# Powering Tomorrow: Strategies for the Diesel-to-Electric Shift

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# Technology Development Drivers

2000's Fuel Price

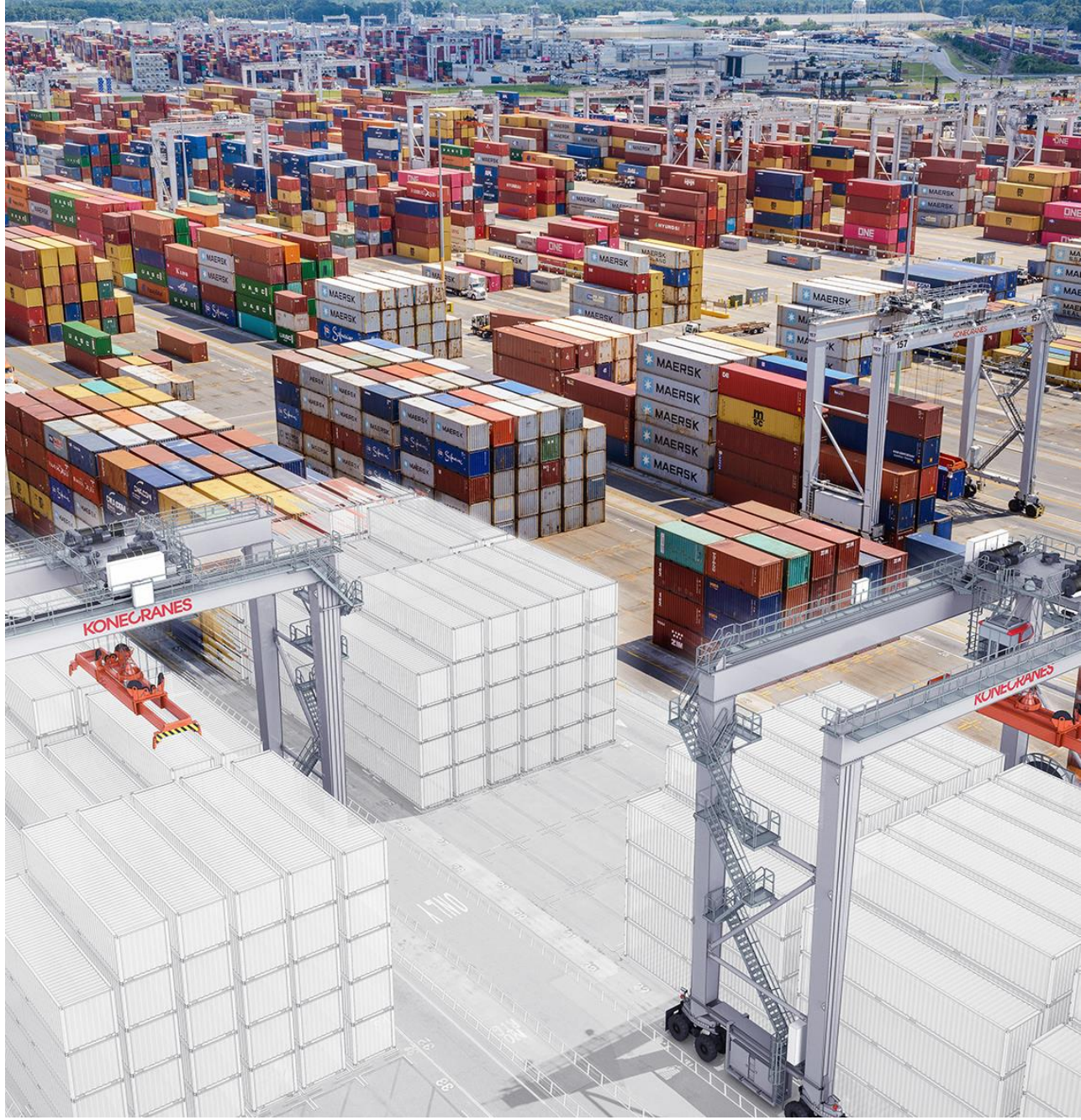
- Tripled through the decade
- Power demand driven engine control

2010's OPEX

- Fuel price "stabilized" on higher level
- Hybrids and energy recovery

2020's Sustainability

- CO2 Emission reduction
- Full Electrification

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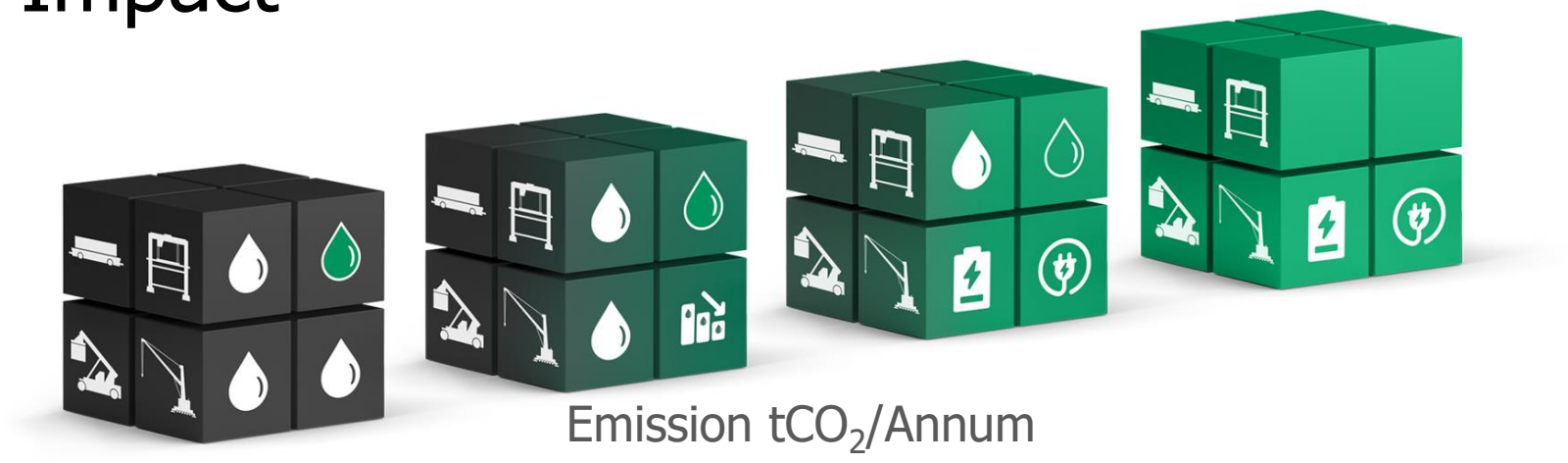
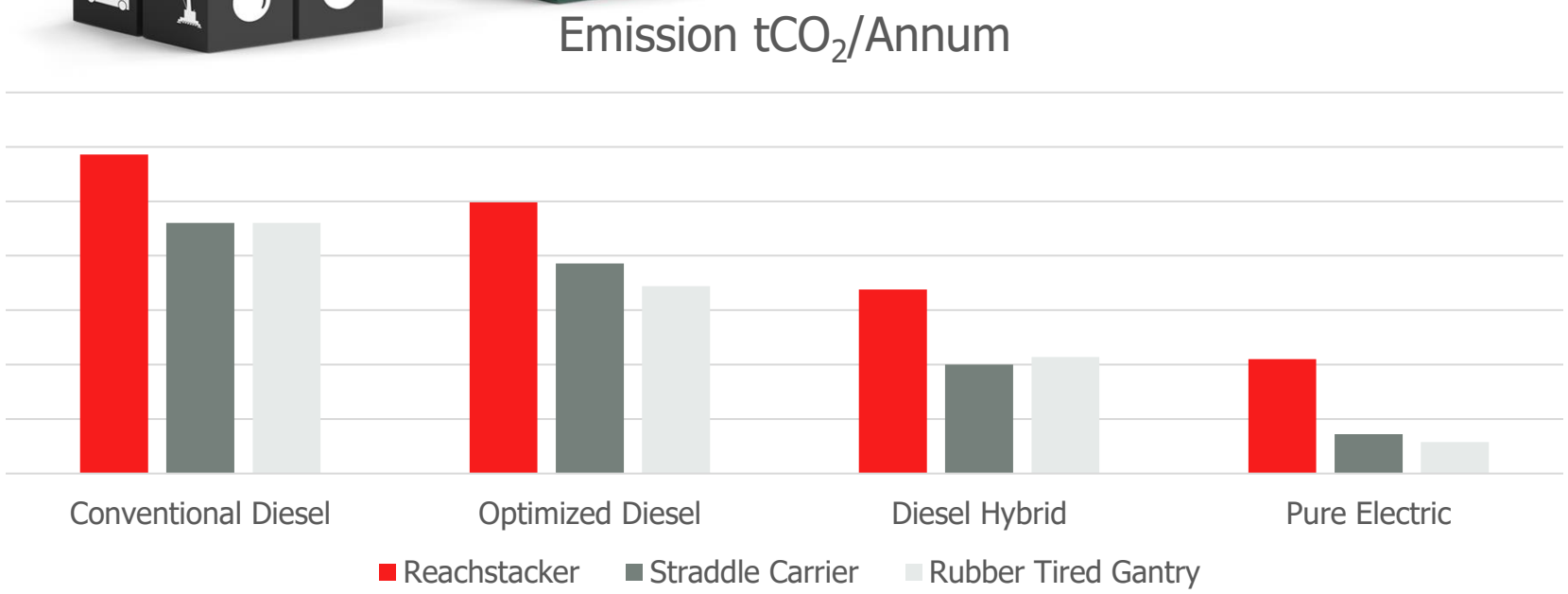
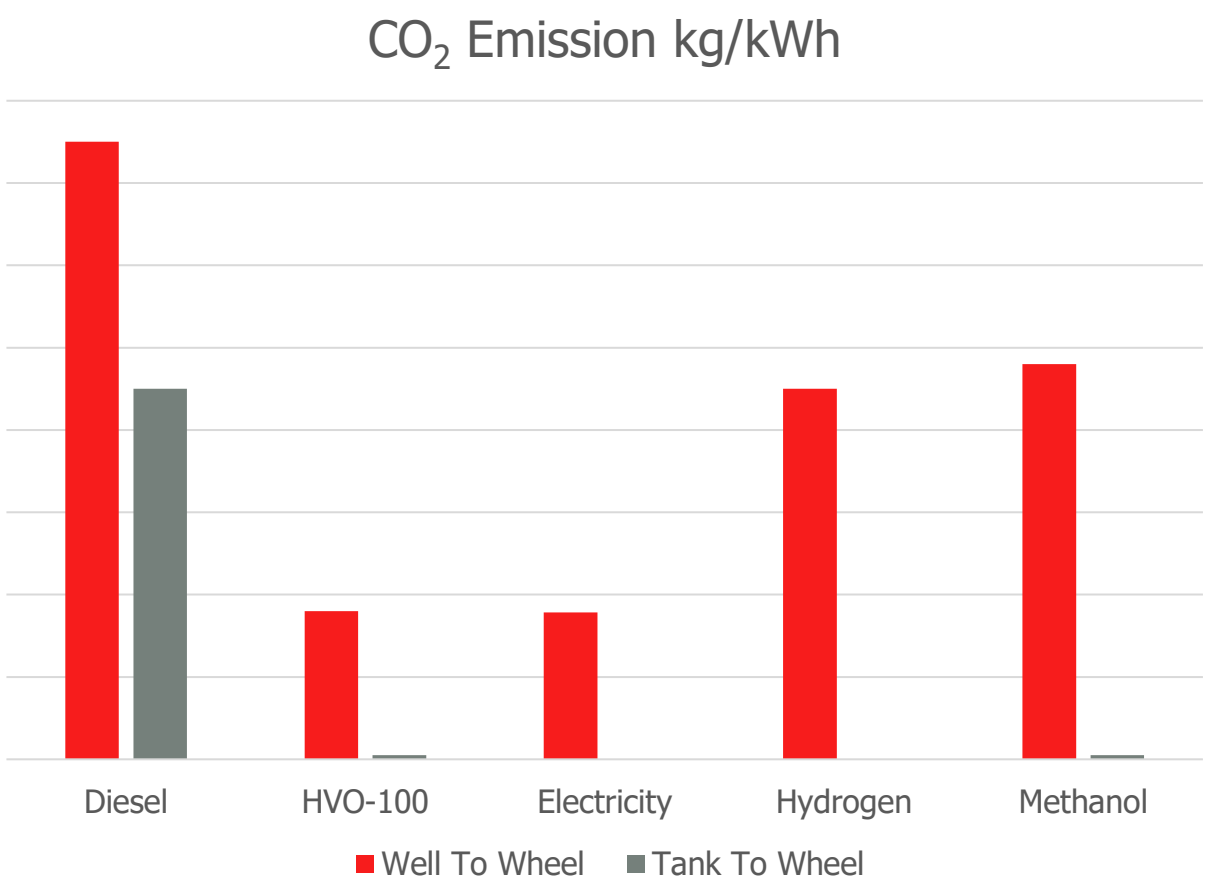
# Mobile Equipment Driveline Evolution and Emission Impact





# Energy Content and $CO_2$




*Source: UK Government, Department for Business, Energy & Industrial Strategy*

# Full Electrification Creates Discontinuity

Infrastructure

- ➢ Re-fuelling changes to Re-charging; 1 to 1 equipment replacement impossible
- ➢ Electricity for driveline, source energy

Charging Strategy

- ✓ Operations and dispatching planning
- ✓ Process interruptions
- ✓ Production capacity and fleet size



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# Conclusions

Electrification is available today:

- Technology experimental period passed, decisions needed
- Local adaption dependences; existing fleet, energy availability, infrastructure
- Bio- and dual fuel engines provide low $CO_2$ for transition time of existing fleet

And electrification provides:

- ✓ Sustainability
- ✓ OPEX reduction
- ✓ Opportunity to automate


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# Thank You!