



# Accelerating the Transition to Biofuels

March 3, 2022

Media Briefing



Emerson Virtual Media Briefing:  
**Accelerating the Transition to Biofuels**



**Marcelo Carugo**

Vice President,  
Global Refining & Chemical Programs  
Emerson Automation Solutions

**How Policy & Sustainability Targets  
are Driving Biofuels Demand**



**Kenneth Lim**

Director,  
Singapore Refinery  
Neste Corporation

**Neste's Leadership in  
Biofuels Production**



**Julie Valentine**

Director, Refining & Sustainability  
Measurement Solutions  
Emerson Automation Solutions

**How Advanced Automation  
Overcomes Production Challenges**

# Logistics

## RECORDING

We're recording the session



## CHAT

Submit questions through the chat at any time

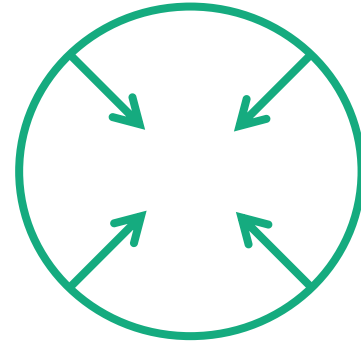


## Q&A

When Q&A starts, I'll unmute you to ask your question

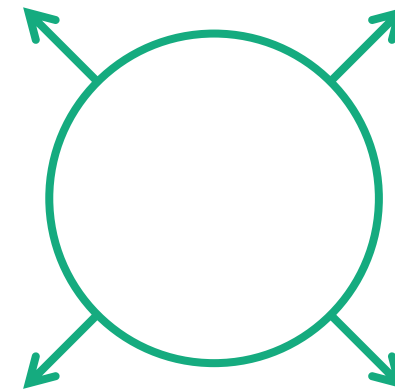
# Emerson's Environmental Sustainability Framework

## Greening OF



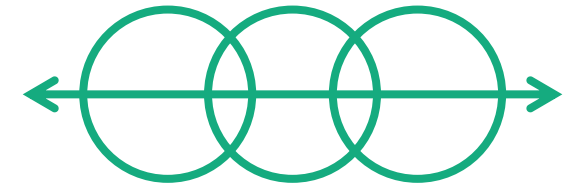
*Improving Emerson's environmental sustainability performance*

## Greening BY



*Enabling our customers' decarbonization and sustainability journeys*


## Greening WITH



*Fostering collaboration among stakeholders*

# Four “Greening By” Strategies for Environmental Sustainability

## 1 ENERGY SOURCE DECARBONIZATION

 **LOW-CARBON POWER (SOLAR, WIND, NUCLEAR, HYDRO)**

 **LOW-CARBON FUELS (BIOFUELS, LNG)**

 **HYDROGEN & HYDROGEN-BASED FUELS**

## 2 EMISSIONS MANAGEMENT

 **EMISSIONS MONITORING & CONTROL**

 **CARBON CAPTURE UTILIZATION & STORAGE**

 **NATURAL & LOW GHG REFRIGERANTS**

## 3 ELECTRIFICATION & SYSTEM INTEGRATION

 **END-USE ELECTRIFICATION (HEAT PUMPS)**


 **ENERGY SUPPLY OPTIMIZATION**

 **ENERGY STORAGE & GRID MANAGEMENT**

## 4 ENERGY EFFICIENCY & OPTIMIZATION

 **ADVANCED CONTROLS & ANALYTICS**

 **SIMULATION & REMOTE MONITORING**

 **WASTE MANAGEMENT**

# Land-Based Transportation Sector Decarbonization Strategies

*New passenger vehicles required to meet increasingly stringent fuel efficiency standards*

 55 mpg by 2025

 48 mpg by 2026

Fuel Economy Standards

*Automakers must produce and sell certain number of hybrid, fuel-cell electric, or fully electric vehicles*

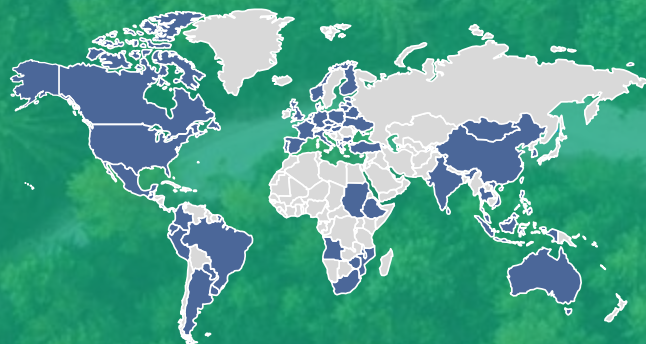
 British Columbia and Quebec

 13 states

 Various countries (some voluntary)

Zero Emission Vehicle Mandates

*Certain volume or percentage of renewable fuels be consumed with gasoline or diesel*




70 countries covering much of the European Union, Americas, and portions of Asia Pacific & Africa

Renewable Blending Mandates

Low Carbon & Clean Fuels Standards

*Gaining traction in U.S. and Canada; typically based on reducing carbon intensity of fuel*

 British Columbia  
National Clean Fuels Standard

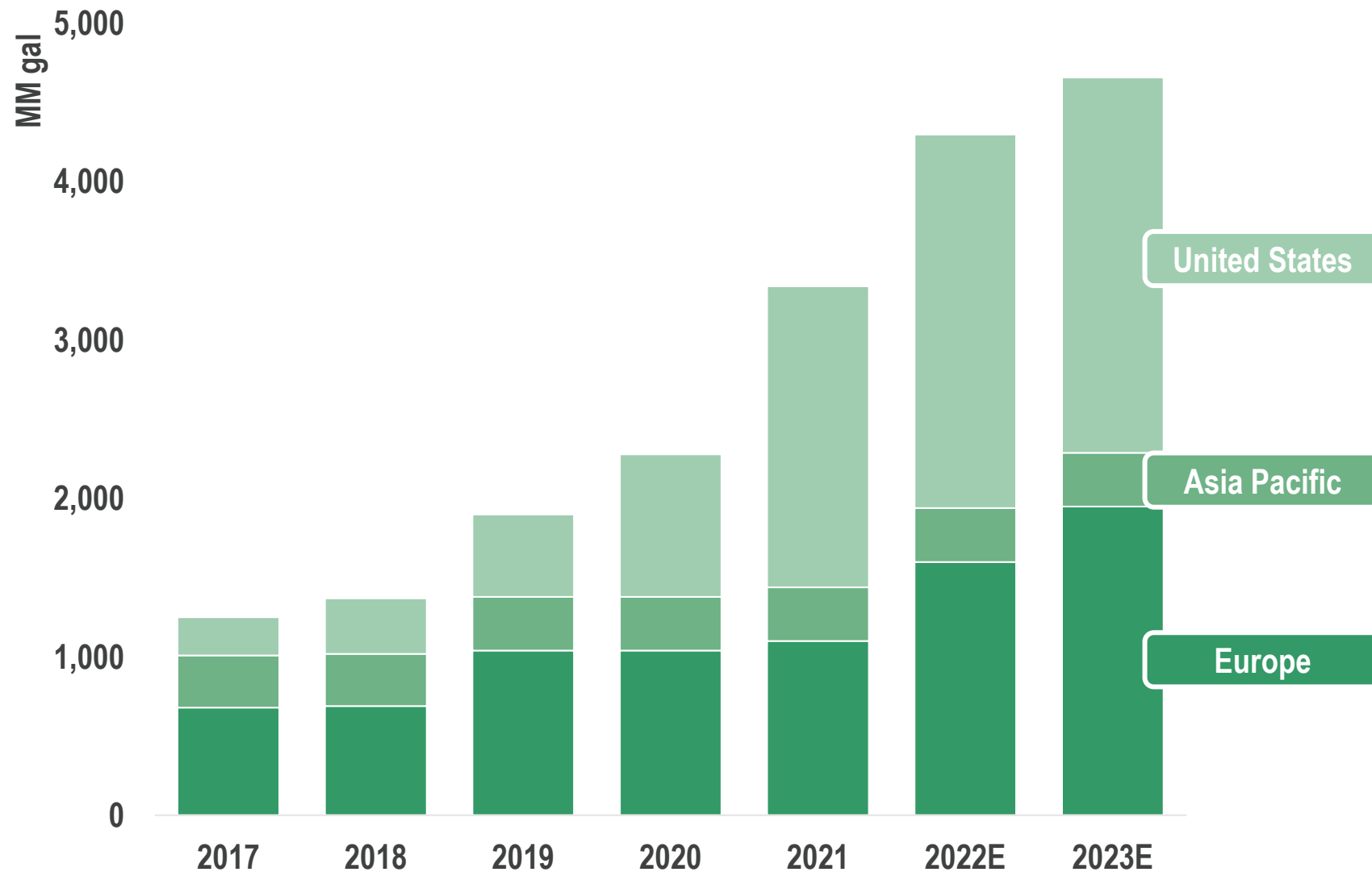
 California, Oregon  
Proposals in several states

 Renewable Energy Directive

2021 Strategies

# Global Supply Growth of Sustainable Diesel Fuels Is Accelerating; Aviation Commitments to Net Zero Will Increase Demand

Renewable Diesel Supply Growth Forecast (MM gal)



Sources: BP, Cowen and Company

## Major Aviation Net Zero Commitments

**Airlines for America®**

DELTA
 American Airlines
 UNITED

jetBlue
 Southwest

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A-E AIRLINES FOR EUROPE
 AIRFRANCE KLM GROUP
 LUFTHANSA GROUP
 FINNAIR

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AAPA ASSOCIATION OF ASIA PACIFIC AIRLINES
 CATHAY PACIFIC
 SINGAPORE AIRLINES

# Digital Transformation Can Help Biofuels Producers Unlock Top Quartile Performance



## PROJECT CERTAINTY



Reduce cost up to 40%



“Born Digital” projects

## OPERATIONAL CERTAINTY

Feed flexibility

Emissions monitoring

Production optimization

Safety System integrity

Energy balance

Automated reporting

Asset monitoring

Mass balance

Custody transfer verification



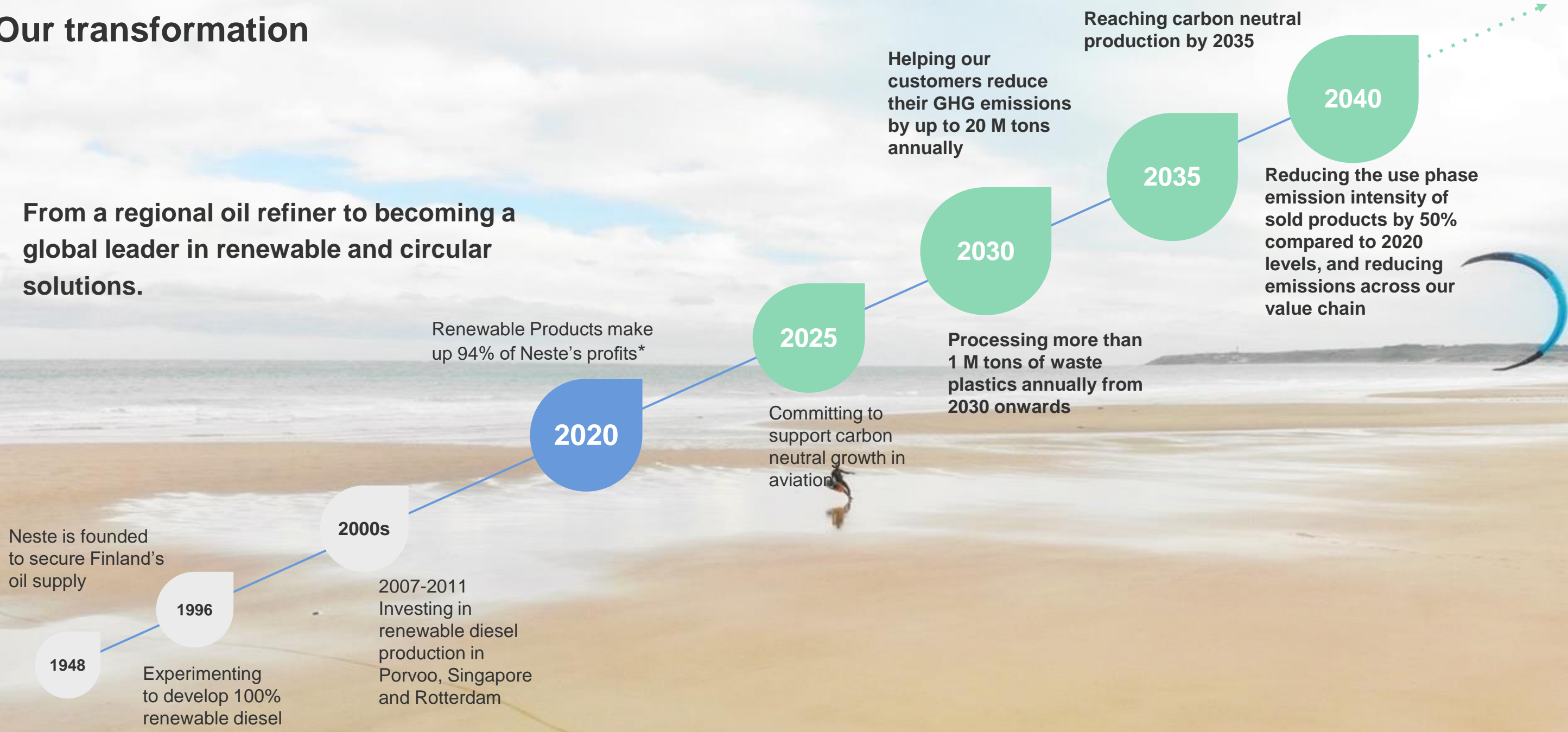
A photograph of a man carrying a young girl on his shoulders. They are standing in a field of white cherry blossoms. The man is wearing a dark blue and white striped shirt, and the girl is wearing a white sweater and blue pants. The background is a soft-focus field of white blossoms under a bright sky. A white curved line graphic is positioned above the text.

# Neste's Transformation in Sustainable Fuels

Kenneth Lim | Director, Neste Singapore Refinery | 03 March 2022

# Our transformation

From a regional oil refiner to becoming a global leader in renewable and circular solutions.



\* Comparable operating profit

94% of Neste's profits\* come from renewable businesses

## Renewable Road Transportation

Over the life-cycle, Neste MY Renewable Diesel reduces greenhouse gas (GHG) emissions by up to 90% compared to fossil diesel.

\*2020 Comparable operating profit

## Renewable Aviation

Over the life-cycle, Neste MY Sustainable Aviation Fuel has up to 80% smaller carbon footprint compared to fossil jet fuel.

## Renewable Polymers and Chemicals

Neste RE Renewable and Recycled is Neste's solution for the plastics and chemicals sectors to help them reduce crude oil dependency while also tackling climate change and plastic waste challenge.

**NESTE**

# Vision: Leading the way towards a sustainable future together

From low-quality raw materials to high-quality products

We are the world's number

1

renewable diesel provider with the annual capacity of 3.2 million tons of renewable products

The share of waste and residues

92%

of our total renewable raw material inputs during first year-half 2021

Our Renewable Products reduced 10.9 Mt of GHG emissions in 2021, equaling the carbon footprint of

4.2 M

passenger cars for a full year.

# Faster, Bolder & Together

Creating a healthier planet for our children

Get ready for the future

We innovate and commercialize new renewable and circular solutions for the next phases of growth.  
We deliver our climate commitments and ensure high standards in sustainability and safety in everything we do.

Boost competitiveness and transformation

We continue driving efficiency and competitiveness through operational excellence.  
We transform fossil refining and distribution towards low emission offerings and carbon neutral production.

Grow renewable and circular solutions

We serve existing and new customers in the road transport, aviation, and polymers and chemicals markets. We grow our production capacity and strengthen and expand our renewable and circular feedstock supply.

## Outcomes:



**Business transformation**  
Build a future-proof and robust business model



**Climate impact**  
Meet climate commitments



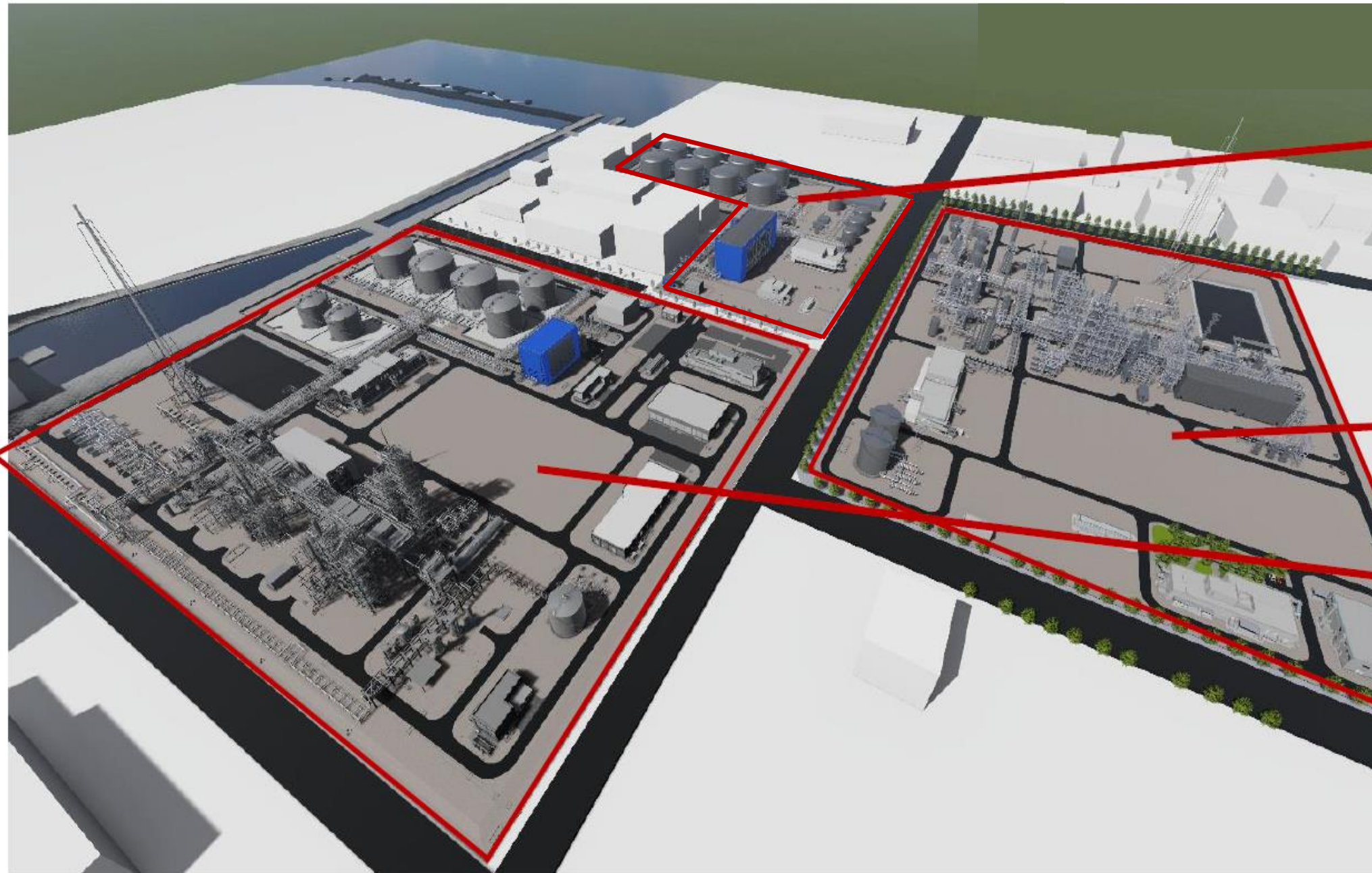
**Value creation**  
Continue strong financial performance and growth

2019 – 2022

- Current Singapore refinery  
**19 ha**
- Total New Area  
**26 ha**
- Investment value  
**1.4 billion Euros**

- Additional Production Capacity  
**1.3 million tons per annum**

**expansion**  
NESTE SINGAPORE  
**2022**



South Area

West Area

Current refinery area  
(i.e. Main Area)

# NESTE and Emerson: Business Partners on the Digital Journey

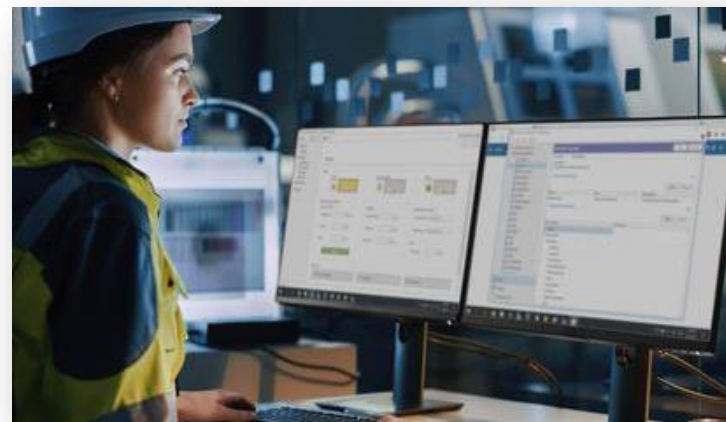
## Ensure Safe Distancing and Minimize Travel

- Cloud platform enables Remote completion of Factory Testing (FAT). Global collaboration:
  - Hardware & Software at Emerson Romania
  - NESTE team in office / home across Europe
  - Operation Team in Singapore
- Connected services enable global experts to support remotely



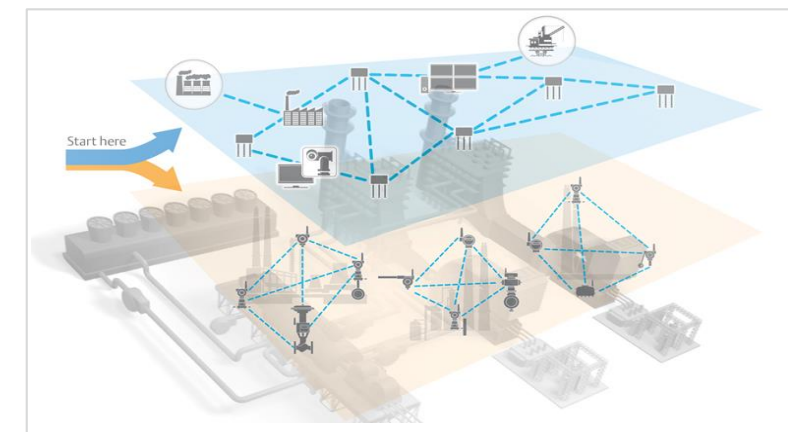
## Modern Production and Asset Management

- Consistent record of all plant assets and comprehensive oversight of equipment of every class
- Modern Operator Interface, Human Centered Design (HCD) following ISA101 standards
  - Improved situational awareness.
  - Optimized to ensure timely display of alarms and critical info



## Future Ready Digital Infrastructure

- Wireless Infrastructure readiness for future digital transformation
- Scalable implementation to address operational challenges
- Securely connect OT data with existing IT network, providing the capabilities to extend digital transformation beyond process control and across the operation enterprise.





## **Julie Valentine**

Director, Refining & Sustainability  
Measurement Solutions

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**How Advanced Automation  
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# Emerson's Digital Transformation Ecosystem

MANY PLANTS

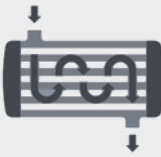
PLANT



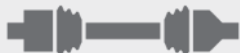
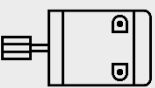
PROCESS UNITS & COMPLEX ASSETS



ASSETS



COMPONENTS



## PLANTWEB

Plantweb Optics Analytics

Operational Certainty Consulting

Data Management & Integration

**Simulation & Digital Twin**  
Mimic, GSS software

**AI & Machine Learning**  
Plantweb Optics Analytics

**Embedded APC**  
DeltaV with Analytics

**Plant Health & Performance**  
Plantweb Optics Analytics Templates

**Machinery Health**  
PeakVue & Integrated Prediction and Protection

**Equipment Health**  
20+ Plantweb Insight Applications

**Device Diagnostics**  
1000s of Embedded Diagnostics  
AMS: Industry Leading Asset Manager

**Predictive Field Analytics**  
Analytics in Devices & Software  
Device Health Alerts

1980

2022

# Digital Transformation at Green Diesel Plants

## Challenges

**Feedstock Flexibility**

**Equipment Reliability**

**Regulatory and Tax Reporting**

**Sustainability Solutions and Metrics**

## Key Enablers

- Measurements independent of fluid properties
- Analytics to evaluate plant performance under varying feedstocks

- Asset monitoring
- Corrosion monitoring

- Central data repository
- Data visualization and reporting

- Continuous / predictive emissions monitoring
- Energy management
- Carbon intensity tracking

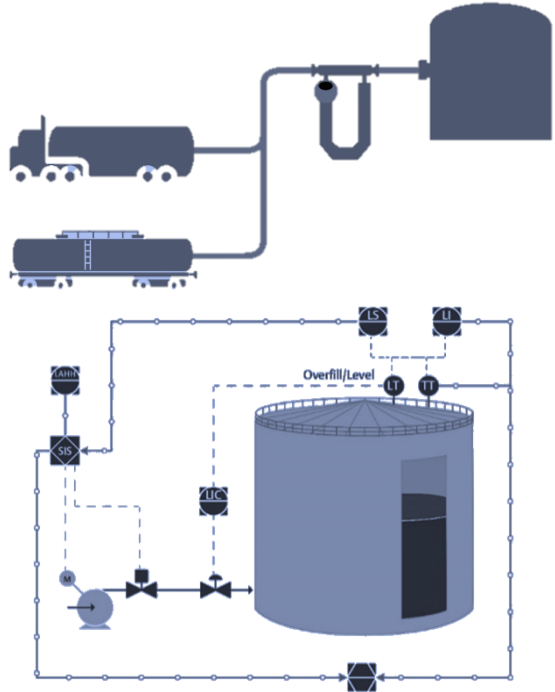
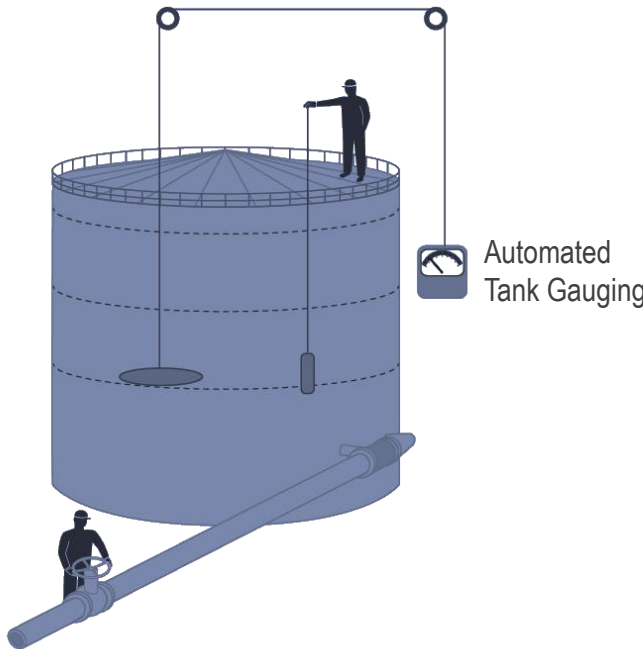
# Reduce Measurement Uncertainty



Operational Challenges

Value Improvement Practice

Impact on Operations



Verify instrument health with on-board diagnostics



Accurately report receipts, usage, and shipments for obtaining government subsidies



Improve operator safety

Traditional level and flow measurement technologies impacted by changing fluid properties and ambient conditions

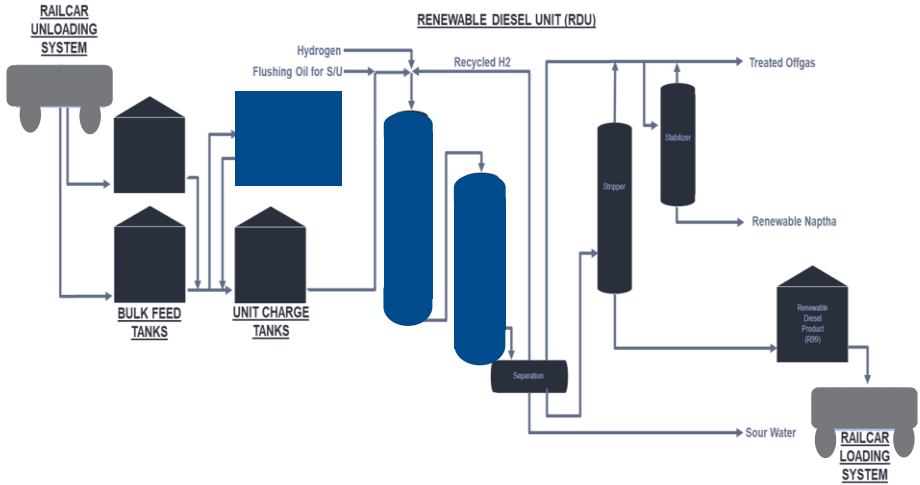
Use level instrumentation and smart metering systems independent of fluid properties

Top Quartile Performance

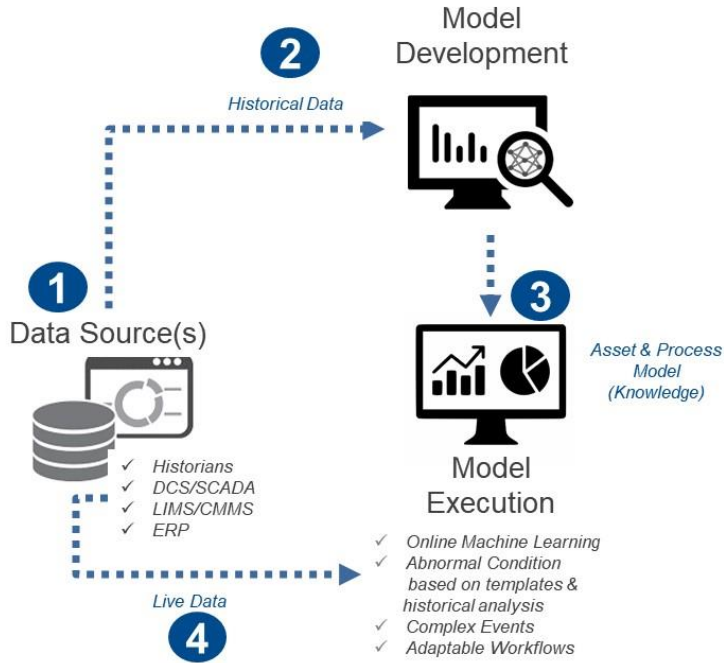
# Improving Plant Efficiency Using Plantweb Optics Analytics



*Catalyst replacement is costly and sub-optimal operation reduces catalyst life*



Reactor control is crucial to producing desirable diesel



Plantweb Optics Analytics enables identifying optimal / non-optimal operating conditions for each feed type and provides optimal targets



Increase diesel yield



Improve operator safety

Top Quartile Performance

# Digital Transformation at Green Diesel Plants

## Challenges

Feedstock  
Flexibility

**Equipment  
Reliability**

Regulatory and Tax  
Reporting

Sustainability  
Solutions and Metrics

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# Implement Continuous Corrosion Control to Reduce Costs with Plantweb Insight



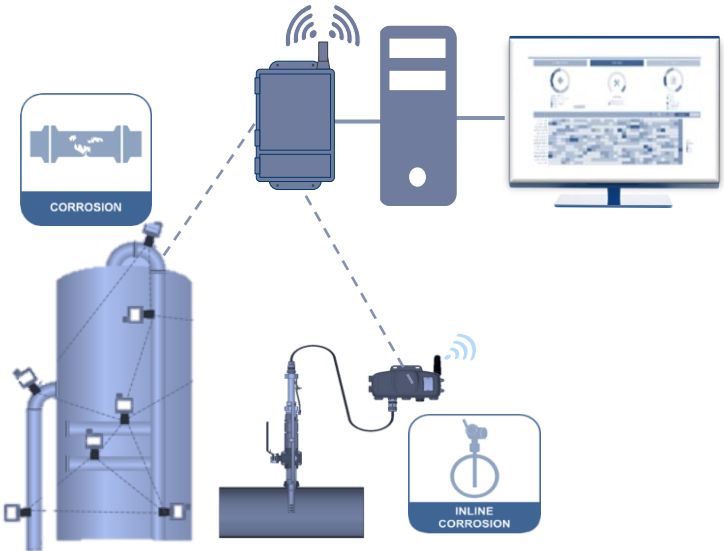
Additional corrosion risks from green diesel feedstocks



Corrosion data can be difficult to interpret

Premature equipment failure and possible environmental release

*Implement corrosion control and maintenance before damage occurs*



Wireless ultrasonic sensors and Plantweb Insight to monitor corrosion and extend equipment life

## Plantweb Applications with Pervasive Sensing



Increase uptime



Early detection of corrosion to avoid loss of containment

Top Quartile Performance

# Digital Transformation at Green Diesel Plants

## Challenges

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Equipment  
Reliability

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**Regulatory and Tax  
Reporting**

- Central data repository
- Data visualization and reporting

Sustainability  
Solutions and Metrics

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# Automate Regulatory and Tax Reporting With Plantweb Optics

Production Challenges

Value Improvement Practice

Impact on Operations

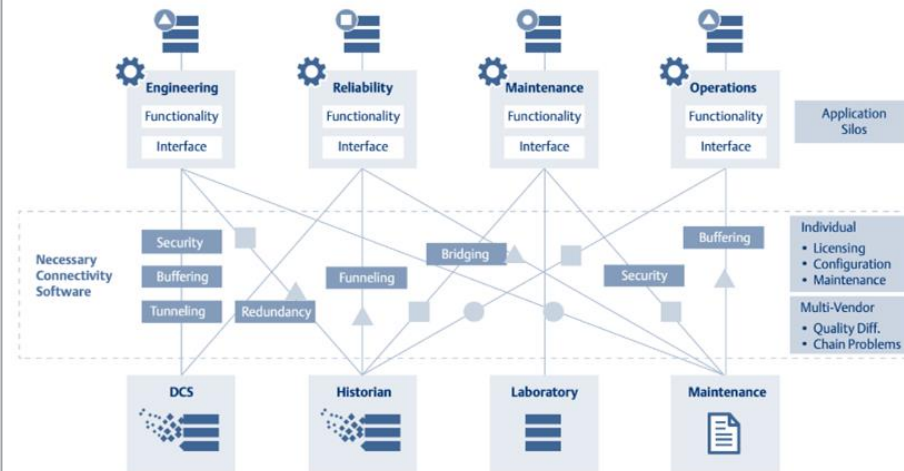


Reports require extensive data from many sources

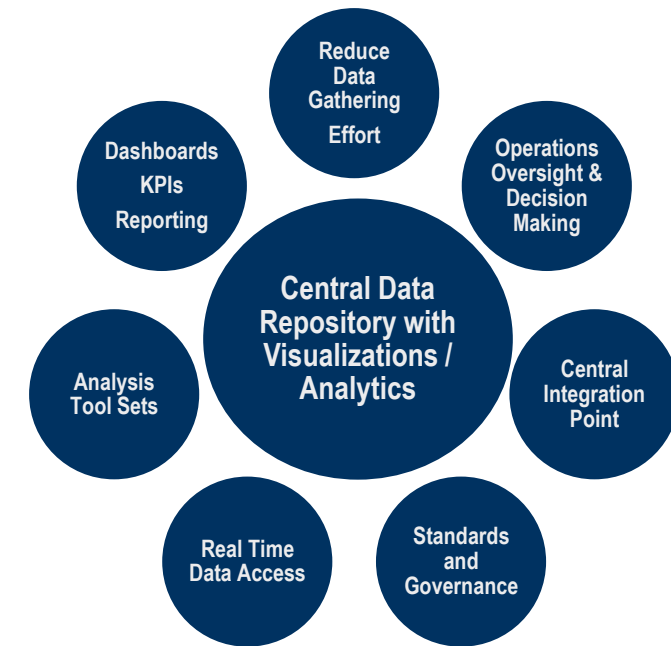


Penalties and fines for reporting errors

## Advanced Data Management with Plantweb Optics



Cost effectively automate data gathering, analysis, visualization, and reporting with flexibility for future requirements



Renewable diesel plants have extensive reporting requirements in most countries

Reduce cost and time to produce required and auditable reports



# Digital Transformation at Green Diesel Plants

## Challenges

**Feedstock  
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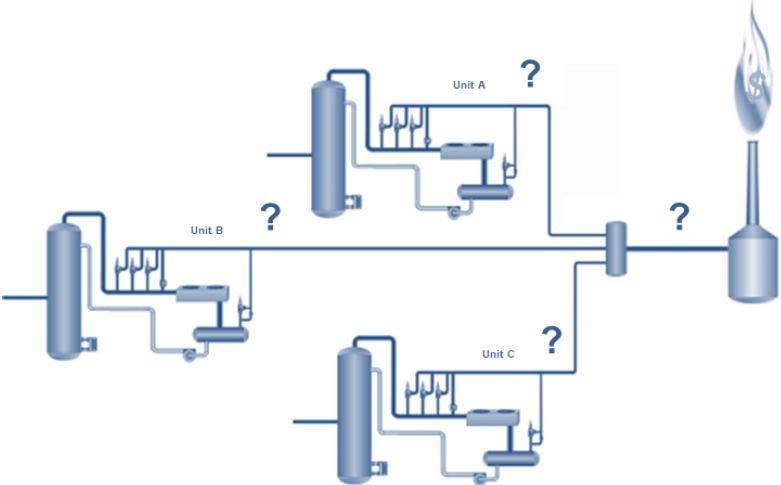
- Central data repository
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# Reduce Environmental Emissions With Pressure Relief Valve Monitoring and Flare Gas Analysis



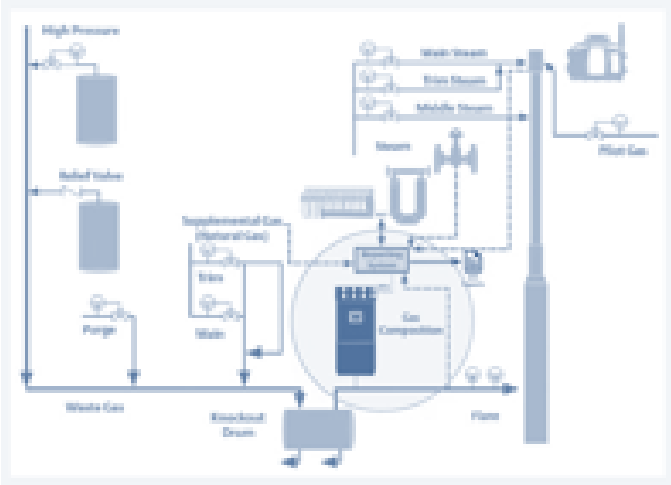
*Locating source, time, and duration of releases from PRVs requires extensive troubleshooting*



*Compositional analysis required for emissions monitoring and efficient combustion*

**PRV and Flare monitoring provide valuable insight on process conditions**

*Wireless pressure gauges, acoustic transmitters, and Plantweb software to record PRV events*



*Vent gas compositional analysis for emissions monitoring and improved flare control*

**Advanced diagnostics ease operator burden while enabling faster problem-solving and improved control**



Identify **specific problem assets to reduce emissions**



Comply with emission regulations and **protect the environment**

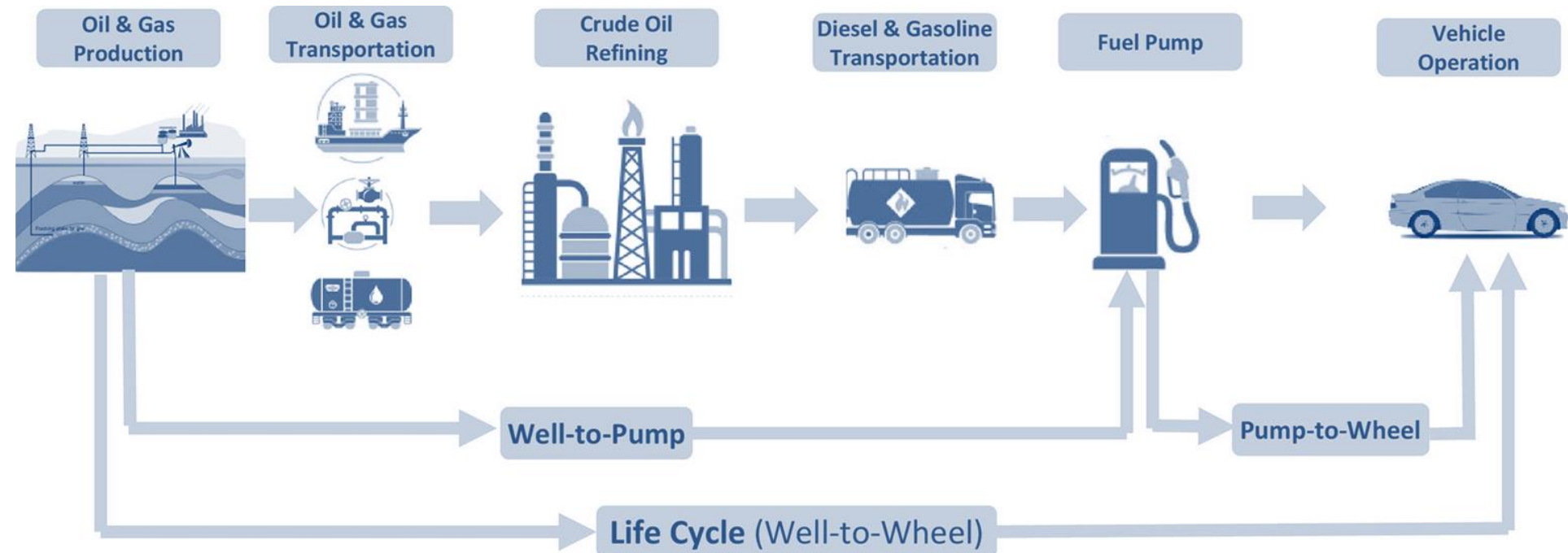
**Top Quartile Performance**

# Most Regulations and Incentives Involve Monitoring Carbon Intensity

## Carbon Intensity

A fuel's *lifecycle*, or *well-to-wheel*, *greenhouse gas emissions per unit of transportation energy delivered*

- ✓ Emissions from generating, refining, and using a fuel
- ✓ Calculated after a fuel's pathway is determined
- ✓ Value of the fuel depends on the Carbon Intensity



Source: Applied Energy

## What impacts Carbon Intensity?



Type of  
feedstock

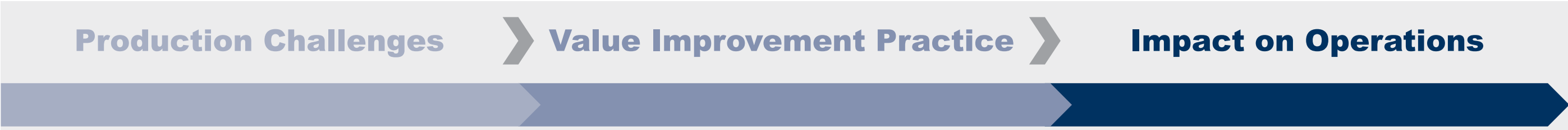


Distance from feedstock  
source to processing



Processing energy  
efficiency and emissions

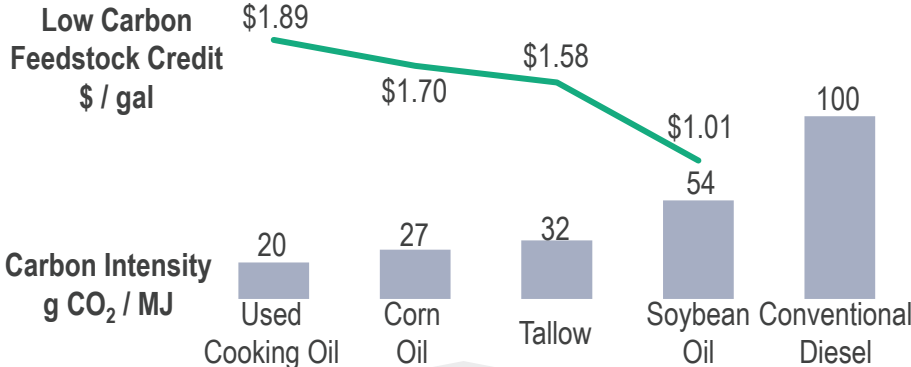
# Increase Carbon Intensity Credits in Renewable Diesel Plants Through Plantweb Optics AI-Based Energy Optimization



Calculation of Carbon Intensity credits **depends on feedstock**

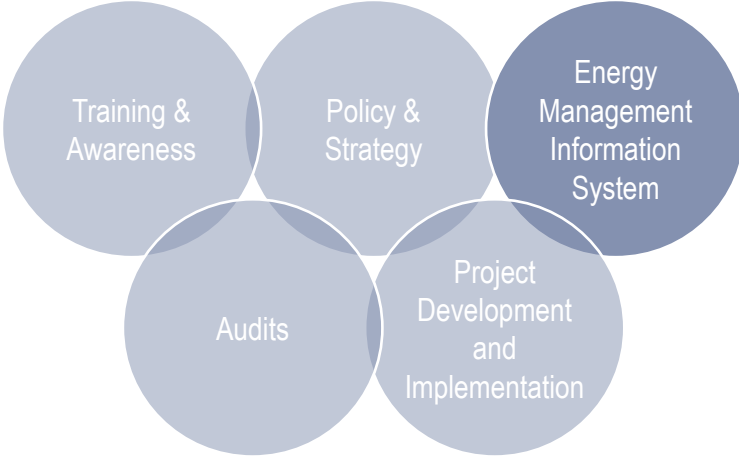


**Minimizing** energy and hydrogen usage **lowers Carbon Intensity**



Energy consumption information is often seen retroactively in monthly energy reports

*Artificial intelligence-based Energy Management is a critical component of a facility's improvement plan*



Unlock the power of advanced analytics to improve green diesel production



**Reduce** total site energy usage **by 5-10%**



**Significantly improve** Carbon Intensity Score

Top Quartile Performance



- ★ Renewable diesel and sustainable aviation fuels play an important role in the energy transition for transportation
- ★ Both Project Certainty and Operational Certainty are critical enablers for these operations
- ★ Digital foundations underpin the long-term operational success of plants, exemplified by Neste
- ★ Emerson's digital technologies offer value-added solutions to meet the challenges and sustainability goals in the biofuels sector

# Question & Answer





# THANK YOU

brooke.west@emerson.com

+1 737-270-3050

