

*thanks  
for your  
attention*

