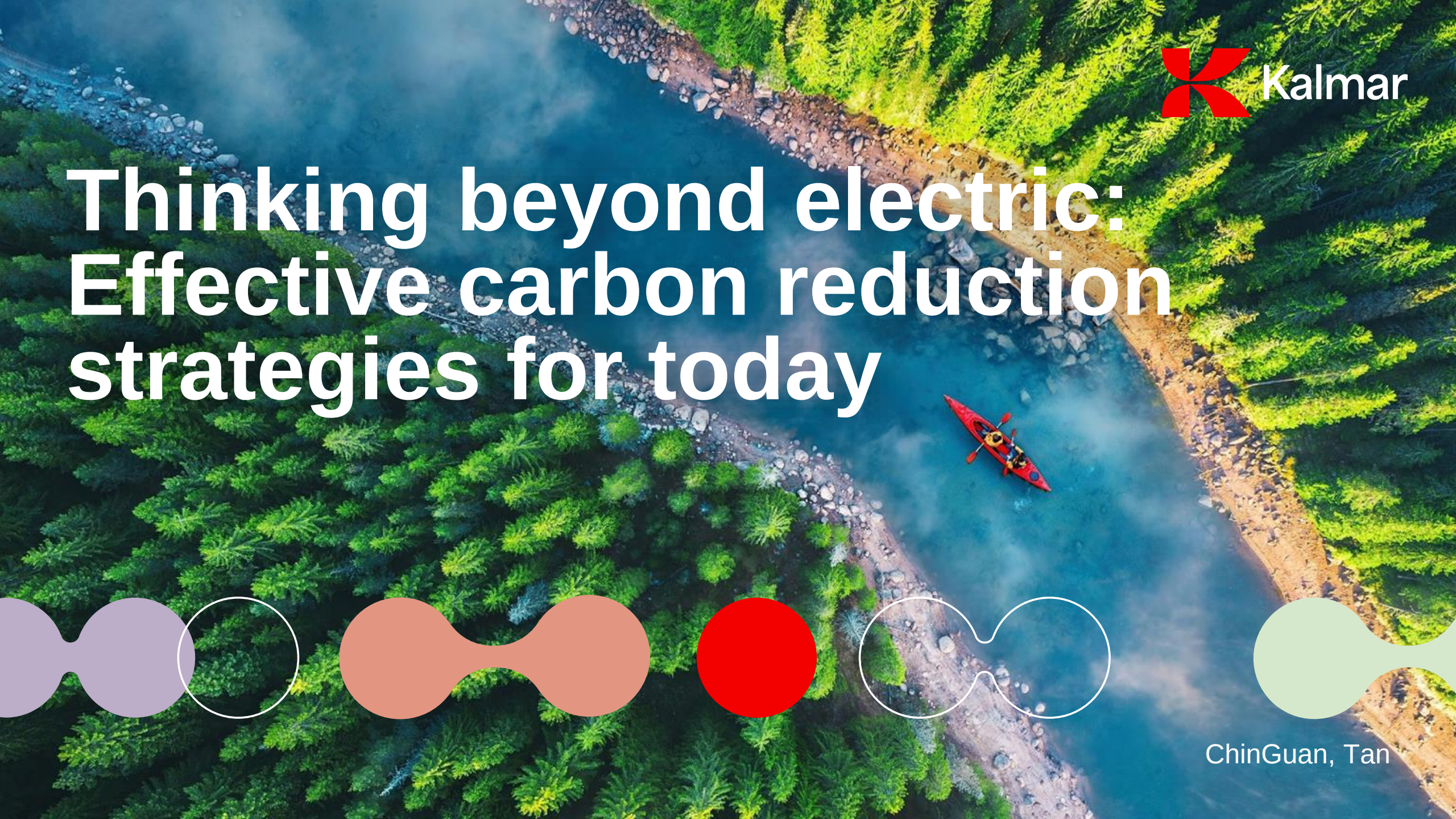
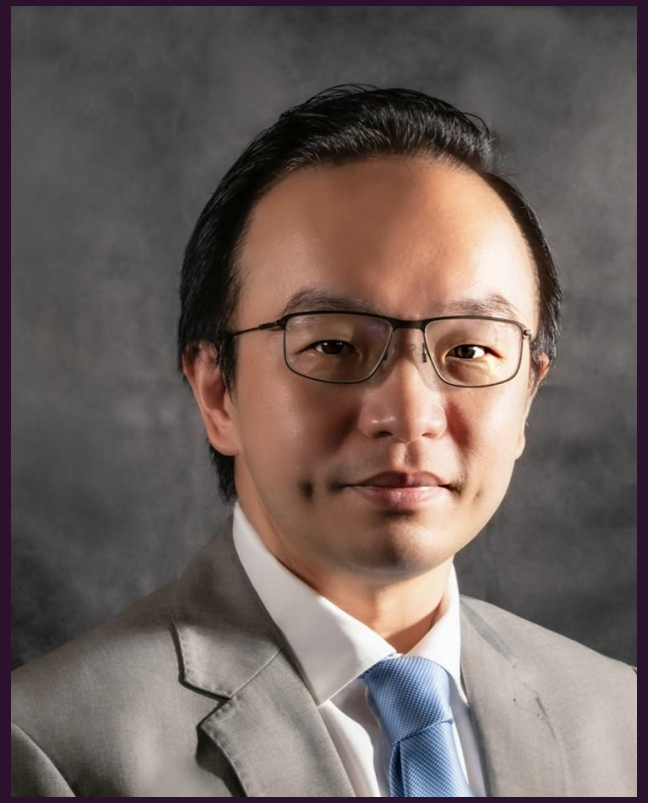


Thinking beyond electric: Effective carbon reduction strategies for today

ChinGuan, Tan



ChinGuan Tan

Solution Sales Director, SSEA Kalmar

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Agenda

- Electrification in Asia - where are we today?
- Alternatives to electrification to reduce CO_2 emissions
- The climate and financial impact of equipment and fuel alternatives
- Key takeaways

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Electrification in Asia:

Where are we today?

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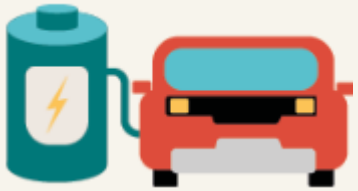
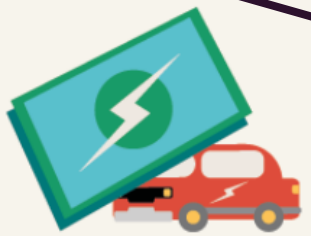
What steps have been taken to boost electric vehicles in Asia

>60% of countries have named **transport a priority** for climate change mitigation

> 80% of countries mention EVs **as part of their mitigation strategies**

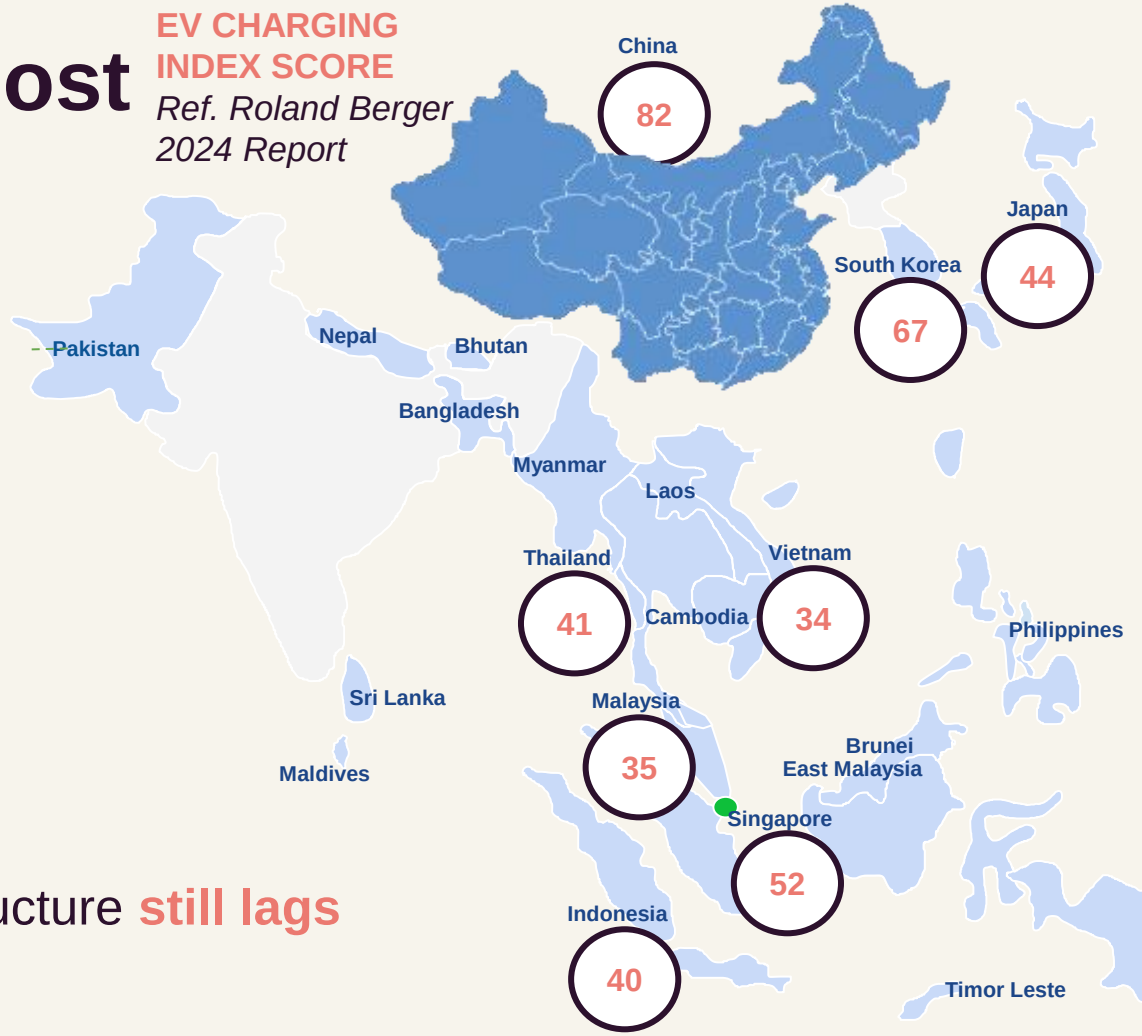
But Infrastructure **still lags behind**





And **policies to incentivise** uptake and access to EVs are still lacking

EV CHARGING INDEX SCORE
Ref. Roland Berger 2024 Report



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Electric cargo handling equipment is nothing new…

1971 — Electric RMG 1st gen

1980 — Light Electric Forklift 1st gen (Lead-Acid)

1989 — Electric ASC with automation

2000 — Electric Straddle Carriers 1st gen

2002 — Electric RTG Zero Emission 1st gen

2009 — Hybrid drive RTG and Straddle Carrier 1st gen

2016 — Light Electric Forklift 1st gen (Li-Ion), Hybrid Straddle & Shuttle Carriers (FastCharge), Electric ASC

2017 — Medium Electric Forklift 1st gen (Lead-Acid)

2018 — Electric Terminal Tractor 1st gen (Li-Ion), Hybrid RTG 2nd gen, Hybrid SC 8th gen

2019 — Electric EC-Handler DCG70 (Lead-Acid & Li-Ion)

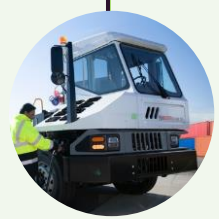
2020 — Medium Electric Forklift 1st gen (Li-Ion), Electric RTG 2nd gen

2021 — Electric Reachstacker (Li-Ion) 1st gen, Heavy Forklift Reachstacker (Li-Ion) 1st gen, Electric Terminal Tractor 2nd gen

2022 — Light, Medium Electric Forklifts (Li-Ion) 2nd gen

2024 — Electric Empty DCG90-110 Container Handler (Li-Ion) 1st gen

Electric Terminal Tractor 3rd gen (Li-Ion)



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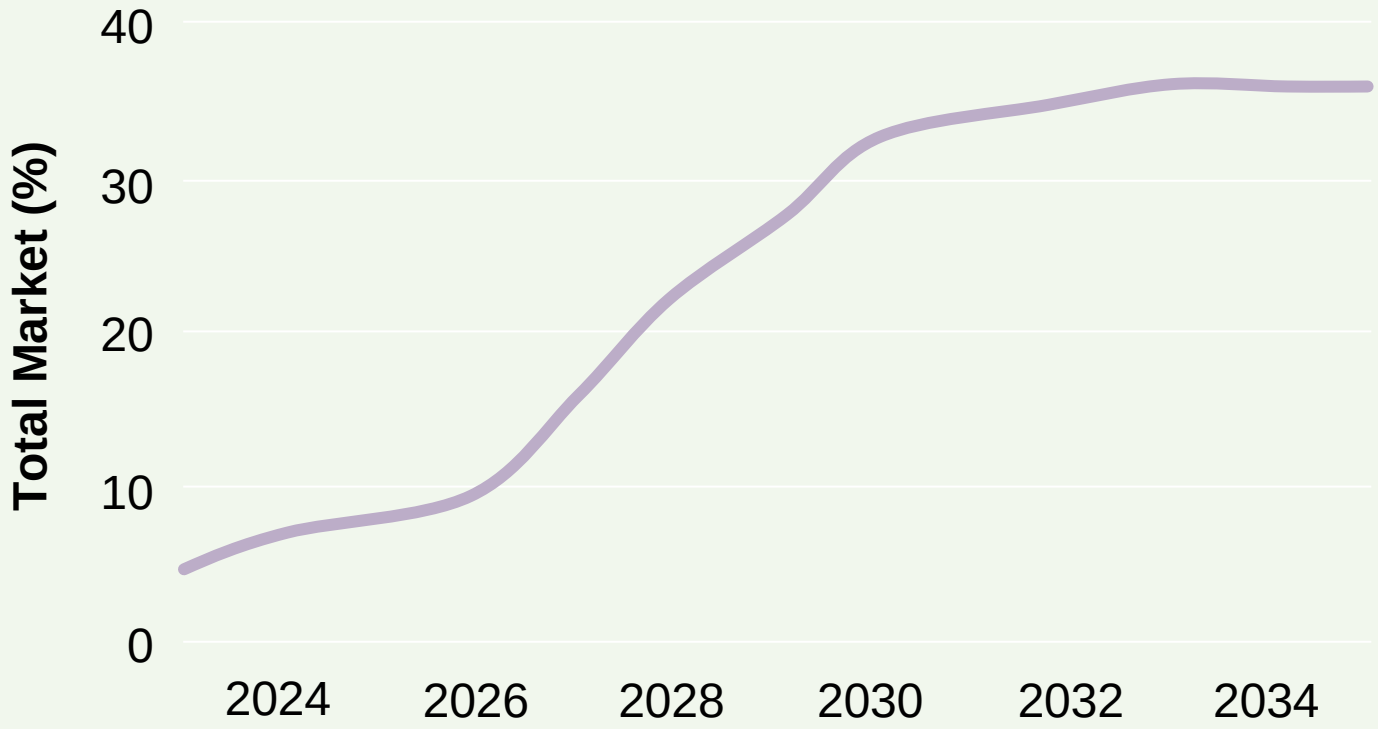
Expected market growth for electric material handling equipment in Asia



Assumptions

- More mature products
- New launches and new technology roadmap
- Technology cost reduction
- Infrastructure investments
- Government incentives for low emission investments
- Cleaner sources of energy
- Peak should start in 2026 and stabilize around 2035

Challenges: **Infrastructure, Energy Sources and Operational Costs**

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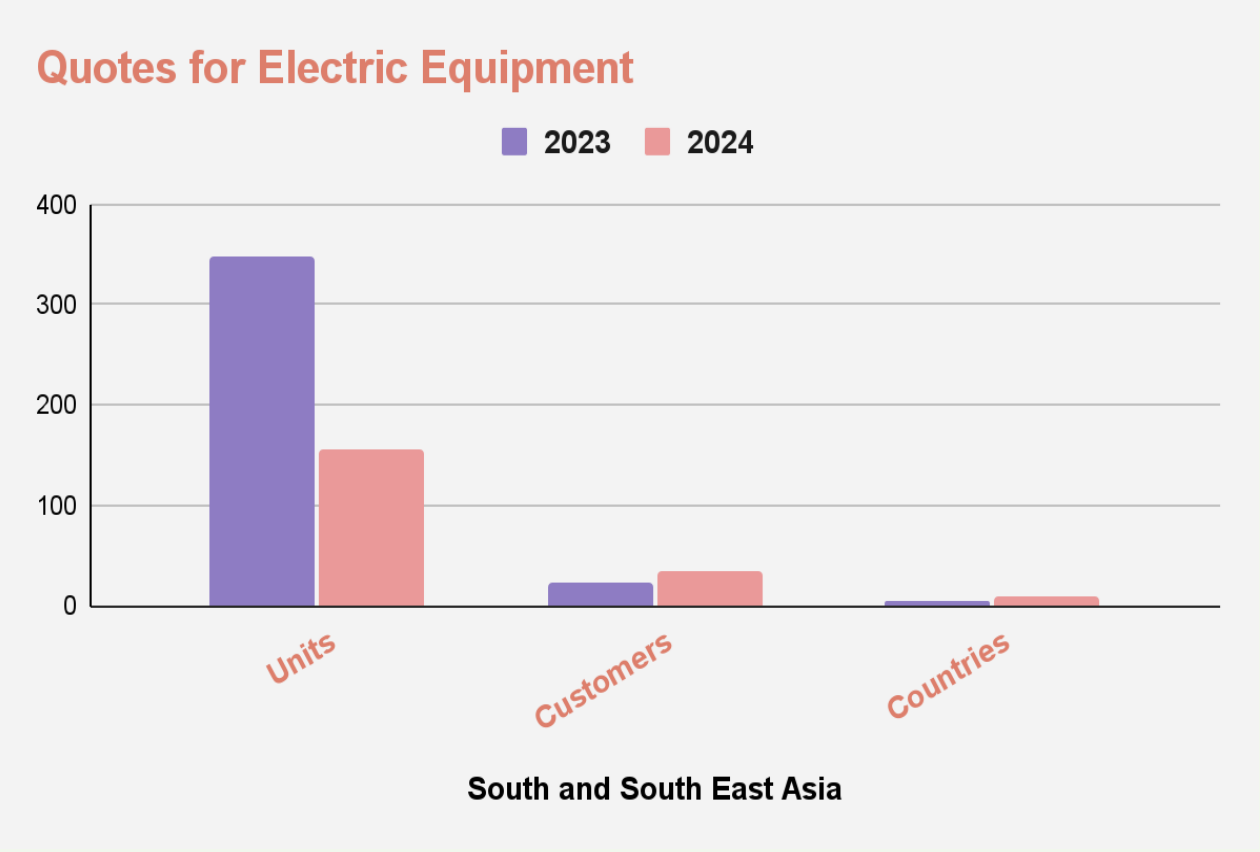
What is the Asian market perspective on this?



Kalmar Asian Customer Behavior

- Around 80% of our customers inquired about EV solutions
- Some customers decided only invest in eco efficient equipment from 2025/2026
- Most inquiries coming from Ports, but also pulp & paper and metal Industries
- South Korea, Vietnam, Indonesia and Malaysia are leading the inquiries

Asia is currently in the analysis phase, before taking the next step

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Alternatives to electrification to reduce CO_2 emissions

Eco-efficient diesel drivelines and renewable fuel

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Three examples of available options

Equipment

Eco-efficient diesel drivelines

Power sources

Biofuel (HVO)

Hydrogen

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Kalmar's Eco Reachstacker

- Most powerful, quiet and fuel efficient diesel Reachstacker in Kalmar's portfolio
- Guaranteed fuel savings up to 40% (backed by a fuel saving guarantee)
- Unique driveline developed by Kalmar, Volvo and Dana Rexroth with technical exclusivity
- Available with both Volvo and Cummins engines
- Proven technology with 10 years in operation

"According to our data comparison between the Eco Reachstacker and traditional reachstackers, the fuel savings rate is around 20%, which means each machine can save more than CNY 100,000 per year on the basis of approximately 4000 running hours for each machine annually,"

Wang Lei,
General Manager
Ningbo Blue Dragon Logistics

"We are excited by the reduced fuel consumption promised in daily operation. Other than cost, it is also better for our working environment. We believe the combined effect would be beneficial for our business and environment. And it is also in line with our mission for green operations,"

Benny Woenardi,
Managing Director of
PT. Cikarang Inland Port

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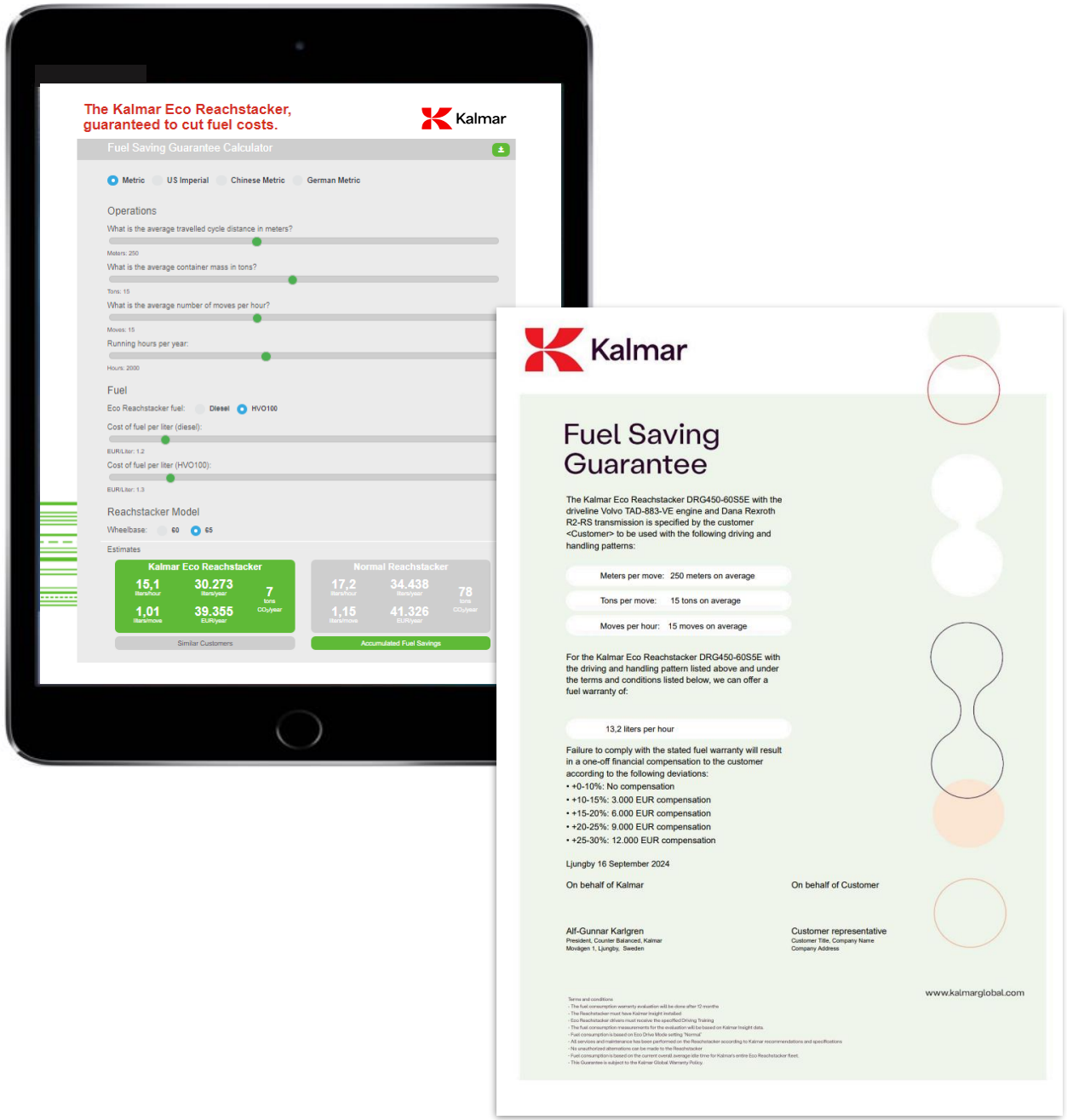

Fuel consumption Guarantee

Predicting and guaranteeing the Eco Reachstacker's fuel consumption

- Calculations are based on live data from machines in field combined with data mining and machine learning
- Guarantees an average fuel consumption per hour for given drive cycle
- Compensates you if usage exceeds the guaranteed liters per hour
- Turns a variable cost into a known fixed costs.

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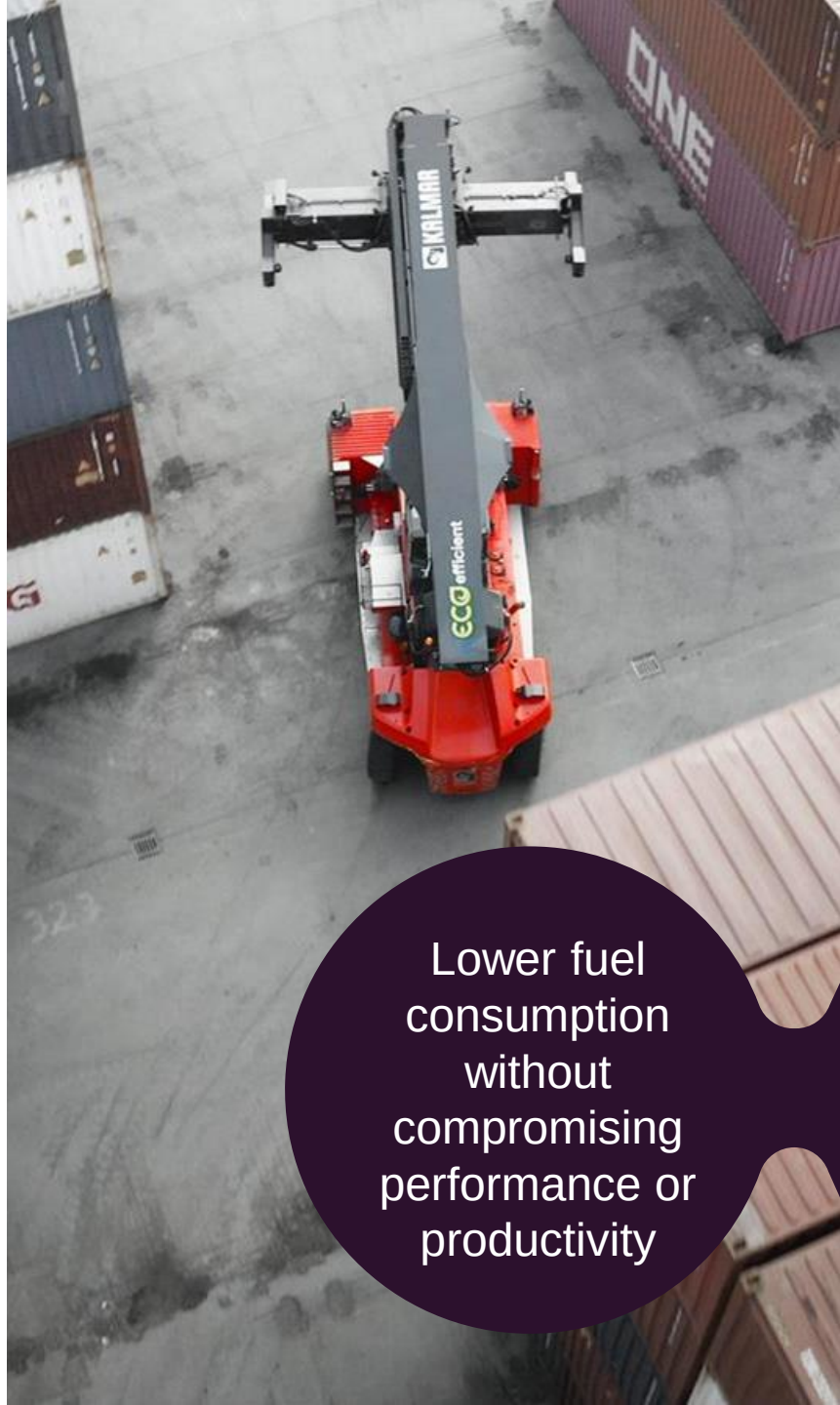
Eco Reachstacker vs. standard Kalmar Reachstacker

Performance according to Kalmar test drive cycle

	Eco vs. Normal
Acceleration 0-20 km/h - no load	~15% faster
Acceleration 0-25 km/h - no load	~10% faster
Acceleration 0-15 km/h – loaded	~15% faster
Acceleration 0-20 km/h – loaded	~25% faster
Productivity (containers/hour), power mode	4,5% higher
Productivity (containers/hour), normal mode	3% higher
Productivity (containers/hour), eco mode	3% higher
Noise inside (dBA)*	1 - 4 dB reduction
Noise outside (dBA)*	2 - 5 dB reduction

*Extra noise reduction kit will offer an additional 3 dB outside cabin and 1 dB inside cabin



Lower fuel consumption without compromising performance or productivity

The Kalmar Eco Reachstacker.

The Kalmar Eco Reachstacker has reduced global emissions by:

69,086,000

Kilos of CO_2

With over **500 Eco Reachstackers** now sold and operating in over **30 countries**, our customers are benefitting from significant reductions in both fuel costs and emissions.

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Hydrotreated Vegetable Oil (HVO)

- HVO is a paraffinic synthetic diesel fuel made of renewable raw materials
- Reduces CO2 emissions by up to 75% compared to fossil based diesel
- Can be mixed freely with diesel at any rate
- Same consumption as diesel
- All Kalmar’s diesel equipment is HVO compatible
- Perfect for a decarbonisation transition

Presently, the largest biofuel producers in the region are, Indonesia, Malaysia, the Philippines, and Thailand.

Biofuel production in Asia Pacific amounted to approximately 422 thousand barrels of oil equivalent daily in 2023. This was the highest figure reported since the year 2000, when production stood at 2,000 barrels of oil equivalent per day.

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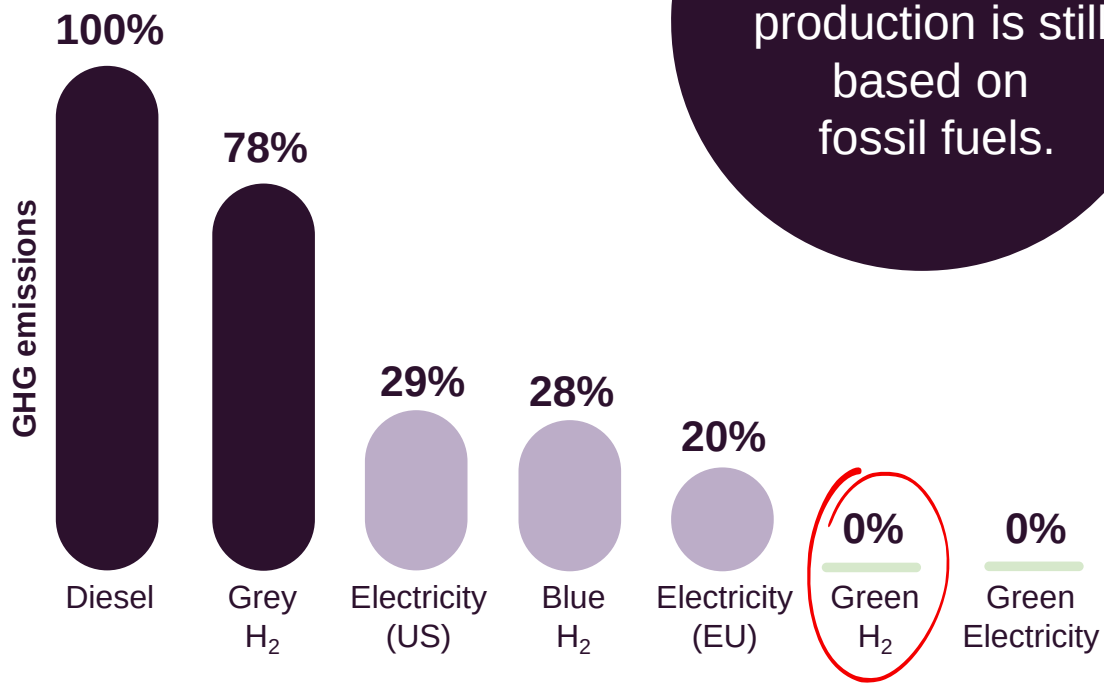
Hydrogen as an energy source

Pros	Cons
Clean power with no on-site emissions	Limited worldwide production of green hydrogen
Long operating times compared to battery solutions	Global transport and storage infrastructure required
Lower demand on electrical grid	Much higher cost
Smaller on-site infrastructure if H_2 is readily available	Special challenges in handling hydrogen

Pros and cons of hydrogen fuel cell technology versus battery-powered technology

Currently, **98%** of global hydrogen production is still based on fossil fuels.



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The climate and financial impact of equipment and fuel alternatives

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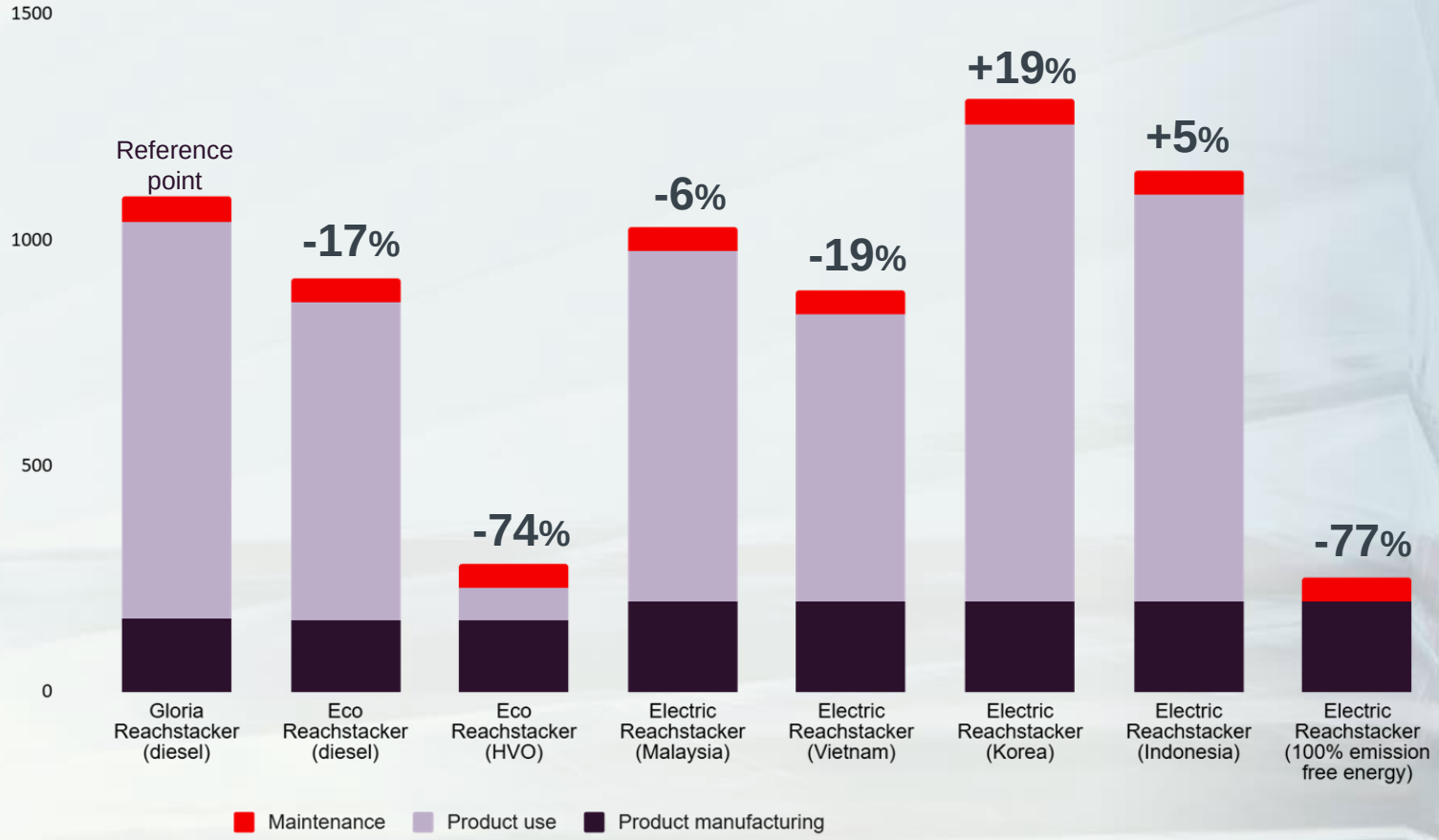
Lifetime emissions comparison for reachstackers (tCO_2e)



Environmental considerations

- The Eco Reachstacker offers a quick and easy emissions reduction
- HVO offers instant CO2 reductions in existing diesel equipment without major infrastructure changes
- Electrification enables high impact in the operational emissions, but energy source is key

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Comparing the total cost of ownership for reachstackers

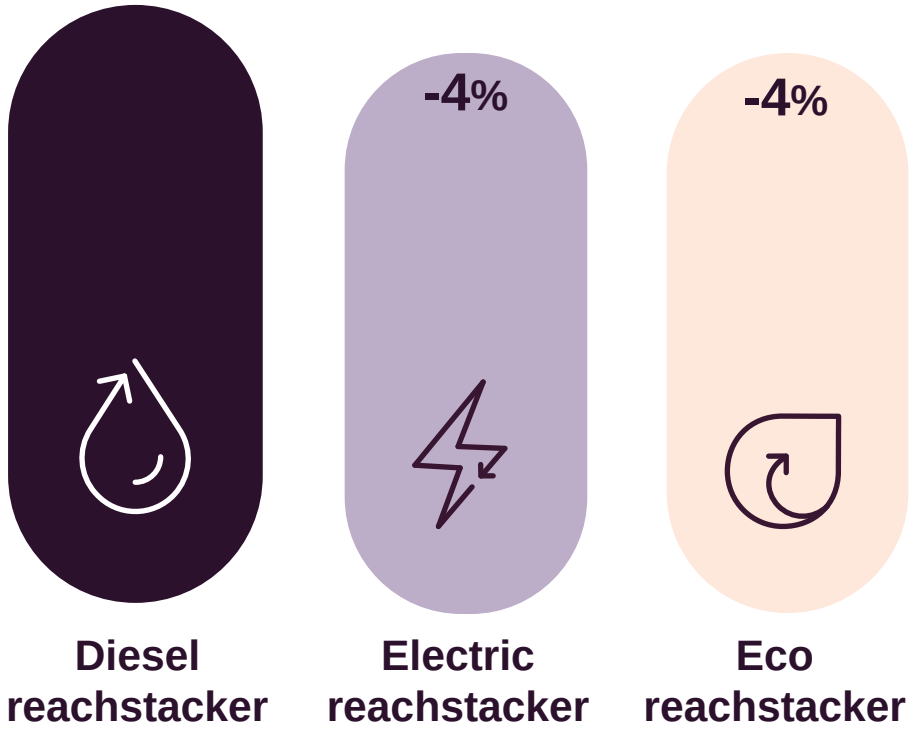
Equipment assumptions

- Same machine model sizes and capacities
- Basic configurations for all machines
- 326 kWh battery for ERG450
- Same drive cycle and energy consumptions
- 3000 running hours/year

Cost assumptions

- Diesel cost: 0.81 EUR/liter (Indonesia)
- Electricity cost: 0.066 EUR/kWh
- No charger or infrastructure cost included

10 year total cost of ownership comparison



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We can’t wait to go greener, so start today with even the smallest step!

Key takeaways

- Electric has big emission reduction potential, but requires infrastructure investments and depends on the emission factor and availability of electricity
- The Asia Market is transitioning to EV equipment, but is still in the analysis phase - 30%-35% of the total market in Asia is expected to be EV by 2035
- Hydrogen costs are not expected to be appealing until after 2030
- Available technologies like Eco Reachstackers offer a valuable option for a greener transition with no or minor infrastructure changes
- Biofuels like HVO offer instant emission reduction in existing diesel equipment
- **Local infrastructure is key to choosing the right solution for a green transition**.

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Kalmar South and South East Asia - Linkedin

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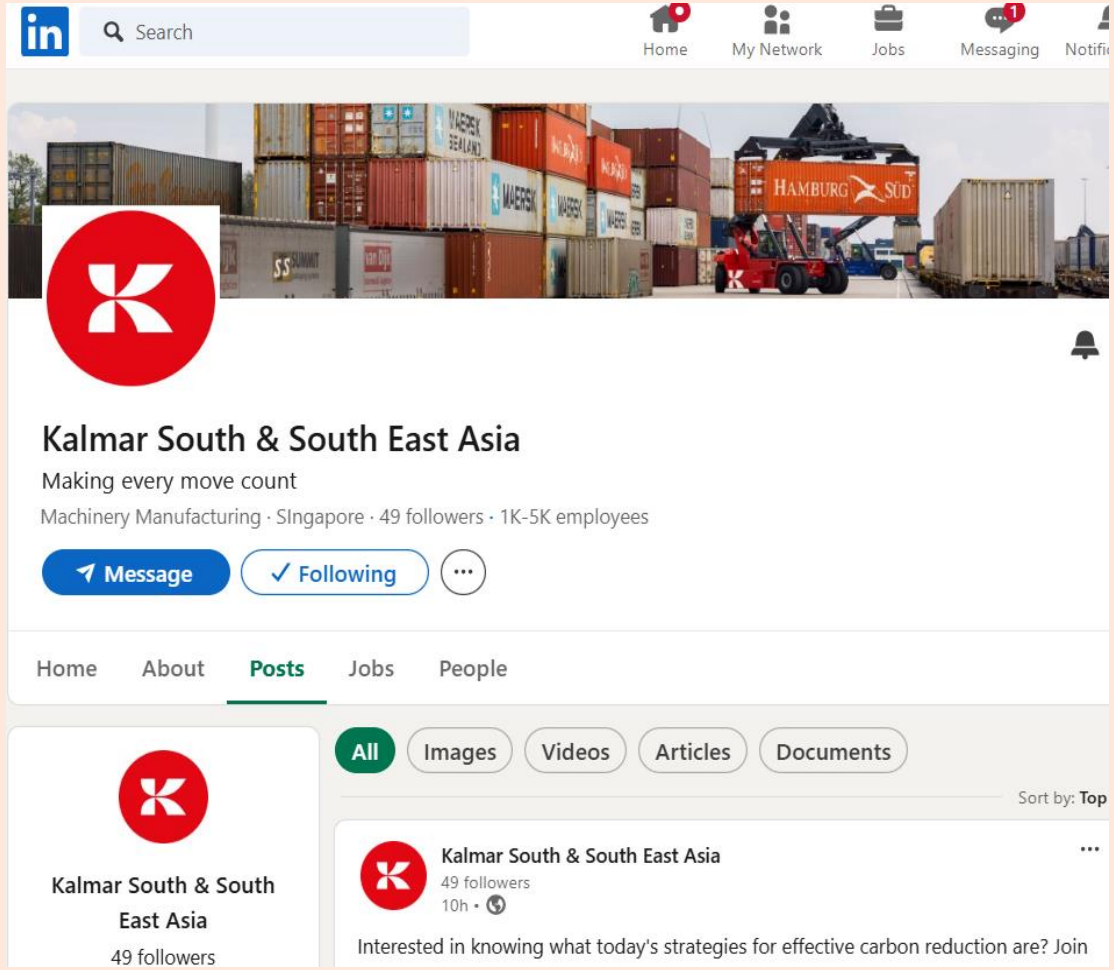

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Thank you for
your attention!
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