Zero Emission Construction Equipment

status and development

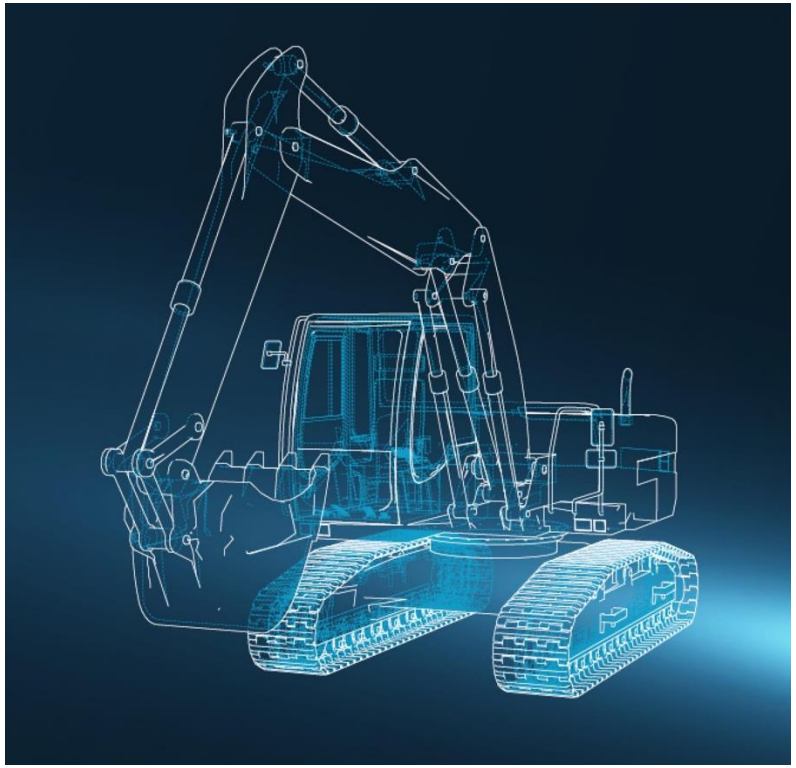
Maskingrossisternes Forening

Oslo, 18th of September 2024

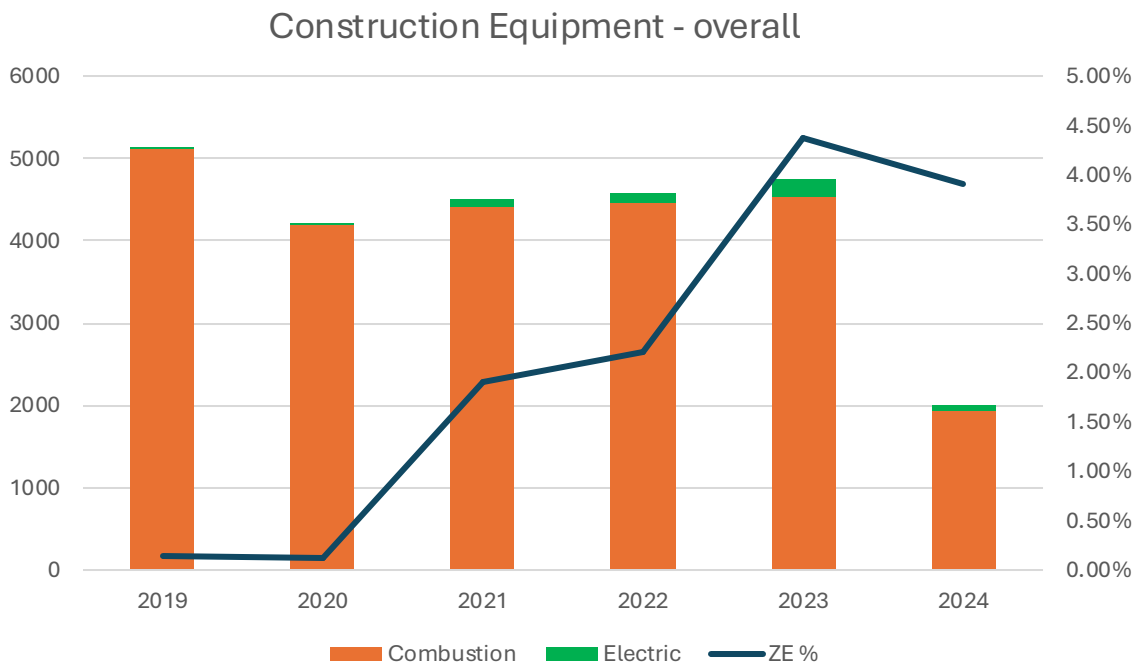
Maskingrossisternes Forening

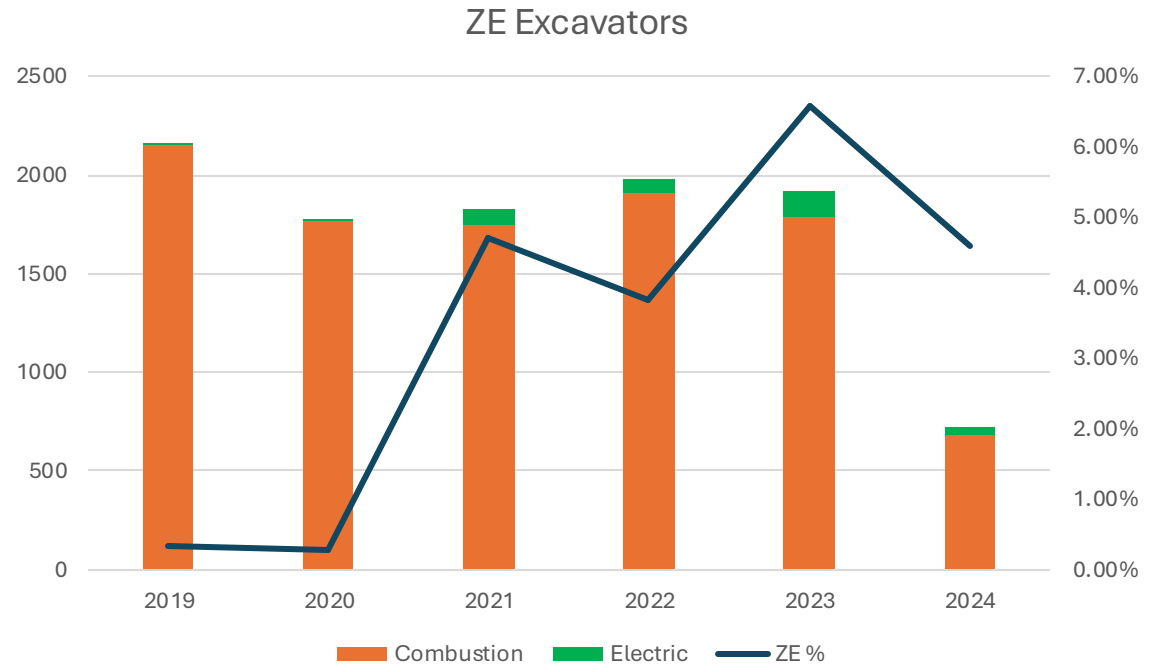
(Norwegian Machinery suppliers' organization)

- Established in 1913 in Oslo
- Representing importers/distributers of equipment with service and spare parts stores in Norway
  - Services in all region of Norway
  - Spare part storage in Norway
- Four subgroups
  - Construction Equipment – 55 members
  - Industrial machinery – 48 members
  - Logistics – 8 members
  - Compressors – 8 members



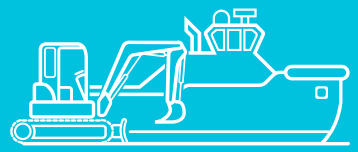
Norwegian marked ZE Construction Equipment





Disclamer: Rental Group is not a member of MGF or the statistics, and equipment imported directly from fabricator is not included in the numbers

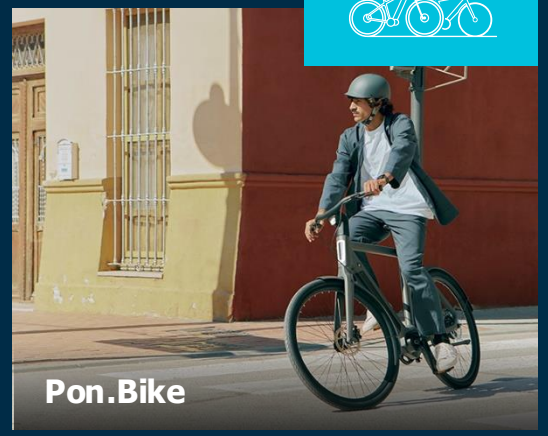
Equipment &
Power Systems

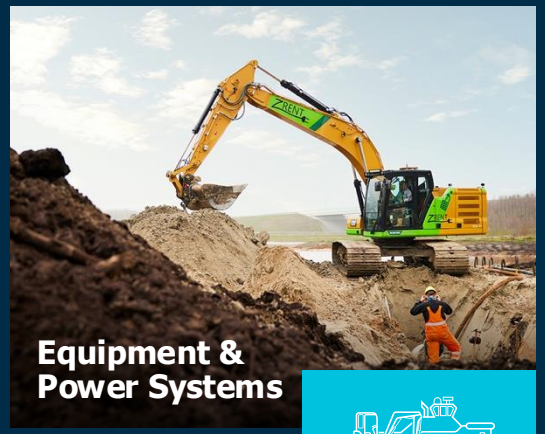


Pon Equipment AS

OFF-ROAD DECARBONIZATION SYMPOSIUM 2024

Håvard Teigen
Engineering Manager





We are a family-multinational with four strong business clusters

LESS IS MORE – ZERO IS THE FUTURE

GLOBAL TRENDS

- GLOBAL ECONOMY
- EMERGING TECHNOLOGY
- DIGITAL
- SUSTAIN-ABILITY

PARIS AGREEMENT

UN SUSTAINABLE DEVELOPMENT GOALS 2030

PON RESPONSE Z-LINE Electrified machines

Z-LINE BY PON EQUIPMENT

SUSTAINABLE SOLUTIONS DELIVERED BY PON EQUIPMENT

Pon Equipment Electric machine development

2016 2018 2019 2021 2022 2023 2024 →

Z-Line project start

First prototype

First 323F Z-Line delivery

First 310 and 320 Z-Line deliveries

Bauma 2022 CAT Electric lineup

First 330 Z-Line delivery

CAT 301.9, 906 Ex-factory

CAT 320, 950 Ex-factory

Z-Line – Available now

Spesification \ Machine	310 Z-Line	320 Z-Line	330 Z-Line
Machine weight	12 500 kg	25 400 kg	33 000 kg
Rated power	50 kW	120 kW	168 kW
Installed battery capasity	150 kWh	300 kWh	470 kWh
Charge power 400VAC (charge time *)	20 - 40 kW (6 - 3 t)	40 - 60 kW (6 – 4t)	60 - 80 kW (6,5 – 4,5 t)
Charge power CCS2 (charge time **)	90 kW (1 h)	190 kW (1 h)	260 kW (1 h)

* Charge time 400V 0-100%
** Charge time CCS 10-80 %

Ex-factory machines from 2024

Energy distribution - Challenge #1

- Charging solutions from Pon Energy Rental
- CCS2 with up to 360 kW
- Battery container w/ integrated charger

- Trailer mounted portable fast charger

❑ **CQ-xs** Quick charging station
❑ 1x360 kW / 2x180 kW

❑ **BQ-s 400** battery
❑ 350 kWh battery
❑ 400 VAC outlet

❑ **CQ-s** Quick charging station with battery storage
❑ Trailer mounted < 3,5 Ton
❑ >200 kWh battery
❑ 200 kW CCS2

❑ **CQ-m** Quick charging station with battery storage
❑ 20’ container
❑ >1000 kWh battery
❑ 1x360 kW + 1x 180 kW CCS2

Worlds 1st full-scale zero emission off-grid site

Dyke between 2 cities :
Tiel & Waardenburg

"Mekante Diek" Consortium

Machine information

Machine Name	Lastest refresh	Current state	Battery percentage	Remaining energy (kWh)	Energy consumption last 5 days (kWh)	Remaining time based on last 5 days (in hours)	Energy consumption last 2 hours (kWh)	Remaining time based on last 2 hours (in hours)
320 Z-Line P006	4/18/2024 9:33:13 AM	STB_LV	90%					
330 Z-Line P001	4/18/2024 1:14:57 PM	Run	23%		63.6	1.4		
330 Z-Line P002	4/18/2024 1:14:46 PM	Run	54%		76.9	2.6		
330 Z-Line P003	4/18/2024 1:15:02 PM	Run	37%		64.7	2.1		
330 Z-Line P004	4/18/2024 12:28:56 PM	STB_LV	65%		60.9	4.0		

Current states

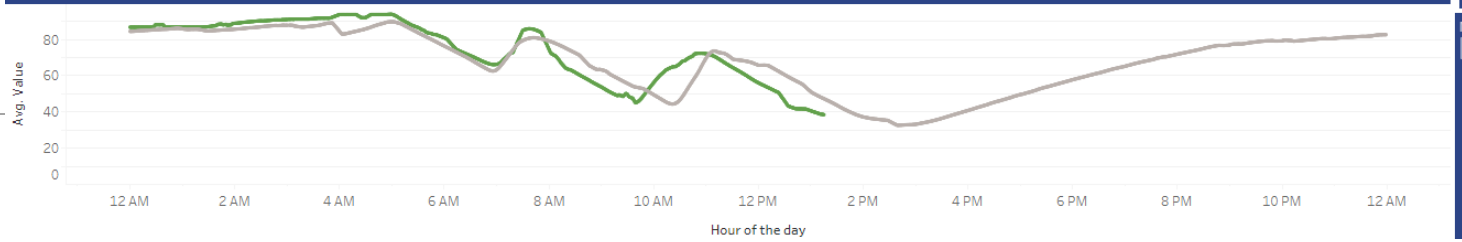
STB_LV: Machine is started but battery not switched on
BATTERY ON: Battery is connected
RUN: Machine is ready to run motor
CABLE RUN: Machine is ready to run motor and is plugged into grid (connected power)
CHARGE: Machine is plugged into grid or fast charger

Battery information

Battery ID	Latest refresh	Battery percentage	Remaining Energy (kWh)
BQ2	4/18/2024 12:34:21 PM	98%	343.0
BQ6	4/18/2024 12:20:50 PM	99%	346.5
BQ7	4/18/2024 6:17:54 AM	61%	213.5
BQ8	4/18/2024 1:07:23 PM	14%	49.0

Location

Machine battery percentage: Today vs. Last 5 days



Machine filter

Machine Name
(All)

Date classification
Last 5 days
Today

Pon Equipment AS

Håvard Teigen
Engineering Manager

havard.teigen@pon-cat.com

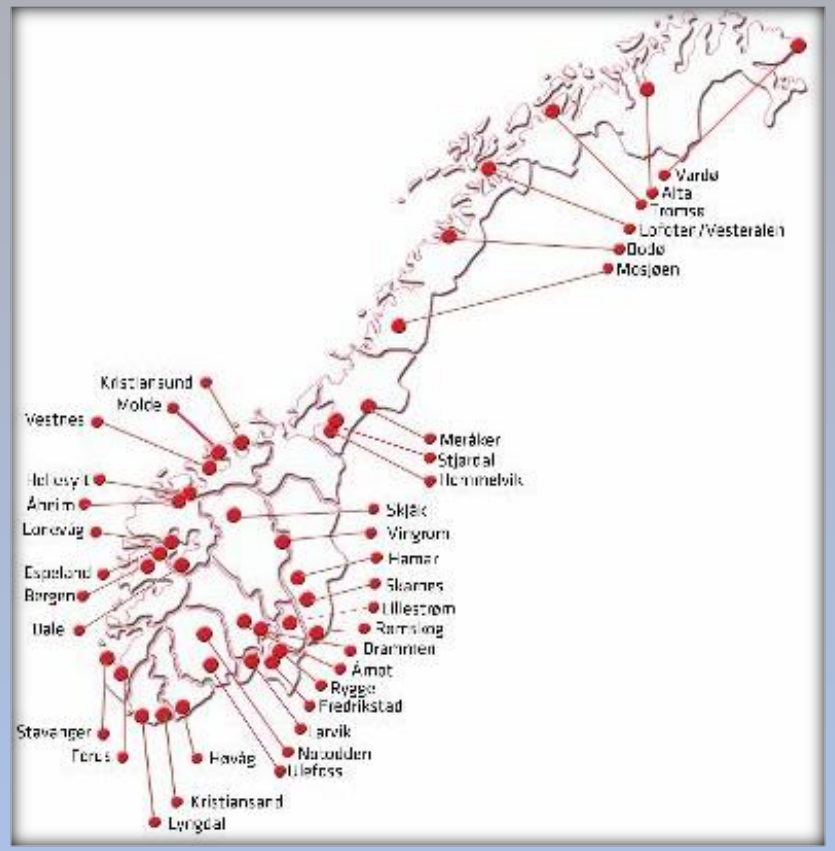
The Norwegian market for zero-emission construction machinery

NASTA ZERON
ZERO EMISSION CONSTRUCTION MACHINERY

ZIRCULAR
NASTA

About Nasta

HITACHI



Reliable solutions

- 1929 Established (Norwegian family-owned company)
- 1982 - Exclusive importer of HITACHI construction machinery in Norway
- Service points and departments, nationwide

KIESEL

Delvator

HITACHI

Reliable solutions

ZIRCULAR NASTA

ZERON NASTA


"Everyone" wants to save the environment,
but no one wants windmills
ZERON
NASTA
ZIRCULAR
NASTA

40% - Industry

In Norway, the construction industry accounts for 15% of total emissions

55% reduction of Co2 by 2030

Klimakur 2030 / Green book

100% of new non-road machines and vehicles will be zero emission in 2030

Support programs: Enova, Klimasats and The research council of Norway

KLIMAKUR 2030

ZIRCULAR NASTA

ZERON NASTA

Electric machines - from 1 to 70 tonnes

3 different solutions:

- **Battery only**
- **Battery+ Cable (Peakshaver+)**
- **Cable only**

CCS2 **MCS**

All our emission-free machines can be run on a cable connection!

ZIRCULAR NASTA

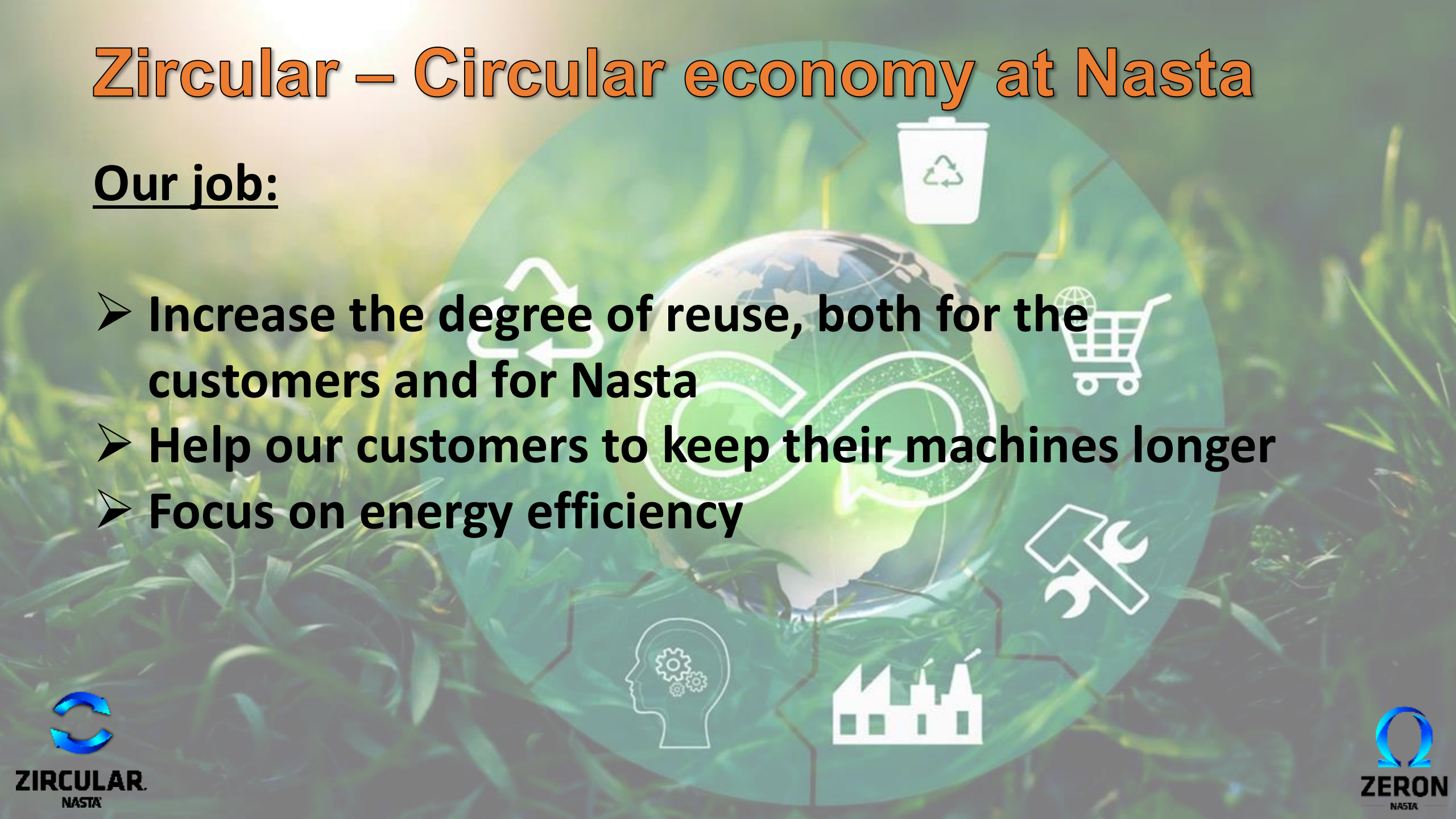
ZERON NASTA

The machine with the lowest carbo footprint, is the machine that will never be built!

ZIRCULAR
NASTA

ZERON
NASTA

Zircular – Circular economy at Nasta

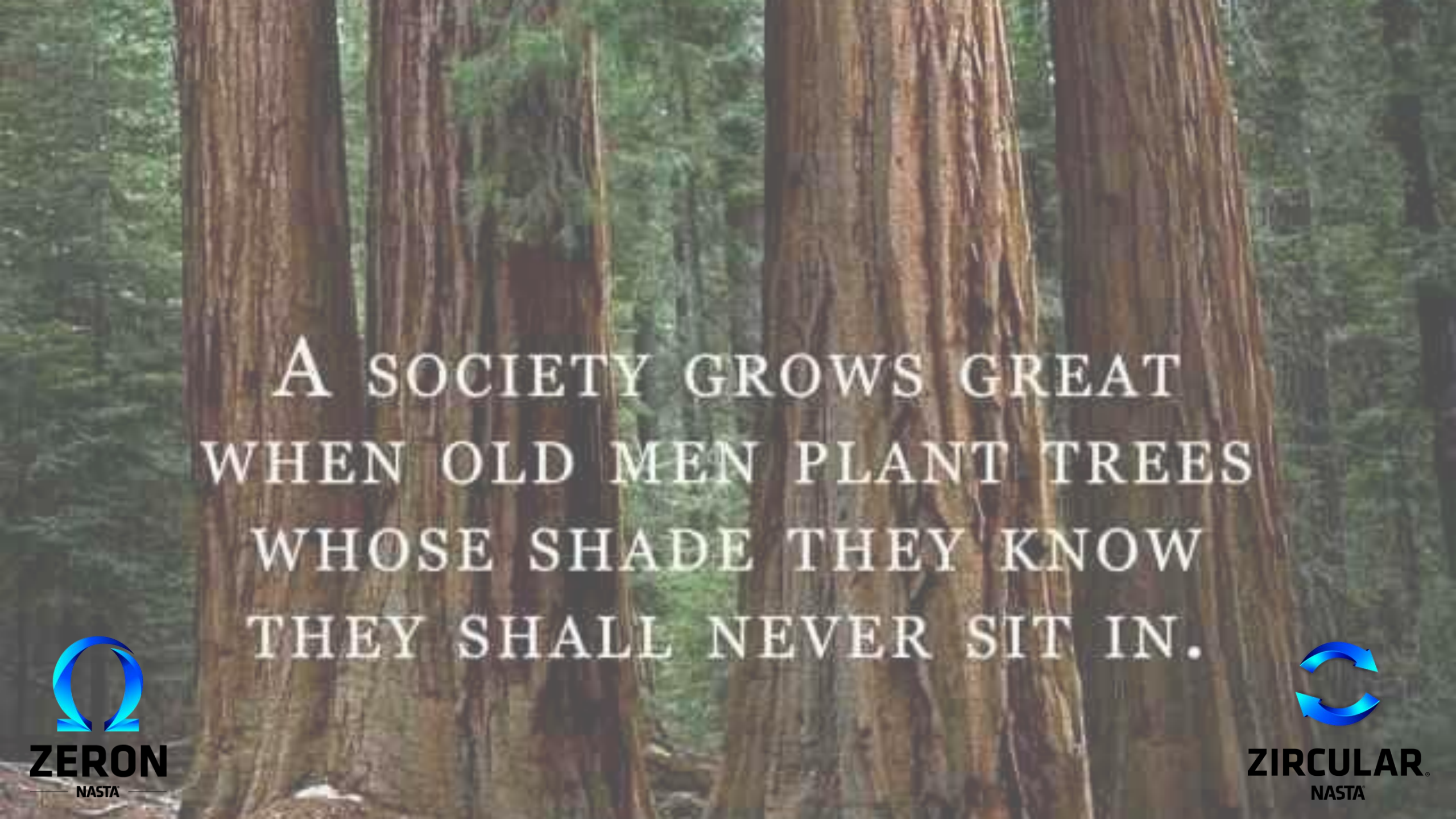


Our job:

- **Increase the degree of reuse, both for the customers and for Nasta**
- **Help our customers to keep their machines longer**
- **Focus on energy efficiency**

ZIRCULAR
NASTA

ZERON
NASTA



ZERON
NASTA

ZIRCULAR
NASTA

Rosendal Maskin AS

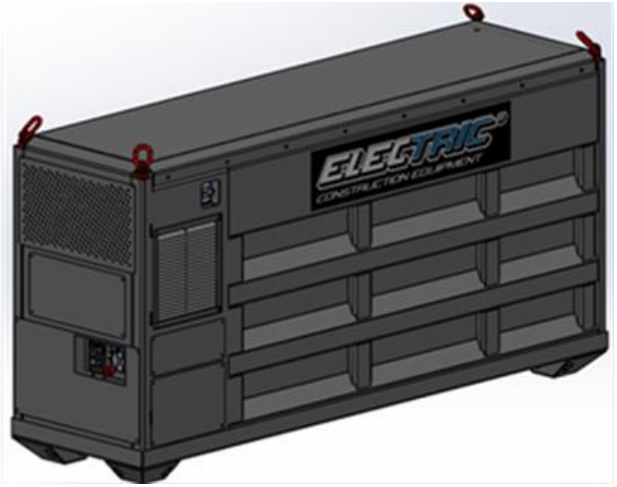
- Import, sale and service of **Develon and JCB** machines, for construction and agriculture in Norway
- Focus on zero emission machies

Battery solution

- **Specifications:**

- Easy to change battery
- Heating and cooling in the battery
- 400 kWh (385 kWh net)
- Weight: 3200kg
- Dimentions(mm): 2512 x 715 x 1275

- Build by ECE in the Netherlands



ECE Electric

- **DX165WR-7 Electric**
  - Battery 400 kWh, net 385 kWh
  - Removable
  - 10-12 hours use without charging
  - AC charge 2* 22 kW
  - DC charge 120 kW
  - 30 machines delivered in Norway

ECE Electric

- **DX355 LC-7 Electric**

  - Battery 2*400 kWh(Net 770 kWh)
  - Removable
  - 10- 12 hours use without charging
  - AC Charge 2* 22 kW
  - DC Charge 120 kW

  - Work full day without charging!

ECE Electric

- **DX555 LC-7 Electric**
  - Battery 3*400 kWh (Net 1155 kWh)
  - Removable battery
  - 8 hours use without charging
  - DC charge 120 kW for each battery
  - World largest electric excavator?

JCB Electric

- **Machines up to 5 ton**

  - **JCB 19 C-1 ETEC**
    - **2 ton mini ex**
  - **JCB 403 E**
    - **2,5 ton wheel loader**
  - **JCB 525-60 E**
    - **6 m telescopic handler**
  - **JCB 1T-2E**
    - **1 ton Mini Dumper**

JCB Hydrogen Combustion Engine

- **Pre-launsh Juni 2024**
- **Commercial launch 2025**

- **55 kW Engine for use in:**
  - **Generator**
  - **Backhoe loader**
  - **Telescopic handler**
  - **++**

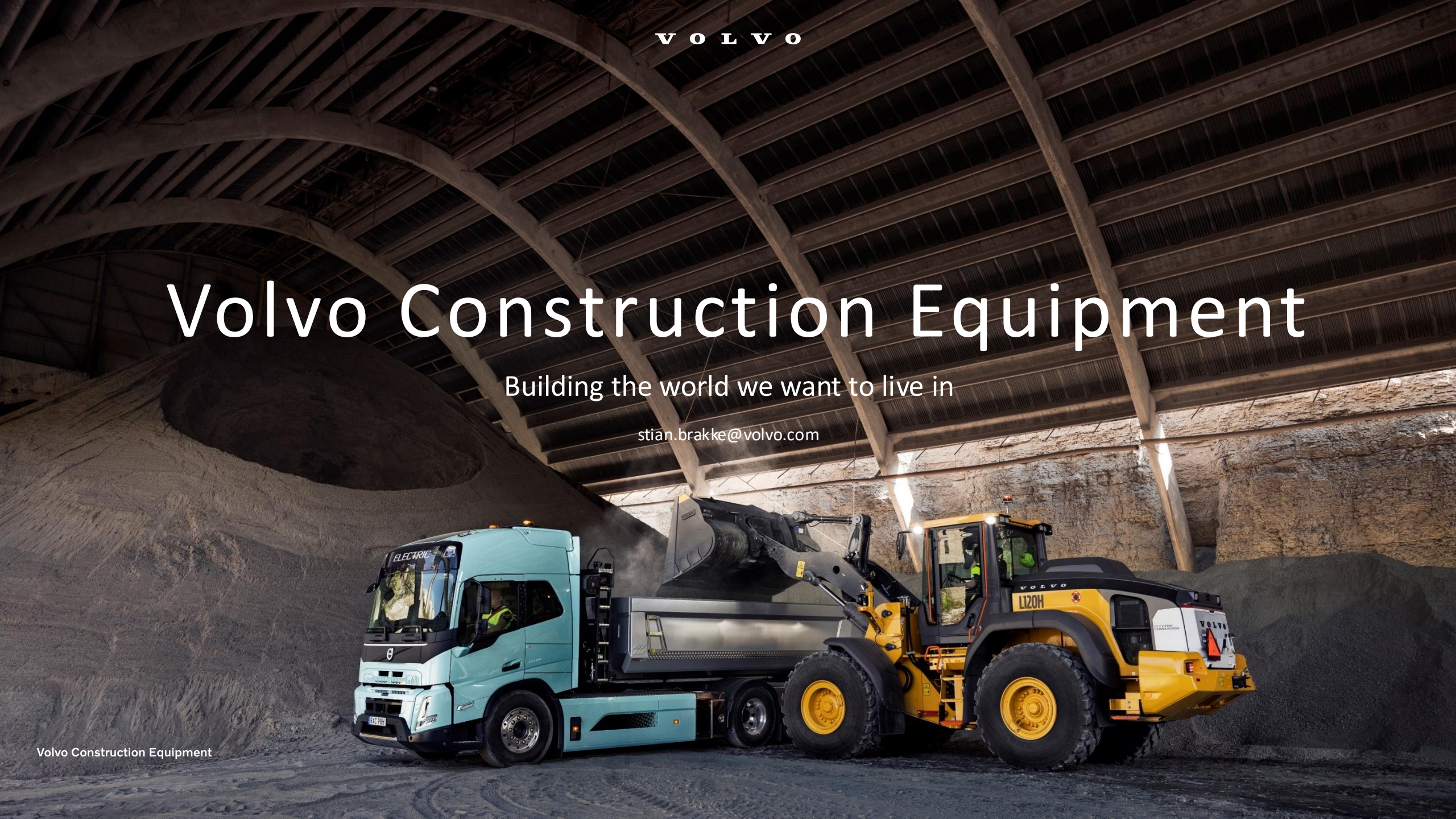
- More info:
- https://www.jcb.com/en-gb/campaigns/hydrogen

VOLVO

Volvo Construction Equipment

Building the world we want to live in

stian.brakke@volvo.com

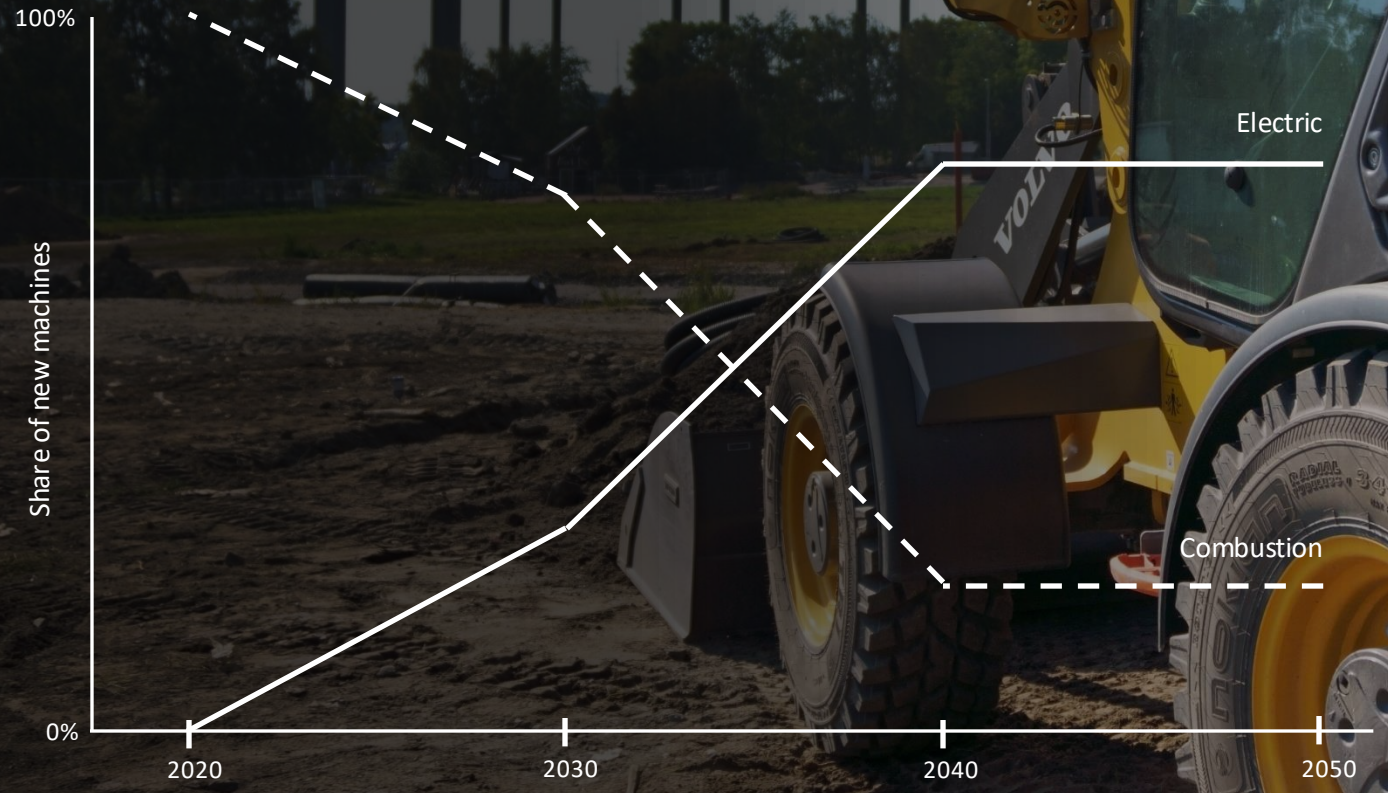


Volvo CE is set to reach net-zero value chain emissions by 2040

SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

Accelerate the sustainable transformation



VOLVO

VOLVO

Available range of electric machines (in Europe)

All trucks. Full electric.

VOLVO

Volvo Energy

BEV’s for underground construction

- Rolf Blomberg
- Underground Business Manager North Europe


Epiroc
ACCELERATE
THE TRANSFORMATION
The world needs metals and minerals for the energy transition. We also need cities that can cope with a growing population in a sustainable way. To succeed we need to speed up the shift towards more sustainable mining and construction industries. We at Epiroc accelerate this transformation.

Epiroc in numbers

Ca 18 000 Employees*

Global presence
Customers in more than 150 countries

Production in Örebro Sweden, Nanjing China and Nashik India

Annual revenues of MSEK 60 343*

*2023

Epiroc 2030 goals for People and Planet

Safe, healthy, ethical

Safety and health

- No work-related injuries

Balanced workforce

- Double the number of women in operational roles

Walk the talk

- Have all employees and business partners comply with our Code of Conduct
- Responsible Sales Assessment Process implemented

Halve CO_2e emissions

Operations

- *Halve CO_2e emissions in operations**
- 90% renewable energy in own operations

Transport

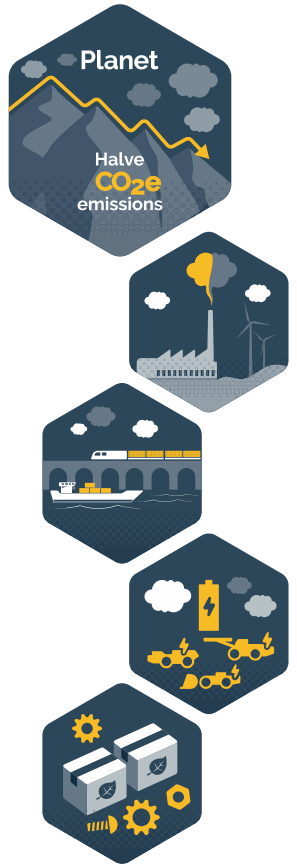
- Halve CO_2e emissions from transport

Products

- Offer a full range of emissions-free products
- *Halve CO_2e emissions from machines sold**

Suppliers

- Require 50% reduction of CO_2e emissions from relevant suppliers



*Approved by the Science Based Targets Initiative (SBTi).

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

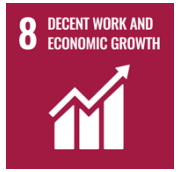
The UN Sustainable Development Goals (SDGs)

We can make the greatest difference in nine of the SDG goals and their sub targets through our 2030 goals. Here is how:

1. We aim to contribute to ending all forms of discrimination against women. We strive to increase the proportion of women employees and managers and have set a target for 2030 to double the number of women in operational roles. The Inclusion and Diversity Board is one example of actions.

1-2. We aim to strengthen local communities in improving water and sanitation management through our support of 'Water for All', an initiative founded by our employees. We also reduce water consumption in operations, particularly in water-stressed areas. Water-well drill rigs are part of our product offering.

2-3. We aim to increase the share of renewable energy and limit the use of energy overall in our operations. We launched an energy-efficiency program to increase the share. We are developing more efficient products and battery-electric equipment that support low-carbon alternatives.



2, 5, 7-8. We aim to contribute to higher levels of economic productivity and decent job creation. By providing safe and decent working conditions, a core component of our Code of Conduct, we have the best opportunity to be a company contributing to sustainable growth.

4-5. We aim to contribute to upgrading infrastructure and retrofitting industries to make them more sustainable, growing the market for clean and environmentally sound technologies with high--productivity products and services.

2, 4-6. We use natural resources efficiently and we aim to generate less waste through elimination, reduction, recycling and reuse in our operations. We reduce the use of fossil fuels and increase renewable energy in operations. We provide tools for deconstruction and recycling.

2. We aim to halve our CO_2e emissions in operations, transport, for relevant suppliers and in the use phase of our products to help tackle climate change. Our energy efficient and low-emissions solutions support our customers in their efforts to achieve their CO_2e emissions targets and meet climate change.

2-3, 5. We aim to contribute to reducing corruption in all forms and our Code of Conduct (CoC) and Business Partner Code of Conduct state zero tolerance and we do not allow any form of modern slavery. Internal mandatory CoC trainings and a responsible sales assessment process are in place.

16-17. We collaborate in different industry networks, partnerships and alliances. By mobilizing and sharing our knowledge, expertise, technology and resources we support the achievement of the Sustainable Development Goals in countries where we operate.


+10%
Productivity
-70%
Energy consumption
- 70%
Heat
-100%
DPMs
-30%
Ventilation development
- 30%
Preventative maintenance costs
Epiroc

Epiroc’s battery system

Sub-pack

Cell

Module

Battery pack

Scooptram ST14 SG

Overview

Tramming capacity
14 000 kg

Drift size
4.5 x 4.5 m

Speed
33 km/h

Battery capacity
300 kWh
CCS 2.0 charging interface

Battery autonomy
~ 3.8 hours

Optimization
Full RCS with telematics
Automation-ready

Perfect match

Minetruck MT42 SG

Payload capacity
42 000 kg

Drift size
5x5m

Speed
19 km/h

Battery capacity
375 kWh

Battery autonomy
~ 4.5 hours

Optimization
Full RCS with telematics


BOLIDEN
Epiroc
ABB
Collaborating for a sustainable future in mining

Epiroc

United. Inspired.

Performance unites us, innovation inspires us,
and commitment drives us to keep moving forward.
Count on Epiroc to deliver the solutions you need
to succeed today and the technology to lead tomorrow.

epiroc.com

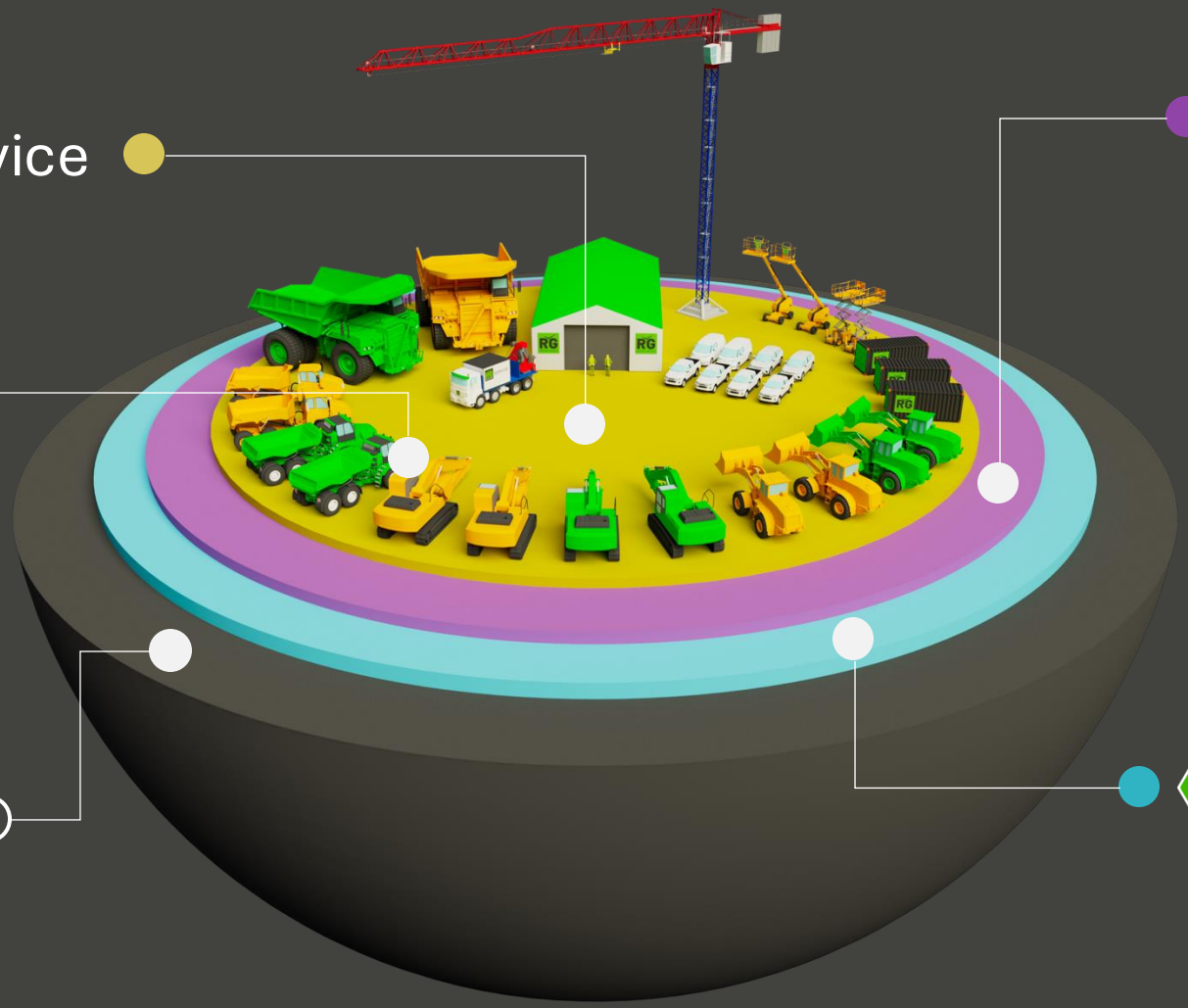
Epiroc


Epiroc

Rental Group

Erik Sollerud

Providing zero-emission solutions



Service

Logistics

Multibrand Fleet

Expertise / Consulting

IDA Digitalizing

TRUST • KNOWLEDGE • INNOVATION

/ One step ahead /

Zero-emission Fleet

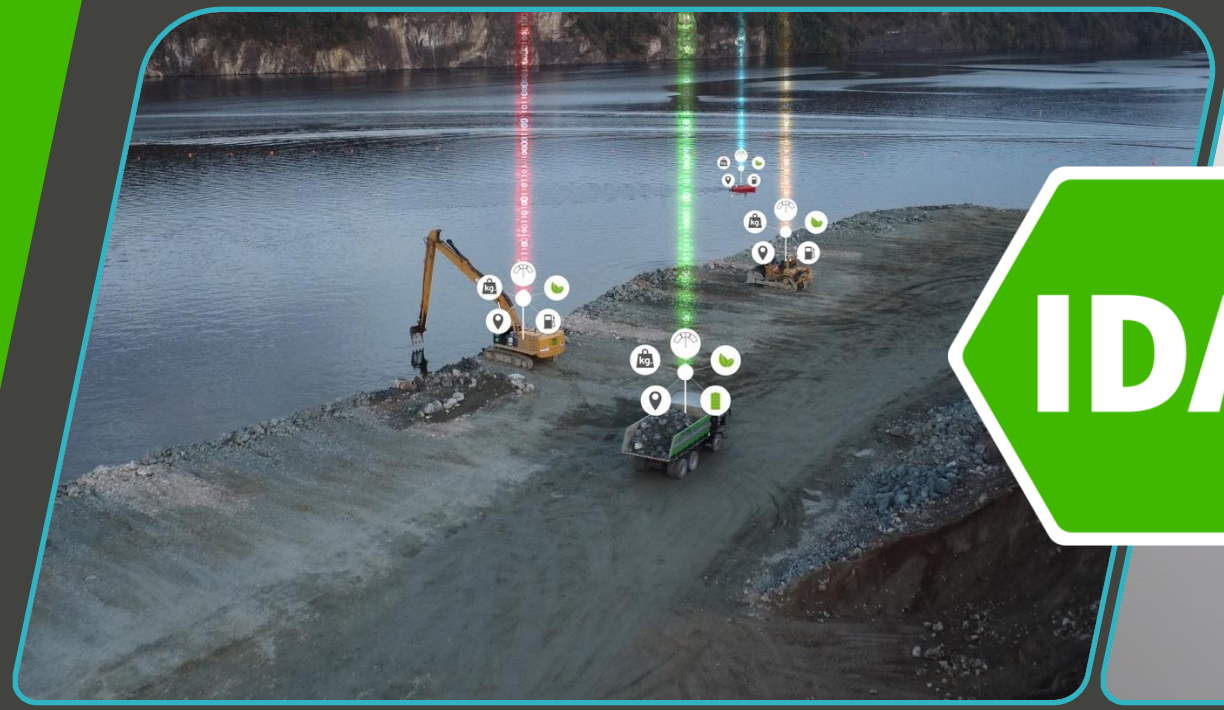
- We tailor our fleet after best available technology for our customers different applications

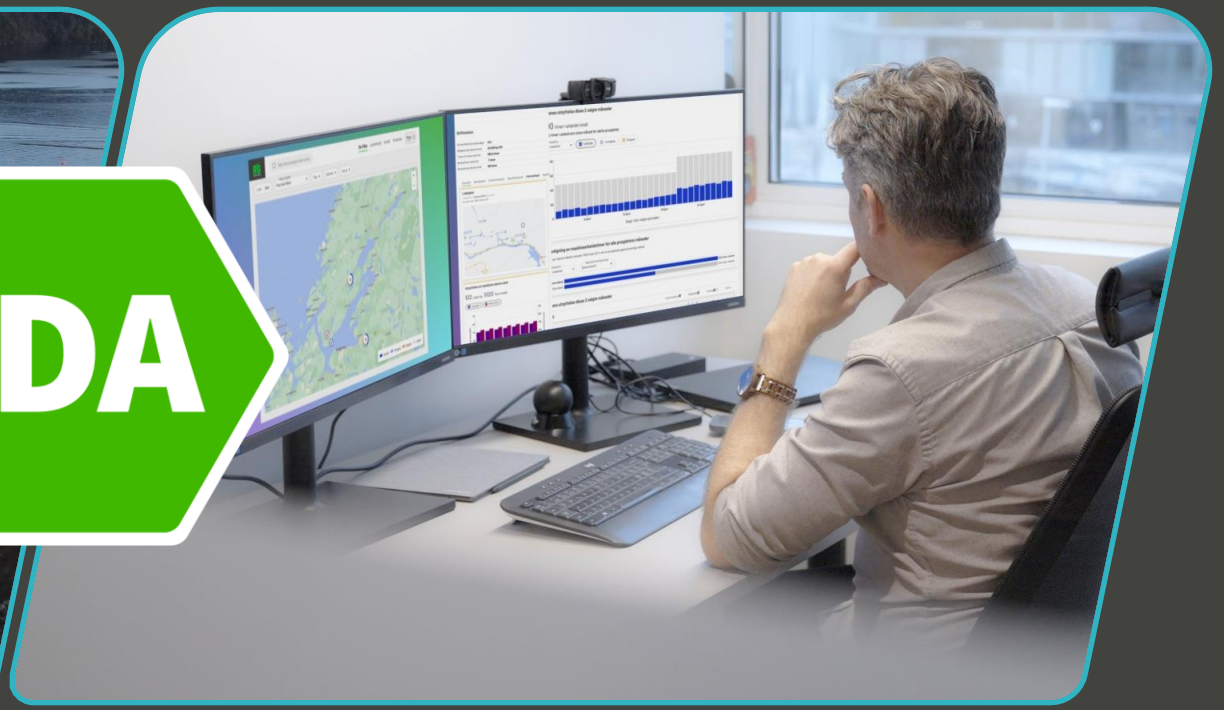
New Milestone in Zero-emission Solutions in urban areas enabling all types of projects to be electrified

Reducing CO2 emissions - We focus on heavy machines combined with energy solutions securing efficient projects

In right applications electrification can be energy neutral

Digitalizing





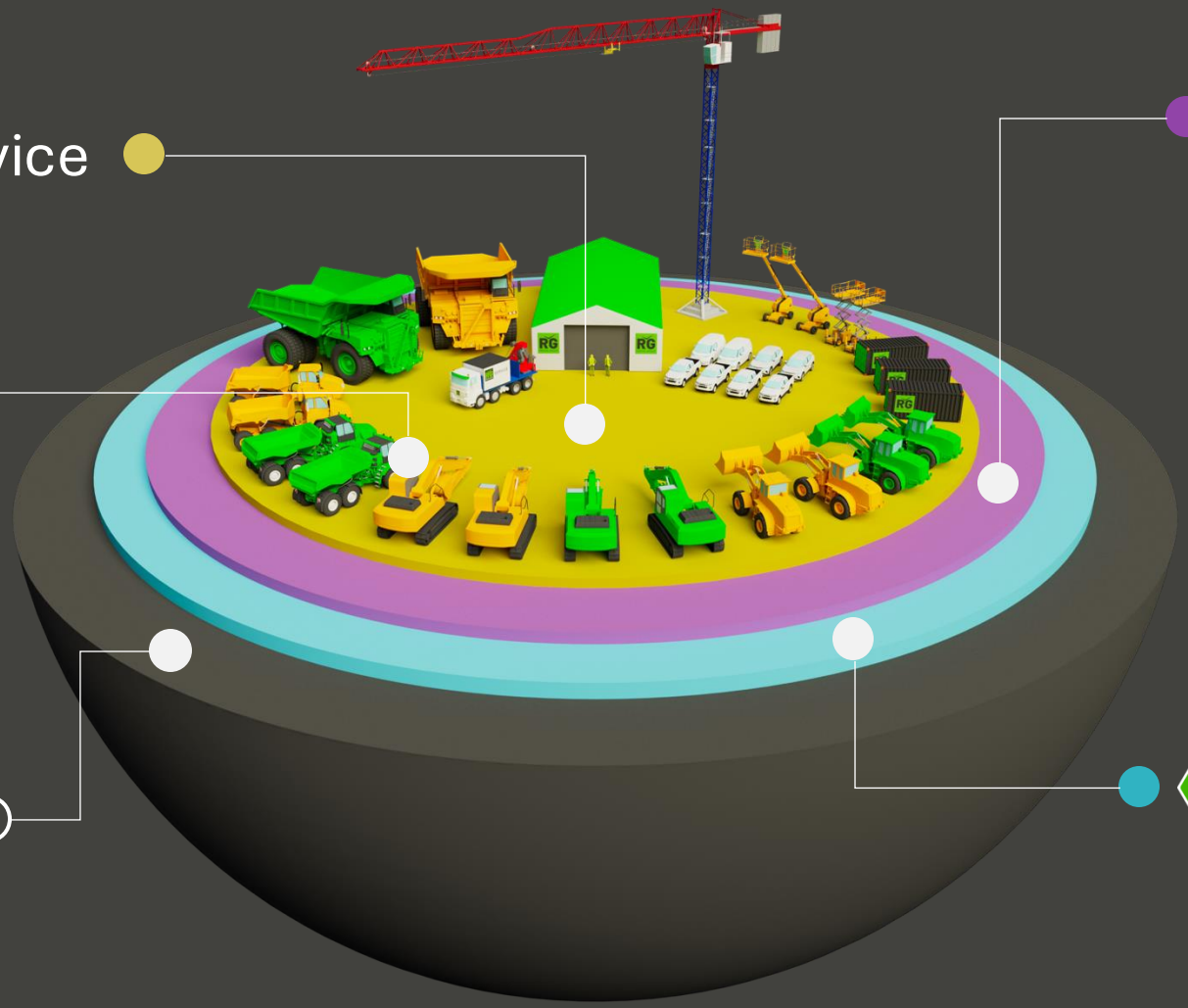
IDA

API and Customer Portal

Insights into machinery fleet emissions

Online CSRD reporting capabilities

Providing zero-emission solutions



Service

Logistics

Multibrand Fleet

Expertise / Consulting

IDA Digitalizing

TRUST • KNOWLEDGE • INNOVATION

/ One step ahead /

Thank you!

Erik Sollerud

CEO

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m: +47 917 44 696

Accelerating the market of ZE construction equipment

Incentives

- Investment support
- Retrofit financing
- Procurement / tendering benefits

Public Procurement

- Rewarding direct emission reductions
- Requirements for direct emission reductions
- Zero-emission requirement in a predictable timeframe

Legislation

- Requirements for emission reduction in public and private construction projects
- Zero-emission requirement in a predictable timeframe

Thank you for your attention!