

# Decarbonising society with digital innovation

Asset electrification as a service

**Rahul Madhavan**

Hitachi ZeroCarbon

-  Why decarbonisation and Hitachi's focus
-  How is Hitachi addressing this change
-  Lessons learnt from projects executed

## Why De-carbonization & Hitachi's focus

# Need for a Greener Economy



- Business as usual is no more a possibility else we will need more earths to live in if we continue in the same model
- Climate change affects everything from geopolitics to economies to migration. It shapes cities, life expectancies . And the world we leave for the generations ahead
- EU aims to be climate –neutral by 2050. Economy with net zero green house emissions
  - Forcing companies to act and change
  - Decarbonization is no more a choice but a must do for organizations
- And to top it all there is a Positive economic case for decarbonisation already today. Lesser fossil fuel usage is resulting in lower **total cost of ownership**. Ex: Higher energy efficiency of electric vehicles, a lower lifetime maintenance cost, and continuously decreasing battery prices.

## Hitachi's Environmental Vision

Hitachi's environmental vision is to pass on a prosperous planet to future generations. Actively contributing to a net zero society is key to achieving that vision.

### Our Targets

**100%** Carbon neutral from our own operations by 2030

**100%** Carbon neutral across our entire value chain by 2050



“

Our ambition is to become a climate change innovator by helping governments, cities and companies to cut carbon. The breadth of Hitachi allows us to combine information technology, operational know how and physical products to tackle climate change - and ultimately improve people's quality of life. We are applying that same innovation to our own business to contribute to a Net Zero society.

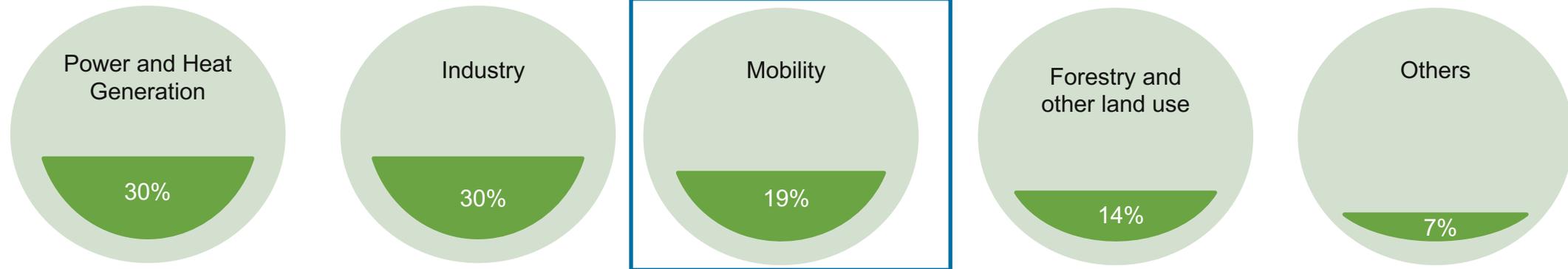
### Alistair Dormer

Chief Environmental Officer and Executive Vice President



# How are we addressing this challenge

## Main causes for CO2 emissions



- Automotive transportation is going through a revolution, advanced electronics is enabling electrification of complex machines and increasing automation, safety, comfort and convenience.

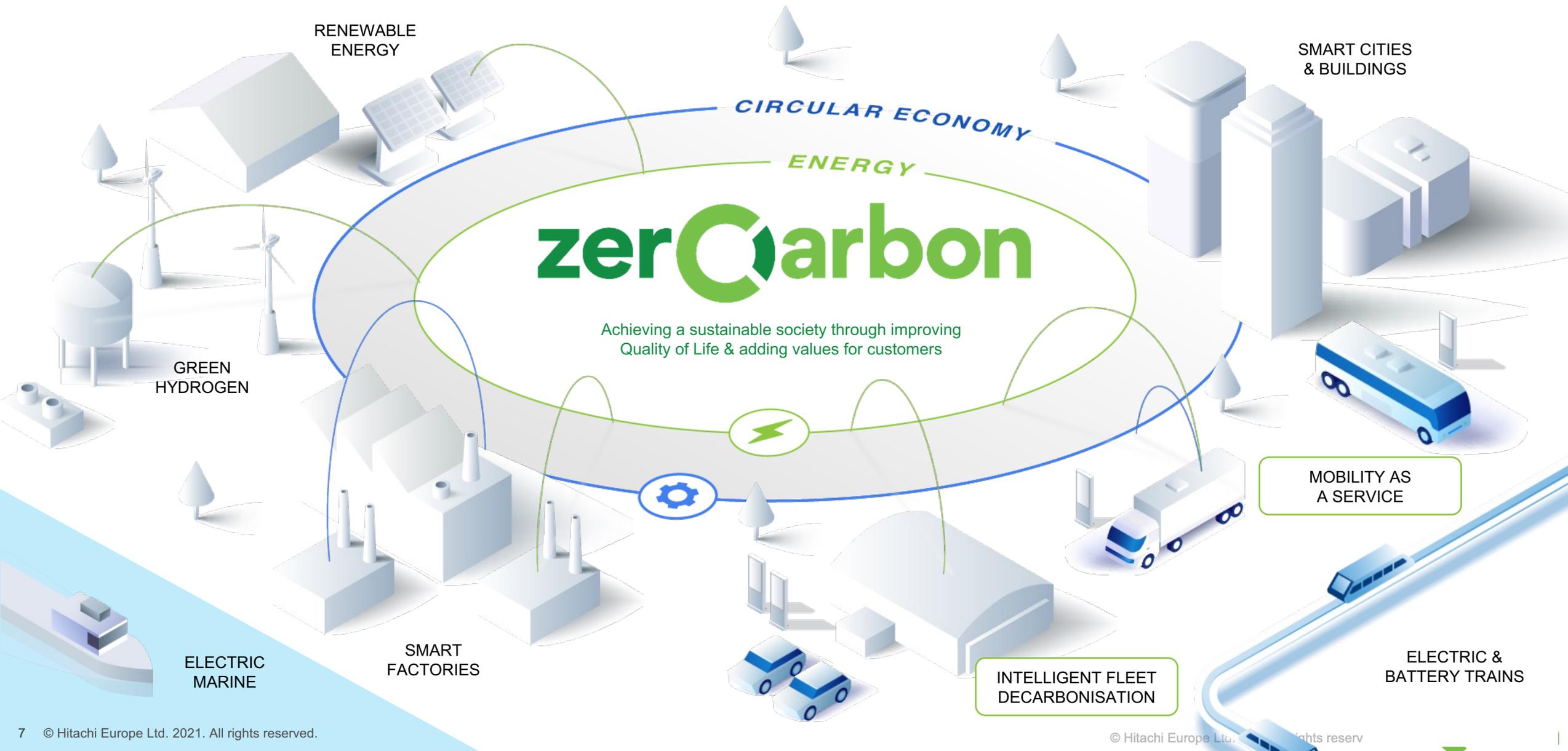


- Mobility is a core business priority for Hitachi

**Hitachi – a \$100bn innovator**

**803** Companies  
**295,000+** people  
**\$3bn** R&D

# How ZeroCarbon builds on this legacy of incubation and innovation



## How is Hitachi Addressing this change

# Step1 - Identify complexity are we solving

Utilization of EV & Infrastructure

Operations  
Maintenance  
Driver  
Financing

Battery as a service

Flexibility at the optimal cost

Grid optimization

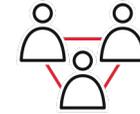
Renewable Energy

BESS Energy Arbitrage

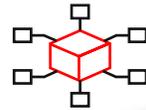
2<sup>nd</sup> Party charging

V2G/V2B

**DATA**



**RELATIONSHIPS**



**COST OPTIMIZATION**



**TECHNOLOGY**



**ENERGY**

**Seamless transition to Zero emission mobility**

**Software and Digitalization**

Governments

Vehicle OEM Infrastructure OEM

Civil works

Technology companies

Regulation

Battery

Charging

Energy

Range

Telematics

## **Paradigm shift:**

### **from vehicle to system procurement.**

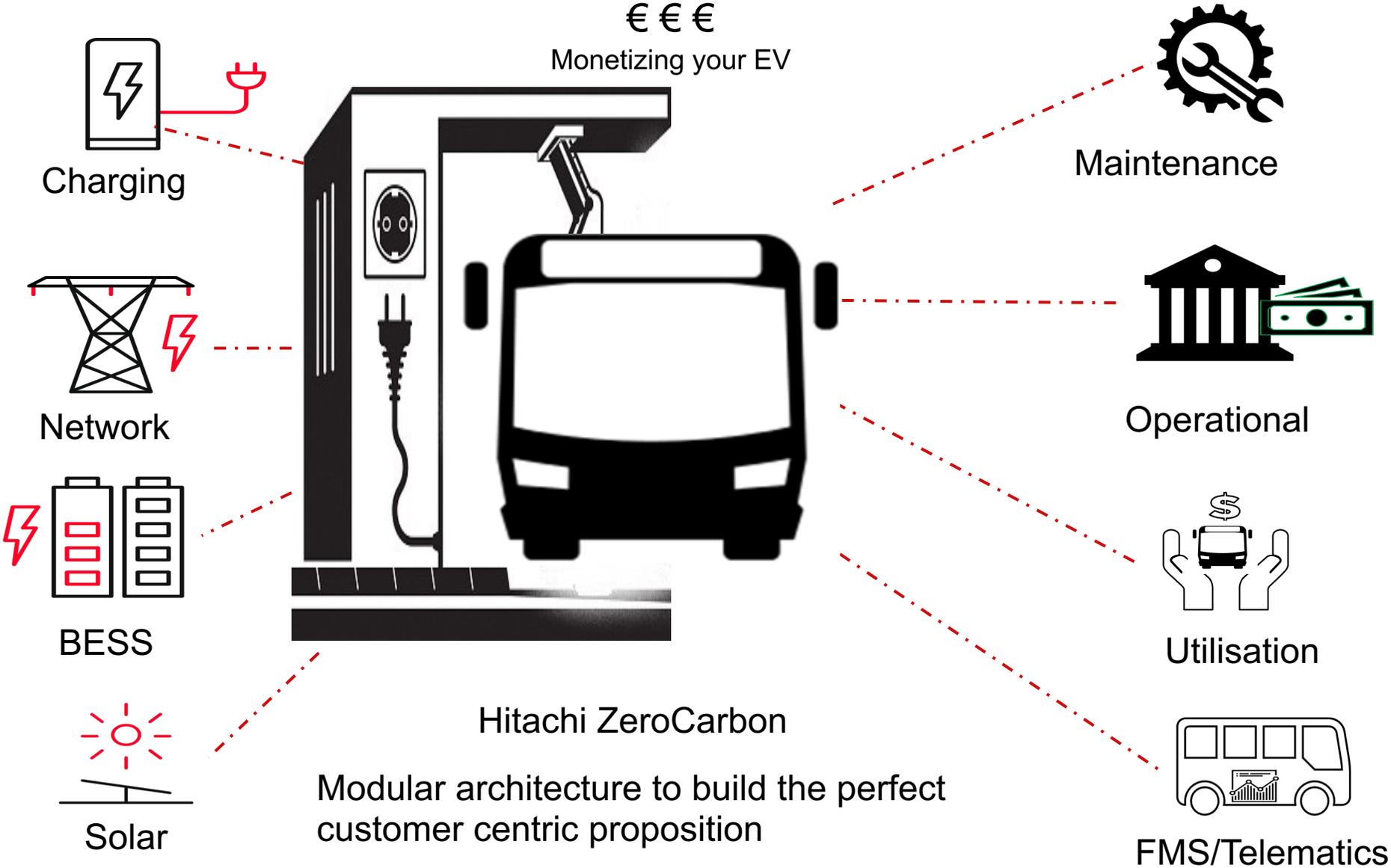
Procuring electric machines and fleet implies a paradigm shift to consider the procurement of a whole system, i.e. vehicle – infrastructure – digital services and operation, rather than the vehicle in isolation.

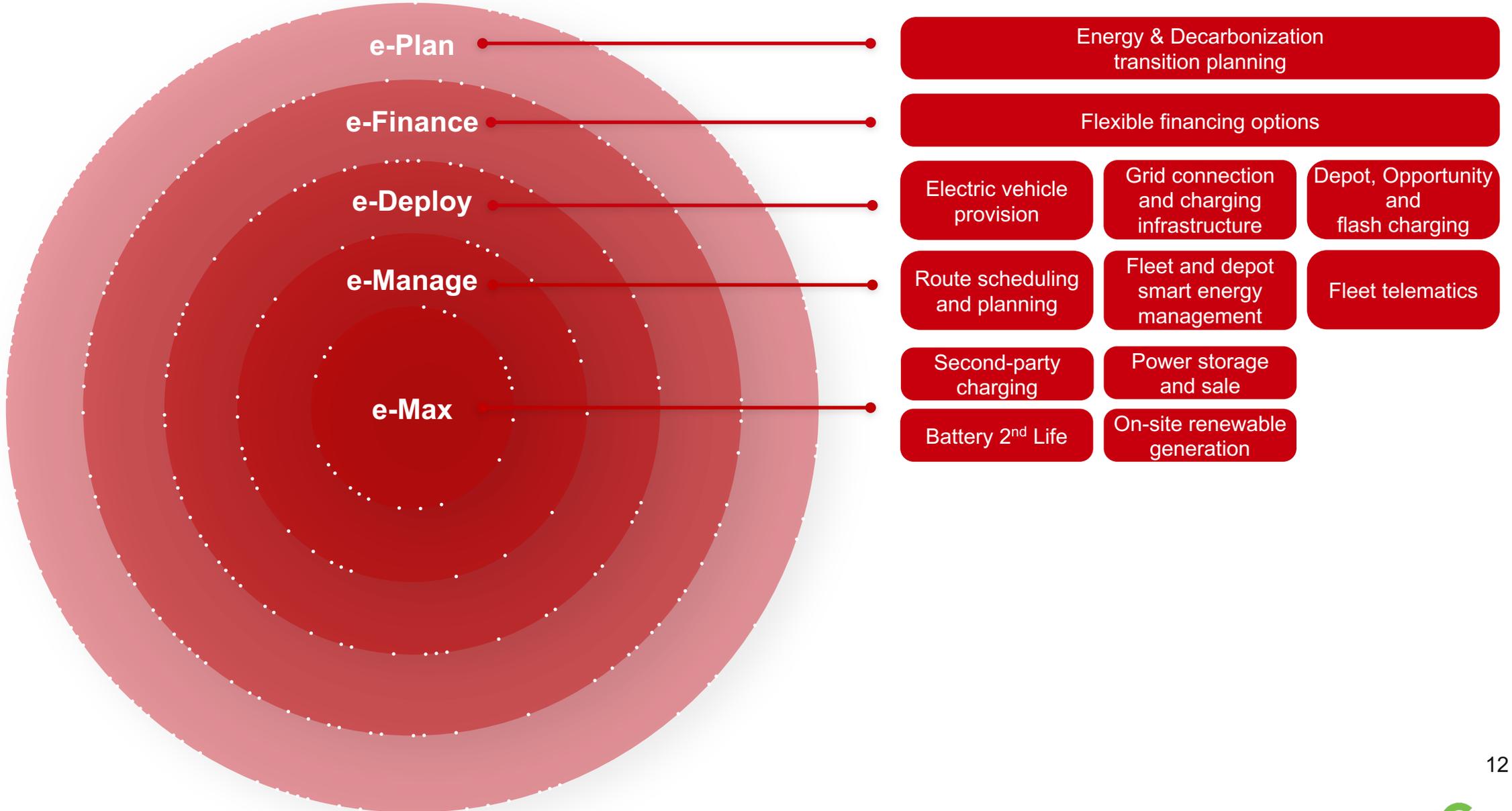
How do we **support and enable** Fleet operators **through and beyond** the transition to Net Zero

Address all the **operational, financial and technological** risks and uncertainties

Ensure depots, fleet and infrastructure is managed in an efficient and **optimized total cost of operation**

# Step2 – Provide customers with a holistic solution with TCO at its core





# How do we enable the vision for our customers

What **technology** is needed?



Vehicles and battery



Charging and grid connection



Smart controls and optimisation

How should we prepare our **people**?



Changes to roles and responsibilities



Changes to the way the fleet is operated

How should we adapt our **processes**?



Scheduling and Planning



Asset maintenance



Legal and compliance

What is the **business case**?



CAPEX and OPEX investment and return



New liabilities: taxes and tolls



New revenue streams

How can the **transition be managed**?

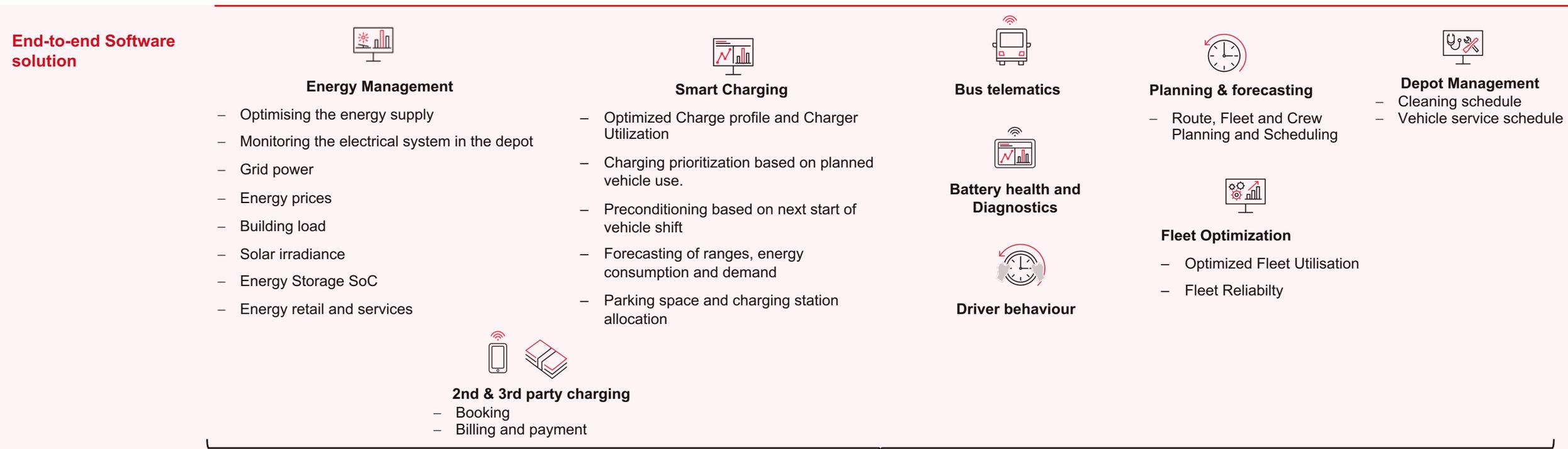
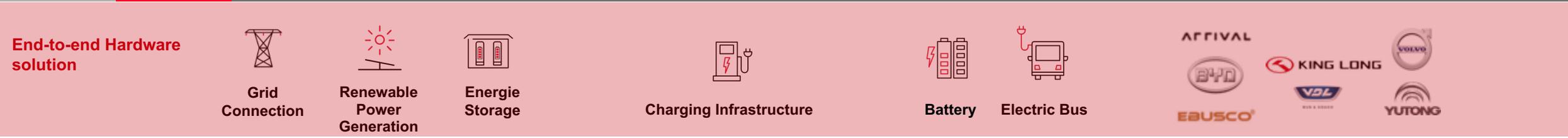


Data analytics and strategic insights



Project management

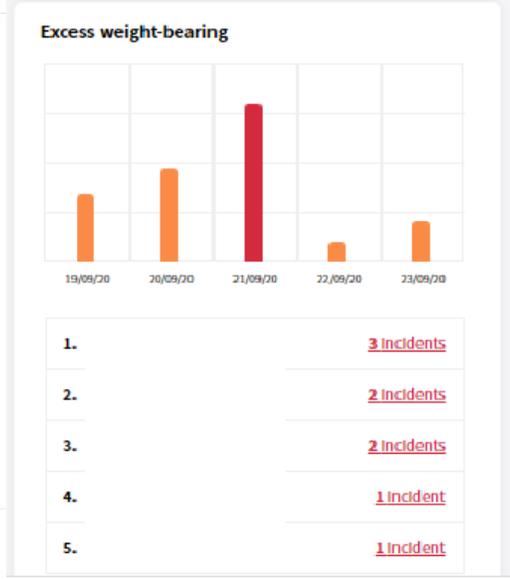
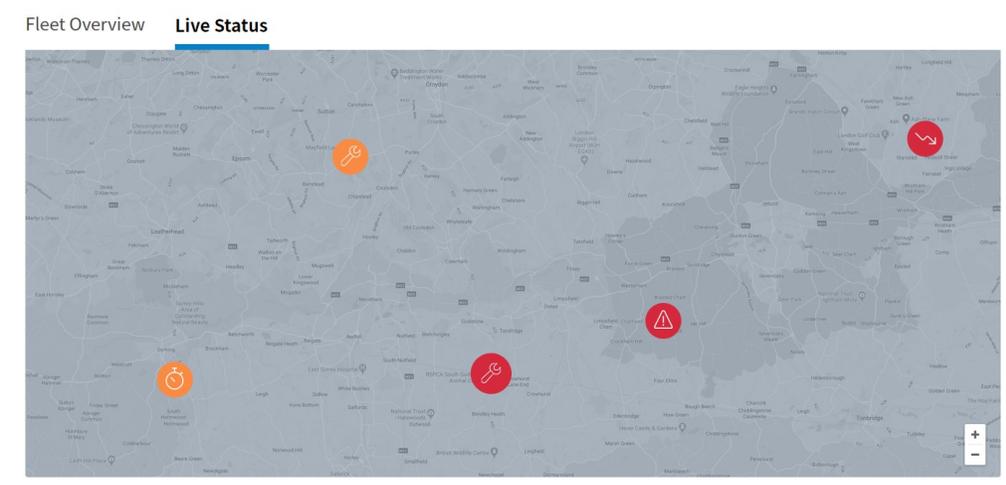
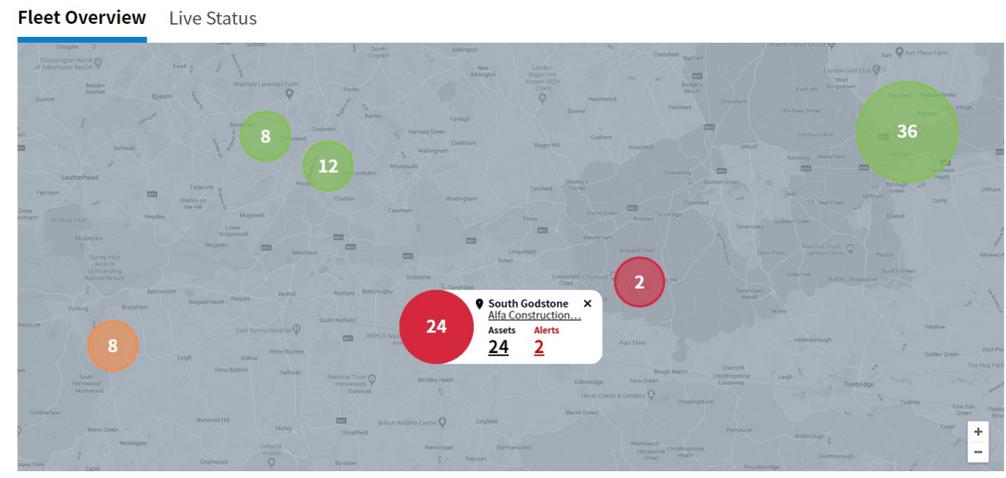
# Step 3 – Digital Innovation



Hitachi Lumada ZeroCarbon Cloud



Fleet Downtime **45%** ↑ 4%    Fleet Utilisation **76%** ↓ 4%    Compliance Incidents **45** ↑ 26%    Available Assets **14** ↓ 4%    Maintenance Alerts **12** ↑ 0%



← All Assets



Machine ID:  
**B201807H1**

Ending

Availability: Assigned  
Customer: [Alfa Construction Ltd](#)  
Contract: 10/09/19 - 29/09/20

Make:	Hitachi
Model:	EH1700-3
Year:	2015
Odometer:	12,123
Weight:	68137 Kg
Payload capacity:	104 tons
Engine make:	Cummings
Engine model:	QST 30
Power:	1050 HP
Av costs per day:	£145

Current Location Suggested Relocation



Alerts **5** Compliance **87%** ↓ 4% Vehicle Health **70%** ↓ 8% Next Maintenance **07/03/21**

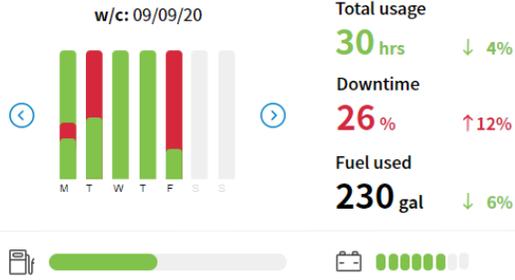
### Alerts

15/09/20  
**Loud clunking noise while driving.**  
**Engine hot.**

- ⚠ High STG 3 rubber level
- ⚠ Low engine oil pressure
- ⚠ Battery warning light
- ⚠ Electrical heater fault

### Usage

Export data



### Maintenance

#### History

Date	Description	Cost
10/09/20	Planned maintenance	£1,998
05/08/20	Replace shock absorbers	£1,850
04/06/20	Service and replace brakes	£1,590
31/03/20	Planned maintenance	£1,743
06/12/19	Check gearbox noise	£1,487
24/09/19	Replace n/s wing mirror	£1,690

Next planned maintenance:  
07/03/21

Schedule:  
• Oil change  
• New tyres front  
• Brake fluid change  
• Service (minor)

Estimate:  
**£1,659**

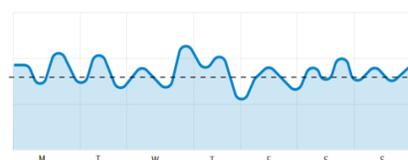
Status:  
✔ Booked

### Diagnostics

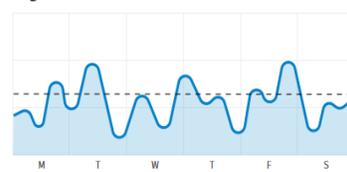
Engine

Compliance Incidents

#### Acceleration



#### Engine Idle



#### Coolant levels (last 24hrs)



The system provides a drilldown into the asset where you can view all asset level details including vehicle diagnostics

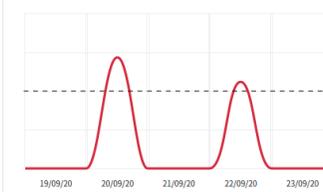
### Diagnostics

Engine

Compliance Incidents

#### Over-revving

2 Incidents



#### Left idling

2 Incidents



See all incidents

### Next 30 days maintenance:

⚠ High priority:

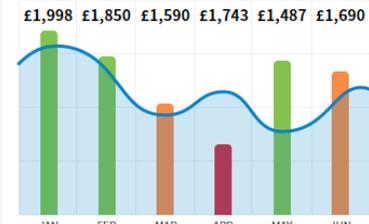
Reported: 15/09/20  
**Loud clunking noise while driving.**  
**Engine hot.**

⚠ Medium priority:

Reported: 28/08/20  
**Battery warning light came on.**

### Costs vs utilisation

6 months 12 months



### Fleet Health



Total: **100** assets  
Critical: **6** machines  
Attention: **4** machines

# Chargepoint & Energy Management

Through integration with the energy Grid API our energy dashboard provides generation breakdown both live and forecasted data.

Where available, view the carbon intensity forecast and compare it with actual, allowing informed decisions to be made around vehicle charging.

View the ca

**Start Session**  
Hit the Submit button to start the session.  
**Good News!**  
This chargepoint supports "Time Of Use" Tariffs. This means that it can take advantage of low priced energy and charge your vehicle when energy is cheap.  
**Vehicle:**  
Which vehicle are you going to charge?  
Ebusco Model 3  
**Dwell Time (Hours):**  
How long will you be plugged into this chargepoint? The longer you stay, the more savings you can make.  
8 Hours  
**Approximate Battery Level (%):**  
What is the approximate battery level of your vehicle at present?  
20%  
**Target Battery Level (%):**  
What is the approximate battery level required upon departure?  
100%  
**SUBMIT**

Manage the charging of individual vehicles, groups and fleets by creating schedules that consider routines such as departure time, target state of charge and, through integration with telematics providers, live vehicle state of charge.

**Lessons Learnt from projects executed**



# Key Challenges to address while taking on the digital journey



## Disconnected Environment and businesses

- Organisations don't want to move outside comfort zones
- Machines are not connected
- Every mode of transport functions differently
- Data challenges with legacy systems



## Data sits in Silos

- Data sits in a **highly heterogeneous environment**, a large variety of machine types and OEMs that speak proprietary protocols (**OT Data Silos**)
- **Data from different departments** across telematics, asset information, planning, repair shops, to insurance sits in its own databases (**IT Data Silos**)



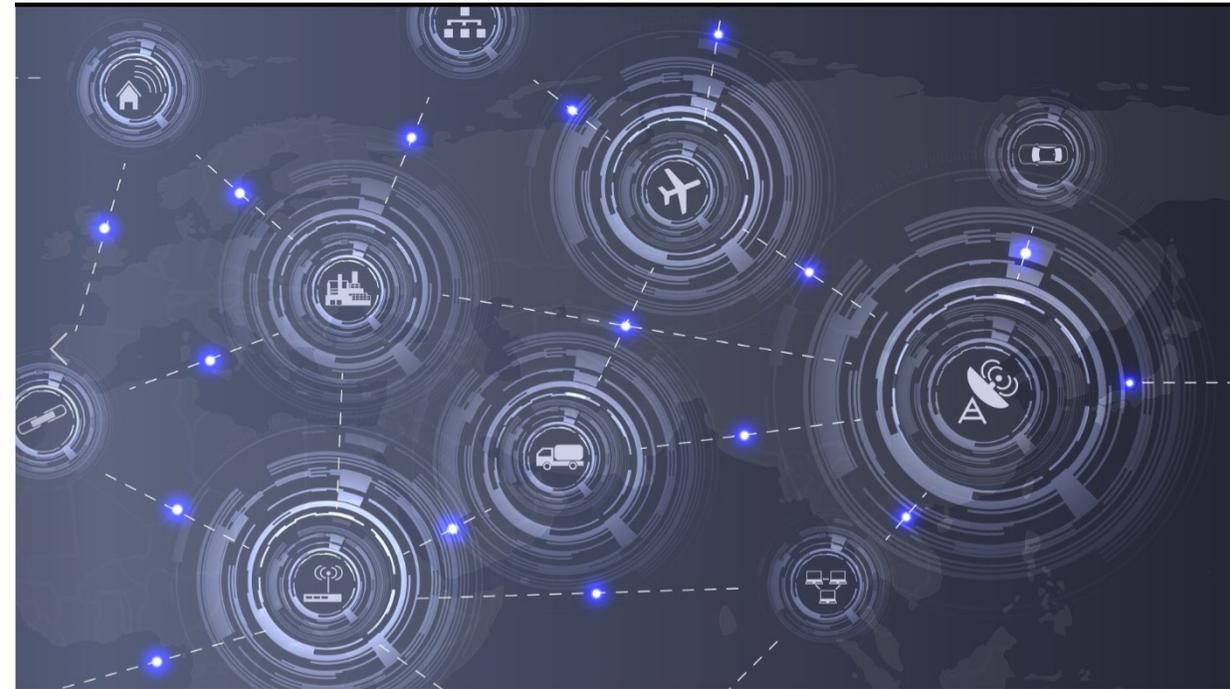
## Difficult to Calculate ROI

- Most IoT projects failed due to **lack of understanding of OT business drivers** and focus too much on technologies
- **88%** of survey respondents list “**Uncertain ROI**” as the largest only non-technical barrier



## Business Transformational challenge

- People don't like changes
- How do we ensure technology adoption and embrace



*Cross pollination of knowledge between various Hitachi Business is our key to a success solution*

*Hitachi Social Innovation is*

# POWERING GOOD

