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Rolls-Royce Solutions

Flexibility in Microgrids

Melissa Mach, Business Development of Sustainable Power Solutions

08. November 2022



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About us – introduction to Rolls-Royce Power Systems



Rolls-Royce group

A world-class technology company, built on three strong and complimentary business units.

Power Systems is the group's 2nd largest business and frontrunner in electrification.



Civil Aerospace



35
types of commercial aircraft powered by us



16,400
engines in service around the world



17,900
total employees



4.536bn
underlying revenue

Defence



160
customers in over 100 countries



16,000
engines in service around the world



11,100
total employees



3.368bn
underlying revenue

Power Systems



>40,000
customers in 13 different industries



20,000
reciprocating engines sold per year



≈ 9,000
total employees

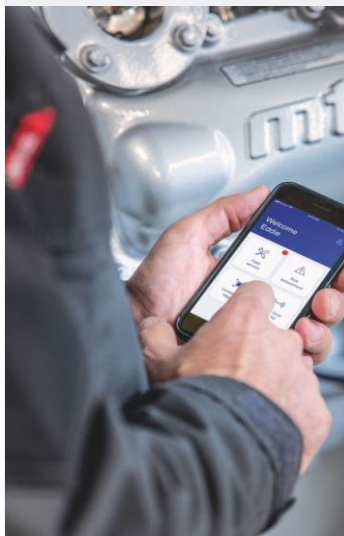


2.749bn
underlying revenue



Power Systems Customer industries

Rolls-Royce Power Systems serves 13 different customer industries around the world.





New framework through: EMPOWER 2030

Dedicated business unit to drive development & delivery of new technologies

Clear commitment for sustainable solutions

Increased attention from management & shareholder



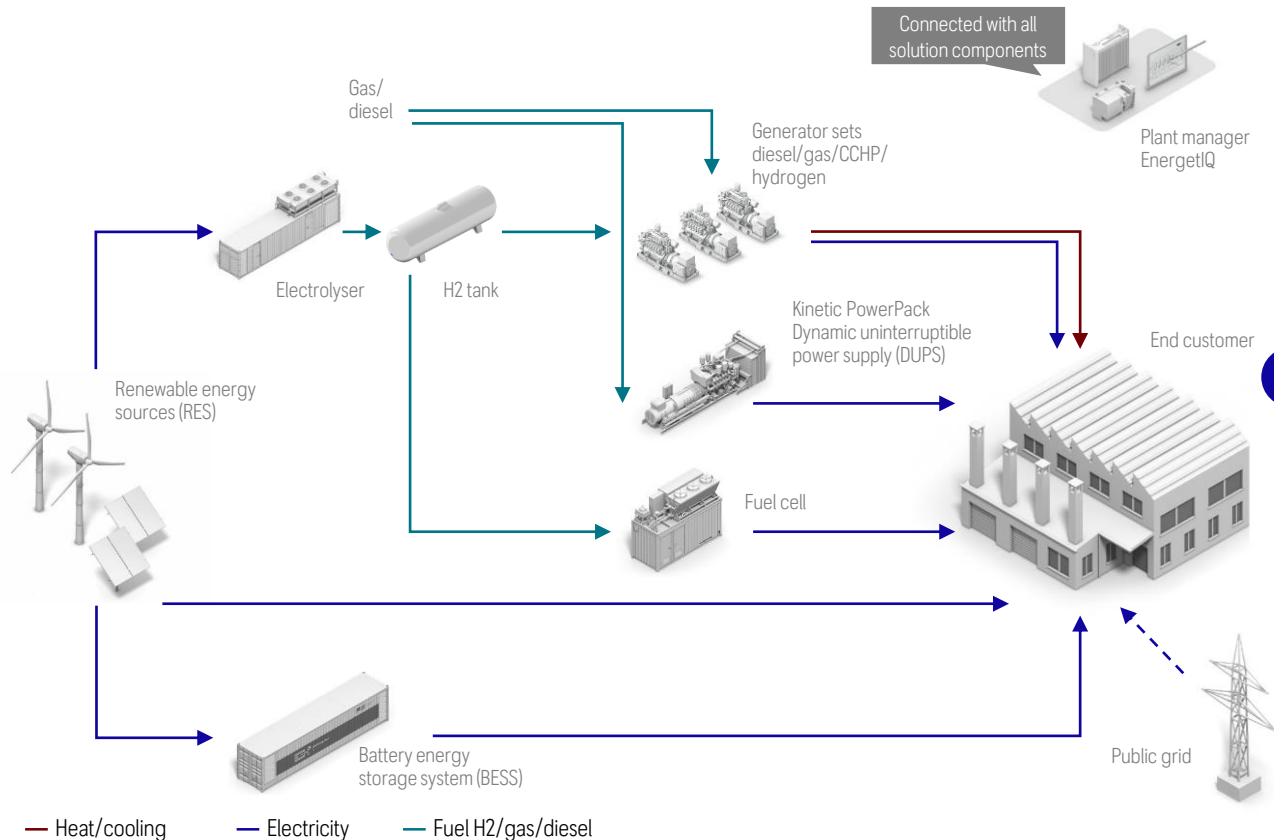
Product Mgmt	BU Stationary Solutions	BU Mobile Solutions	China Business	BU Sustainable Solutions
R&D	PowGen	Marine	Key growth market w/ cross-application responsibility	CO ₂ free technologies
Procurement				
Quality	Oil & Gas	Naval & Land		e.g. BESS, fuel cell
Ops				Comprehensive solutions
Service Excellence		Rail & Mining		
Finance				e.g. Microgrids
HR		C&A		New business models
Digital/IT				
				e.g. StaaS, EaaS

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How microgrids provide flexibility to energy systems



Portfolio offering | Our Microgrid is an end-to-end solution to solve our clients future power and energy needs



Note: Exemplary display of key solution space and applications - non-exhaustive

E2E service package from a single source

Project simulation and component sizing

+ Energy consulting and EPC

Conceptualisation of solution and system design

On-site commissioning and testing

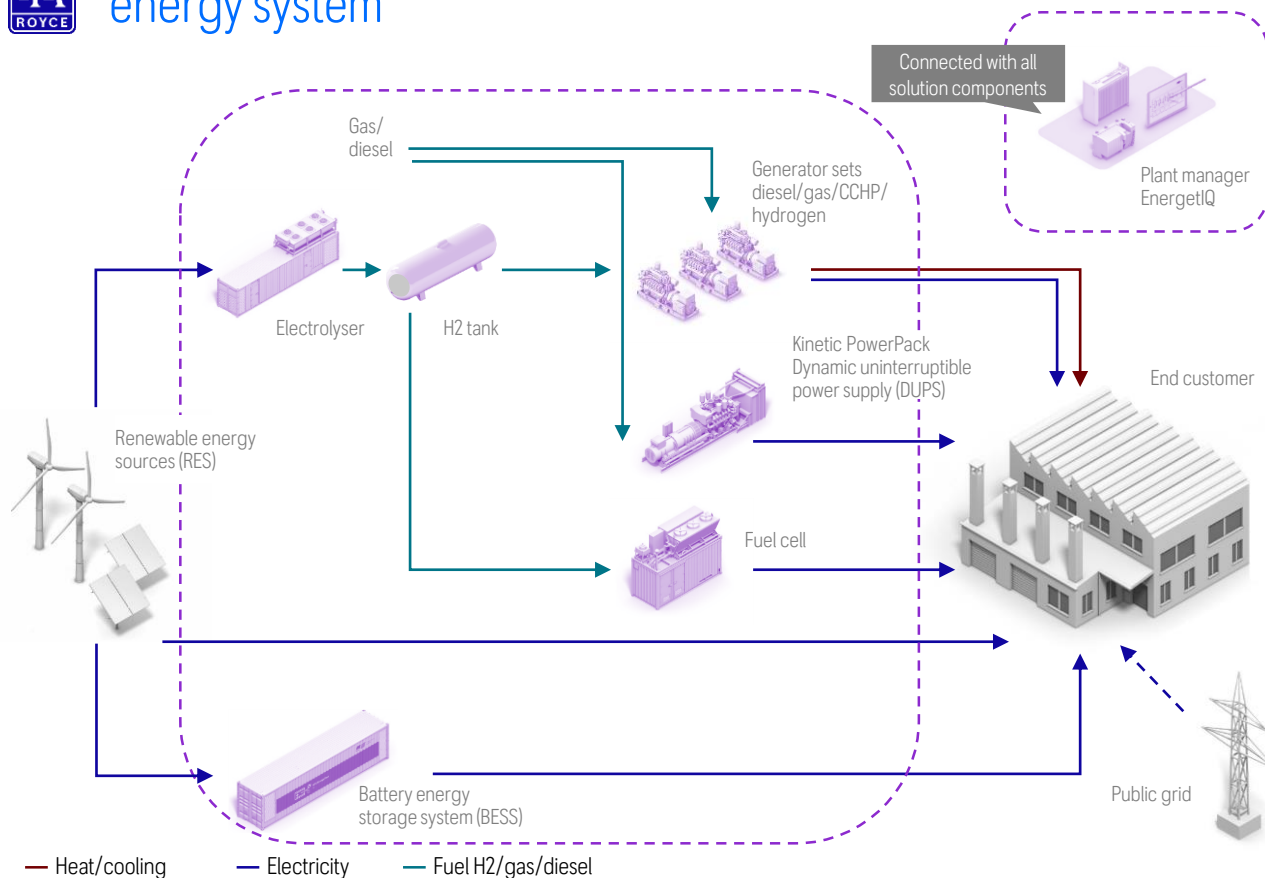
Vendor screening, testing and pass-through for outsourced components



A Rolls-Royce solution



Flexibility | Our components are key to achieve flexibility in the energy system



Connected with all solution components

Short term electricity storage via our BESS

Long term storage via our electrolysis + hydrogen storage

Firm capacity served by our gensets

Uninterruptible power supply with our DUPS

Green backup power by our fuel cells

Intelligent control via our EnergetIQ

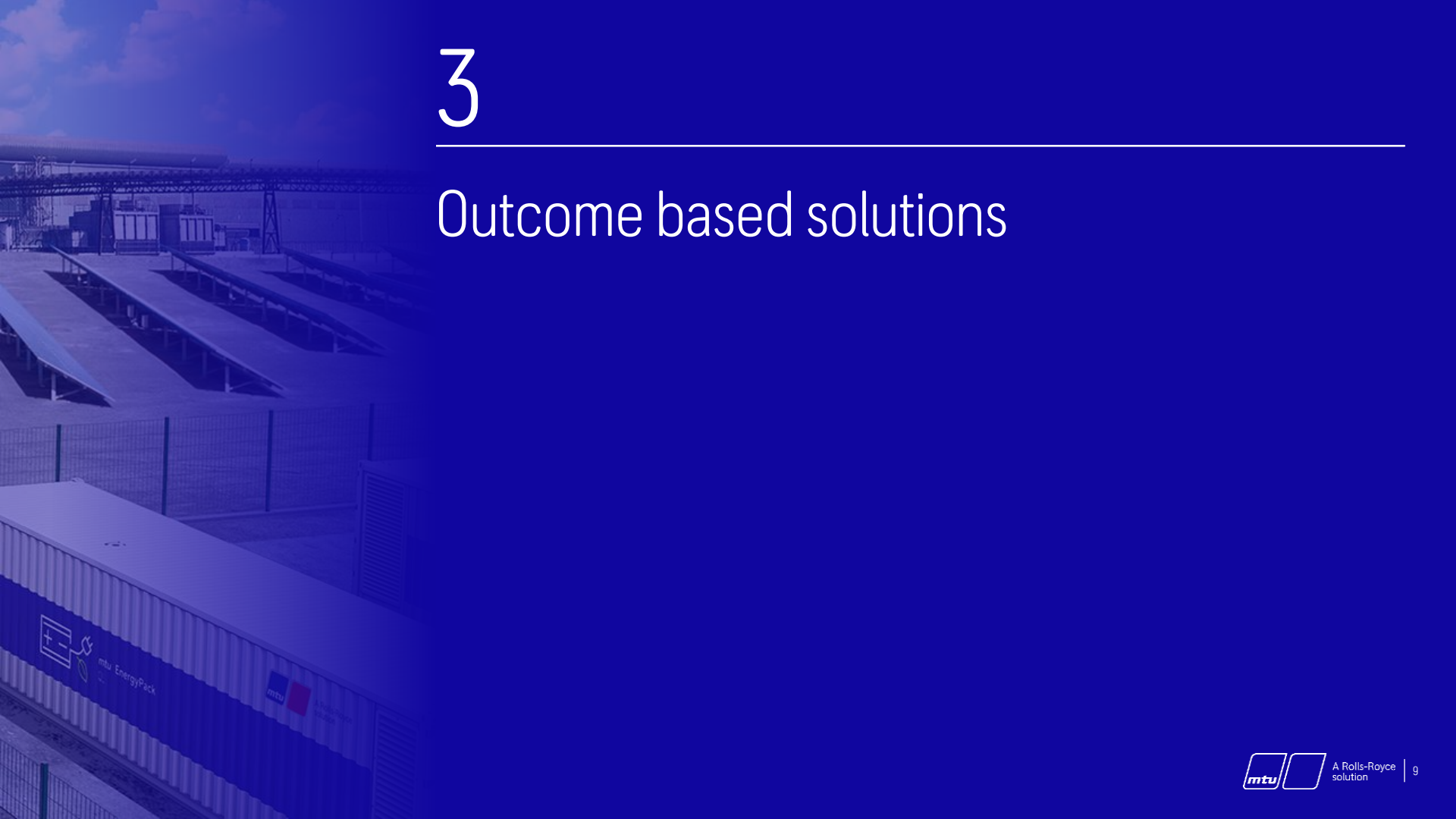
Note: Exemplary display of key solution space and applications - non-exhaustive



A Rolls-Royce solution

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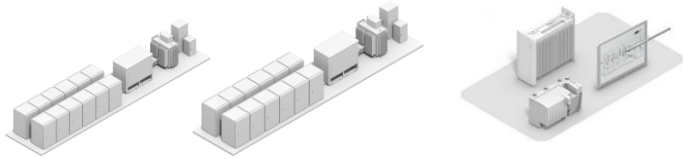
Outcome based solutions





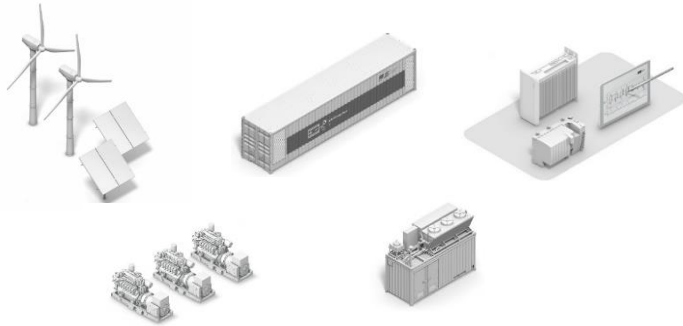
Outcome based solution offering

Storage-as-a-Service (StaaS)



Guaranteed capacity to be commercially operated

Energy-as-a-Service (EaaS)



Fix electricity price of reliable, green energy

... as a 'one-stop shop'

Simulation and sizing

- Load profile analysis
- TCO simulation
- Opt. component sizing
- Grid stability analysis

Engineering and manufacturing

- In-house OE development
- Customizing-based 'Tech-Baukasten'
- Manufacturing in line with mtu standards
- Factory acceptance testing

Installation and commissioning

- Development of interfaces
- On-site installation (optional)
- Commissioning and on-site acceptance tests

Financing services

- LoC-based financing & ECA²-backed direct loan
- Equity funding & forfeiture short-term financing
- Full depreciation leasing (Europe)

Operation and maintenance

- Active monitoring
- Remote diagnostics
- Reporting and optimization
- Predictive maintenance





Customer benefits of EaaS

Overarching EaaS is the most convenient way for customers to satisfy their energy needs



Reduction of carbon footprint

EaaS providers emphasize sustainable & green energy solutions and provide customers a risk-free shift to green power solutions



Optimized energy cost management

PPA agreements guarantee fixed costs based on usage/need & energy experts operate assets in the most efficient way



Avoid non-core activities

Avoid costs for non-core activities (e.g., managing operations of equipment) and reduce interfaces and planning effort for customer



Save energy & increase performance

Energy efficiency via AI, highly innovative software, data analytics and monitoring products – continuous access to cutting-edge tech



Improved financial resilience

Customers are more flexible in managing costs during crisis/downturns either because they outsource the entire power generation or the operations of their own equipment



New revenue streams around excess energy

Generate revenues via energy trading services of EaaS company (only viable if customer still owns the equipment)

EaaS models allow us to combine two worlds for maximum flexibility & efficiency

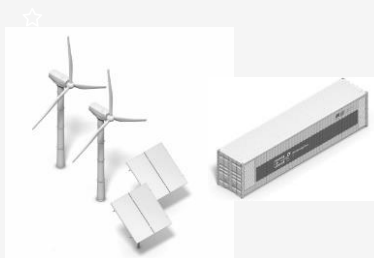
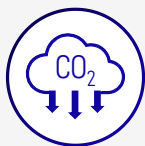
Example configurations, non-exhaustive

Behind the meter



In front of the meter

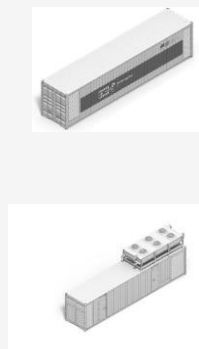
1 Reduce GHG emissions



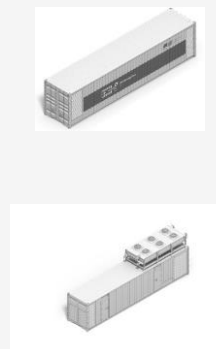
2 Energy cost optimization



1 Frequency regulation



2 Energy trading



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Rolls-Royce Power Systems commitment to net zero



Our impact 2019*

109.000.000 tons CO₂

~ 2x annual emissions of Greater London

~ 1x emissions of Belgium

* Over lifecycle

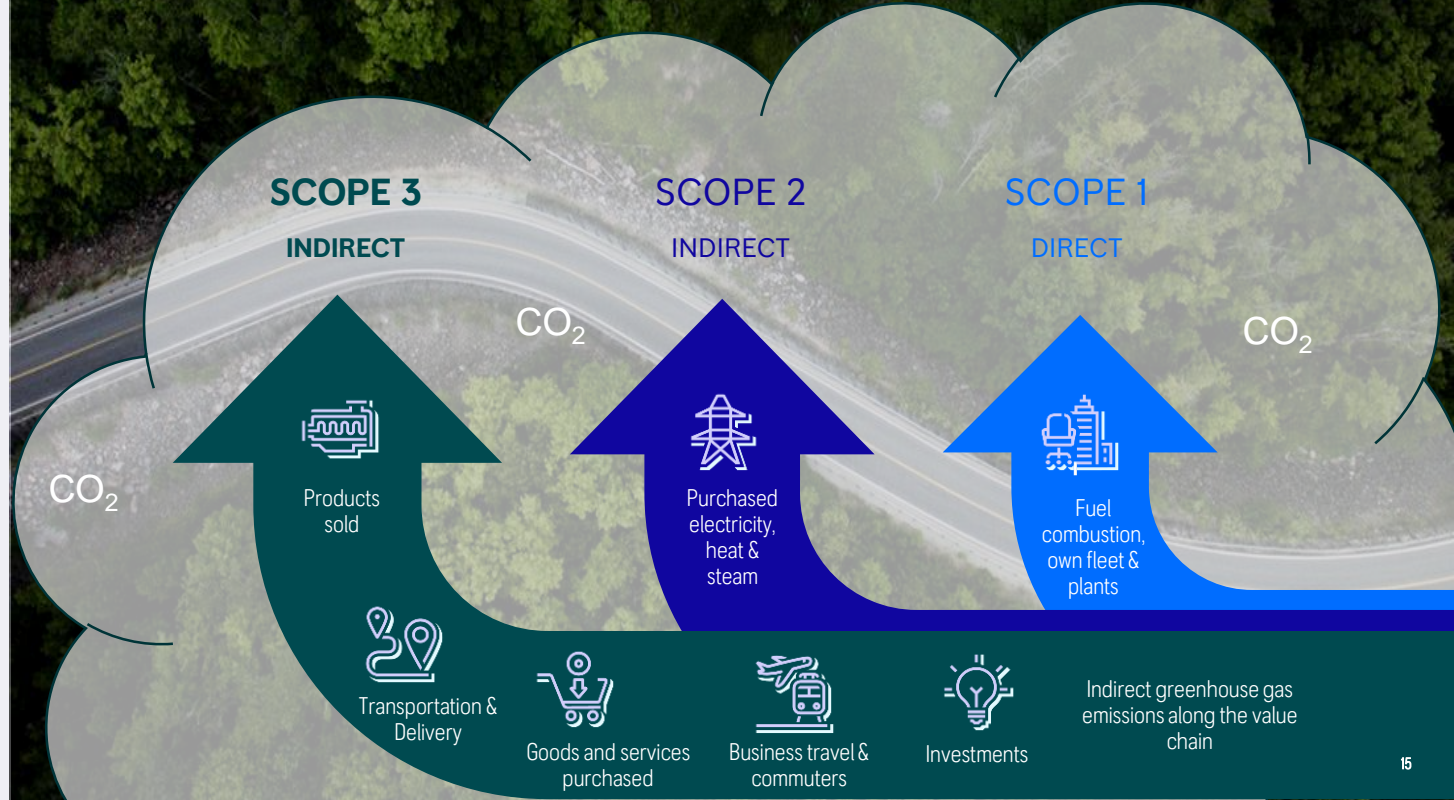


A Rolls-Royce
solution



Reduction of greenhouse gas emissions in all three scopes

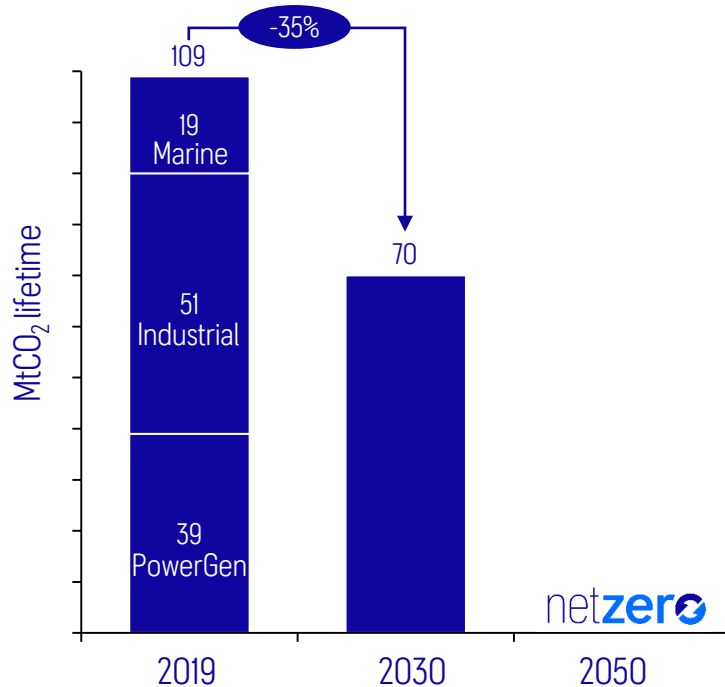
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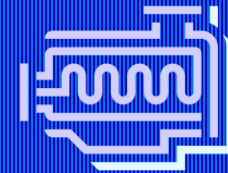
Our contribution to the fight against climate change

Significant reduction of greenhouse gas emissions by 2030

Target for the product portfolio (Scope 3):



How do we achieve these targets?



Conversion of most important engine series to sustainable fuels from 2023 onwards

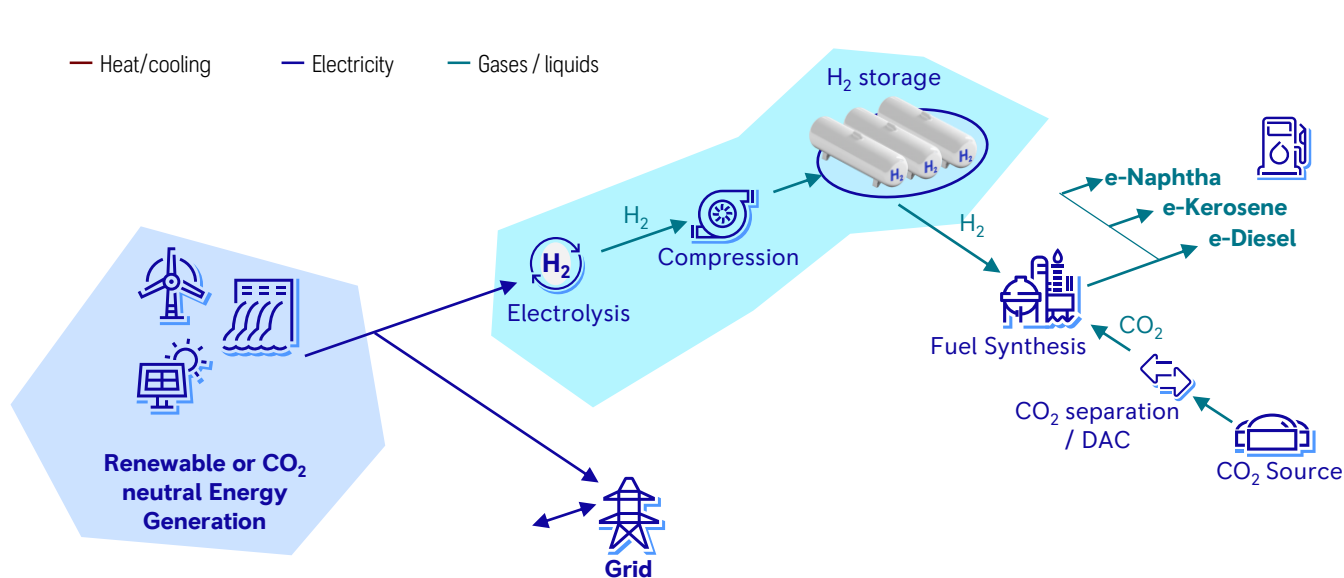


New technologies
e.g. CO₂-free fuel cell systems from 2025 for energy supply

Internal combustion engine sustainable fuels, hybrid, electrified solutions incl. fuel cell



Vision RR Power-to-Fuel Plant: Build a powerful consortia lead by RR to support RR NetZero targets and to accelerate the break-through of PtL-SAF



Produce SAF at competitive costs for our sites based on RR technology!
→ Global search for suitable production locations with cheap RE supply.





Thank you very much for your attention!

We are looking forward to your questions and to the discussion with you!

netzero@PowerSystems

