

KONECRANES

# Power options for RTGs

The complete range,  
modular and retrofittable



# The full range of power options



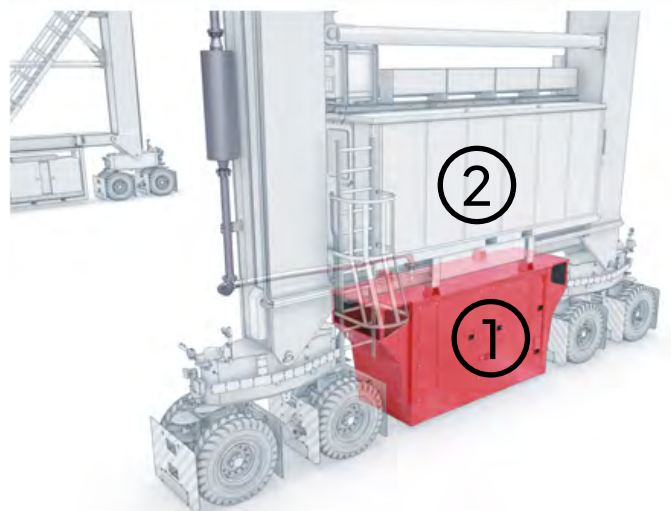
Fully electric operation requires less maintenance, produces less noise and reduces emissions. These are particularly important considerations if your container terminal is near a residential area.

**We provide the complete range of power options for Konecranes RTGs. They are entirely modular and retrofittable: diesel operation with fuel saver technology, diesel/battery hybrid, cable reel, busbar, cable reel/battery, busbar/battery, and pure battery operation.**

With Konecranes RTGs your “power path” is completely flexible. You can start with diesel power and move to hybrid or fully electric operation later with economical retrofits. We now offer important E-hybrid options: busbar RTGs with batteries and cable reel RTGs with batteries, no diesel. The options are described in the following pages.

## Nobody knows your cranes better than Konecranes

We designed and built your Konecranes RTGs, we maintain and modernize them, and we know them inside out. When we change the power supply, we also look at the big picture, to make sure the power system is fully integrated with the software and the mechanical and electrical systems. So you won't have any surprises down the road.



1) Power supply compartment 2) E-house

The mechanical and electrical interfaces are the same for all of our RTG power options. It is very easy to convert from one power supply to another.



# RTG Ecolifting

Ecolifting is Konecranes' long-term vision to reduce the CO<sub>2</sub> and noise emissions of its container handling equipment.

We introduced our first RTG in 1995. It was diesel-driven. It didn't take us long to introduce our Diesel Fuel Saver technology. Then came our hybrid RTG, which has become very popular. We learned a lot about battery management and behavior from the hybrid RTG, and we were the first to offer a battery RTG. Today, we offer the E-Hybrid options of:

- Busbar RTG + batteries
- Cable reel RTG + batteries

Every power option can be retrofitted economically depending on your business needs and yard infrastructure.



Fully-electric drives

# Li-on batteries

Konecranes is proud to be the first to introduce a battery power option for RTGs. It gives the freedom of diesel-powered operation without the CO<sub>2</sub> and noise emissions. It gives the eco-efficiency of all-electric operation while “cutting the strings” of cable reel and busbar infrastructure in the yard.

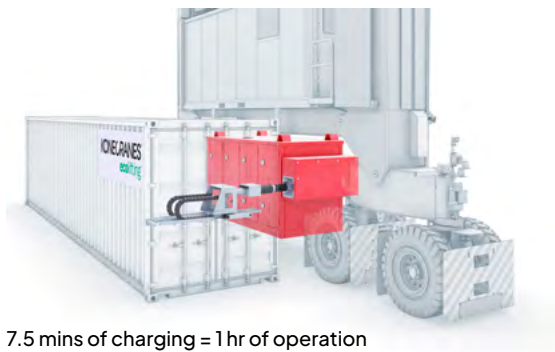
## Cutting the strings

Fully-electric RTGs powered via busbar or cable reel systems require yard infrastructure adjustments that are not feasible for all container terminal operators. The Konecranes Battery RTG (B-RTG) can be adopted easily by brownfield container terminals without major yard adjustments. The technology can also be retrofitted to any brand of RTG. With the Konecranes B-RTG, you go to zero local carbon emissions and “cut the strings” of yard infrastructure requirements.

The Konecranes B-RTG works with a charging station or manual plug-in to the mains. This will depend on the particular work processes of your container terminal.

If a charging station is used, it can be placed in various ground-level container slots for convenient B-RTG access. Regular containers can be stacked on top of it. It is connected to the harbor mains via regular underground cables.

- 4 hrs' operation at 222 kWh
- 8 hrs' operation at 296 kWh
- Same technology & components as used on 200+ hybrid RTGs already working



7.5 mins of charging = 1 hr of operation





## Fully-electric drives

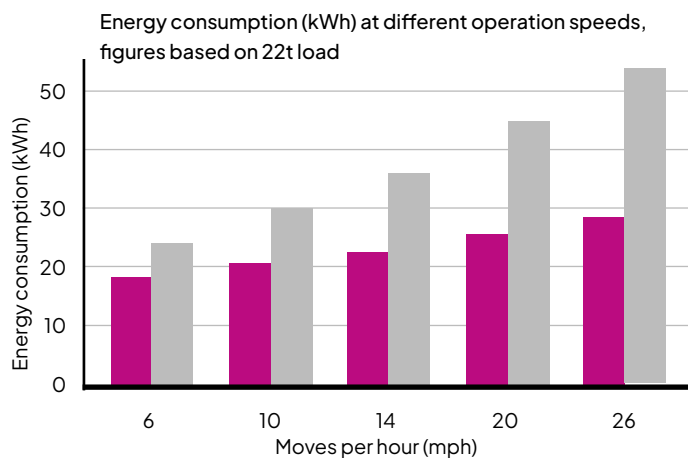
# Cable reel

We have delivered over 800 yard cranes with a cable reel

This solution equips the RTG with a cable reel, a feeding cable and a transformer, feeding electricity from the grid to the crane. The feed point can be either at one end of the operating area or at the center.

A fixed or portable auxiliary power supply is used to move the RTG between stacks. This can be a small battery pack or an auxiliary diesel generator. When the RTG is in its new position, the power is reconnected.

This solution is 100% modular and can be retrofitted to existing Konecranes RTGs.



- Power pack: cable reel, with network braking
- Power pack: cable reel, without network braking

## The E-Hybrid option

# Cable reel + batteries

Konecranes now offers a powerful new cable reel option: RTGs powered by a cable reel system with onboard batteries, no auxiliary power required. With this solution, the peak power demand per RTG is reduced to only 60kW, instead of the up to 400kW of traditional electric RTGs. The RTGs are charged "dynamically" – whenever needed during operation.



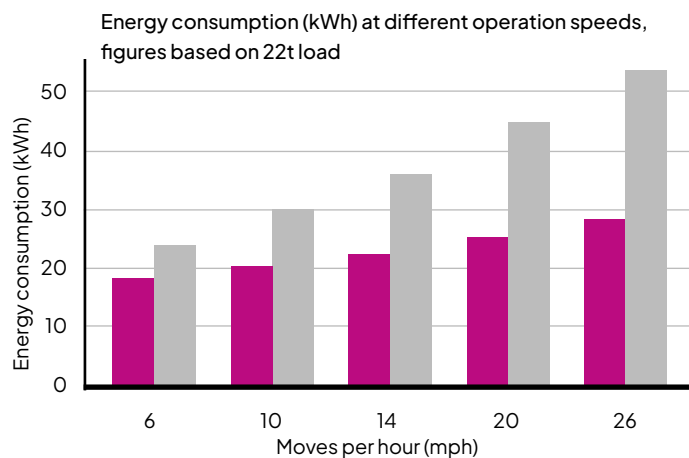
## Fully-electric drives

# Busbar

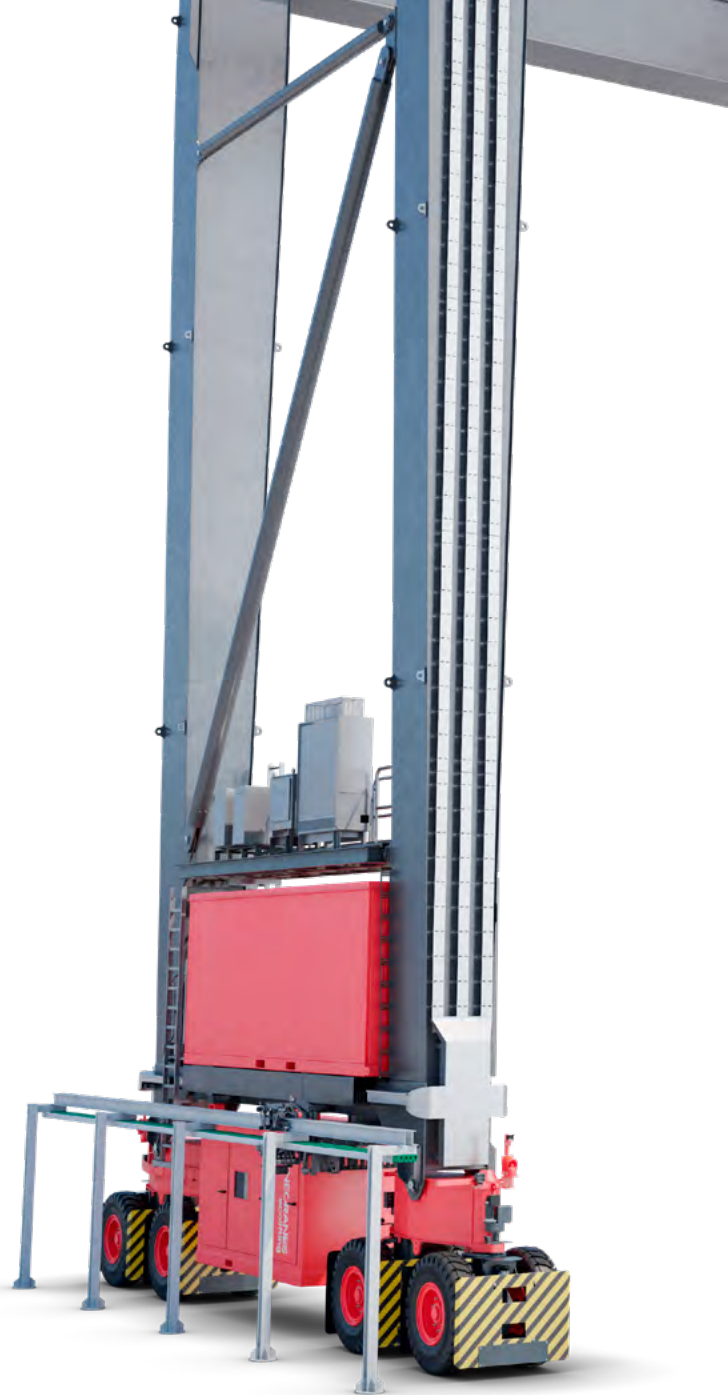
### 100% modular retrofit to existing Konecranes RTGs

Like the cable reel, the busbar option converts the RTG to fully electric operation. The power is supplied by a busbar rail, typically low voltage, which provides the connection to the grid. Operation is quiet. There are no diesel emissions and no time is spent refueling.

With this solution, we convert the diesel RTG to busbar operation by replacing the diesel engine with a power collector, making the machine fully electric.



- Power pack: busbar, with network braking
- Power pack: busbar, without network braking



## The E-Hybrid option

# Busbar + batteries

Konecranes now offers a powerful new busbar option: RTGs powered by a busbar system with onboard batteries, no auxiliary power required. With this approach, the peak power demand per RTG is reduced to only 60kW, instead of the up to 400kW of traditional electric RTGs. The RTGs can be charged "dynamically" - whenever needed during operation. They can also be charged "statically" - e.g. parked at the end of the stack to charge during the night.



# Hybrid expanded

Freedom, much reduced power requirement, blackout mitigation

## Diesel + batteries

We can now think of hybrid RTGs as traditional - they are commonly used. Whenever possible, the crane is operated with electrical power drawn from the energy store. Like a hybrid car, it takes the energy generated during braking and converts it into electricity to recharge the battery pack or onboard batteries. This reduces diesel fuel consumption dramatically. This power option is a proven Konecranes solution. It's entirely modular and retrofittable on older Konecranes RTGs, and even non-Konecranes RTGs.

## Cable reel + batteries

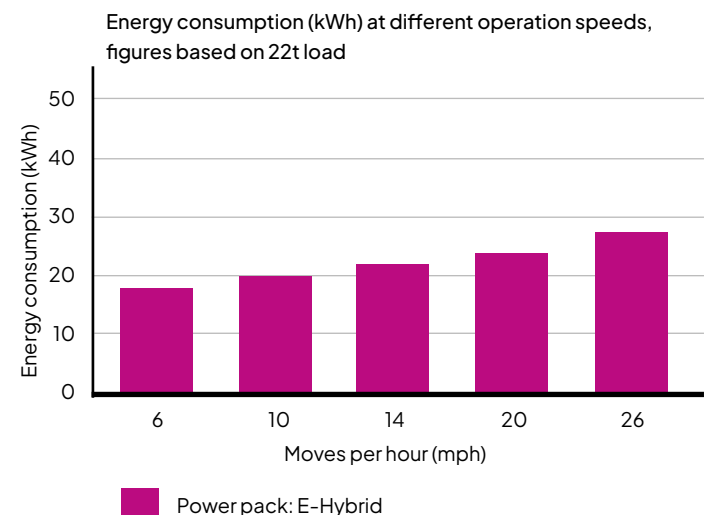
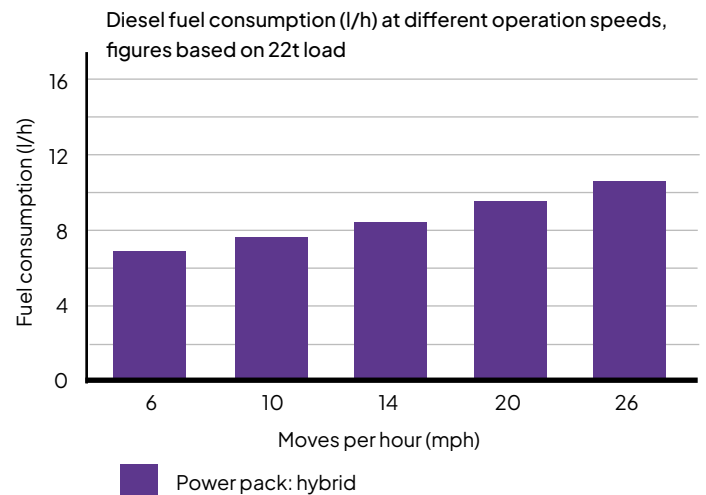
### E-Hybrid

Konecranes has delivered hundreds of cable reel RTGs worldwide. We now offer RTGs based on cable reel + battery operation, where the RTGs operate with a traditional cable reel system that charges the onboard batteries "dynamically" during normal operations. The power requirement is greatly reduced, going down from the up to 400 kWh per duty cycle to 60 kWh per duty cycle. Very significant savings can be achieved in both CAPEX and OPEX.

## Busbar + batteries

### E-Hybrid

Konecranes now offers a powerful new busbar option: RTGs powered by a busbar system with onboard batteries, no auxiliary power required. With this solution, the peak power demand per RTG is reduced to only 60kW, instead of the up to 400kW of traditional electric RTGs. With this system, the RTGs can be charged "dynamically" - whenever needed during operation. Very significant savings can be achieved in both CAPEX and OPEX.



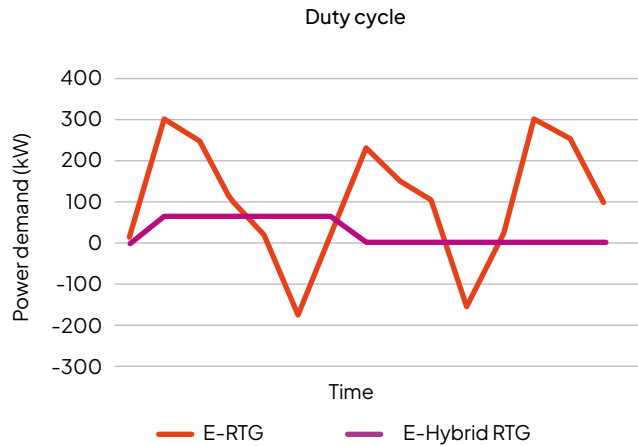


## Benefits of dynamic charging

### E-Hybrid

By “dynamic charging” we mean the ability to charge the RTG batteries at any time via a cable reel or busbar system. An E-RTG cable or busbar operation has a much higher electricity and infrastructure requirement. When you add batteries to the RTGs, you need only 60kW charging power from the supply grid:

- Smaller substations and much less yard cabling
- Major cutting of infrastructure costs both CAPEX and OPEX



## The door is open

### Hydrogen

The door is open to hydrogen operation too, using the same modularity used with Hybrid and E-Hybrid Konecranes RTGs.

- 60–100kW hydrogen power pack for stack changing only
- H<sub>2</sub> combustion engine
- Zero CO<sub>2</sub> and near zero NO<sub>x</sub> tailpipe exhaust
- H<sub>2</sub> fuel cells
- Zero CO<sub>2</sub> and NO<sub>x</sub> tailpipe exhaust





# Optimized diesel drives

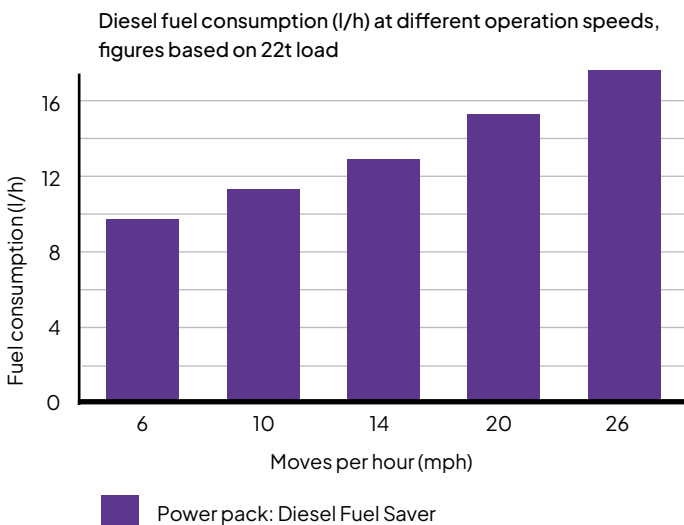
## Konecranes Diesel Fuel Saver: high RPMs when you need them, low RPMs when you don't

You don't need to run the RTG diesel engines at high RPMs, nonstop. Konecranes Diesel Fuel Saver provides power on demand, matching the RPMs to the work the machine is doing. It ensures that the diesel engine is running at optimal efficiency at all operating points, without high-speed idling.

Konecranes Diesel Fuel Saver cuts fuel consumption dramatically, without compromising crane performance. This can amount to savings of tens of thousands of Euros a year per RTG, depending on operations.

This solution is 100% modular, from your OEM supplier, and can be retrofitted to existing Konecranes RTGs. The package includes replacement of the old diesel engine with a variable speed engine and installation of an active bridge inverter.

## Save truckloads of fuel




With Konecranes Diesel Fuel Saver technology your diesel engine always runs at maximum efficiency





Konecranes is a global leader in material handling solutions, serving a broad range of customers across multiple industries. We consistently set the industry benchmark, from everyday improvements to the breakthroughs at moments that matter most, because we know we can always find a safer, more productive and sustainable way. That's why, with around 16,800 professionals in over 50 countries, Konecranes is trusted every day to lift, handle and move what the world needs. In 2024, Group sales totalled EUR 4.2 billion. Konecranes shares are listed on Nasdaq Helsinki (symbol: KCR).

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