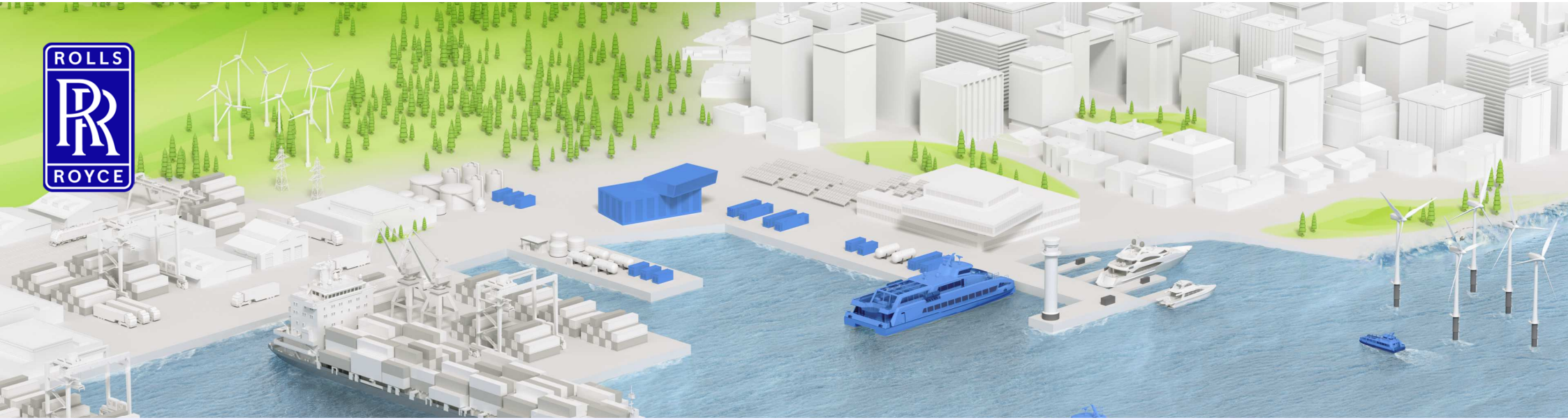


DIVE INTO A WORLD OF SOLUTIONS

H2 Thementag Hafen Duisburg

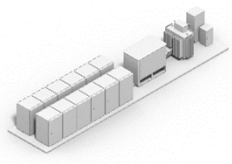
mtu A Rolls-Royce solution

Wir bieten ein breites Portfolio an exzellenter Technologie …

Zukunftsichere Ggrüne Technologie

Genset[1]

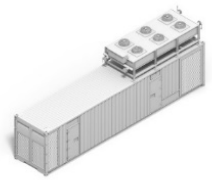
Dynamic uninterruptible power supply (DUPS)



Battery energy storage system (BESS)

Wasserstofflösungen

Hydrogen genset



Electrolyzer

Fuel cell

Optimizes all solutions

Plant manager EnergetIQ

1. Suitable for gas-, diesel-, e-fuel-, blending and H2-retrofit 2. Export credit agency

E-fuel-ready

… als 'one-stop shop'

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

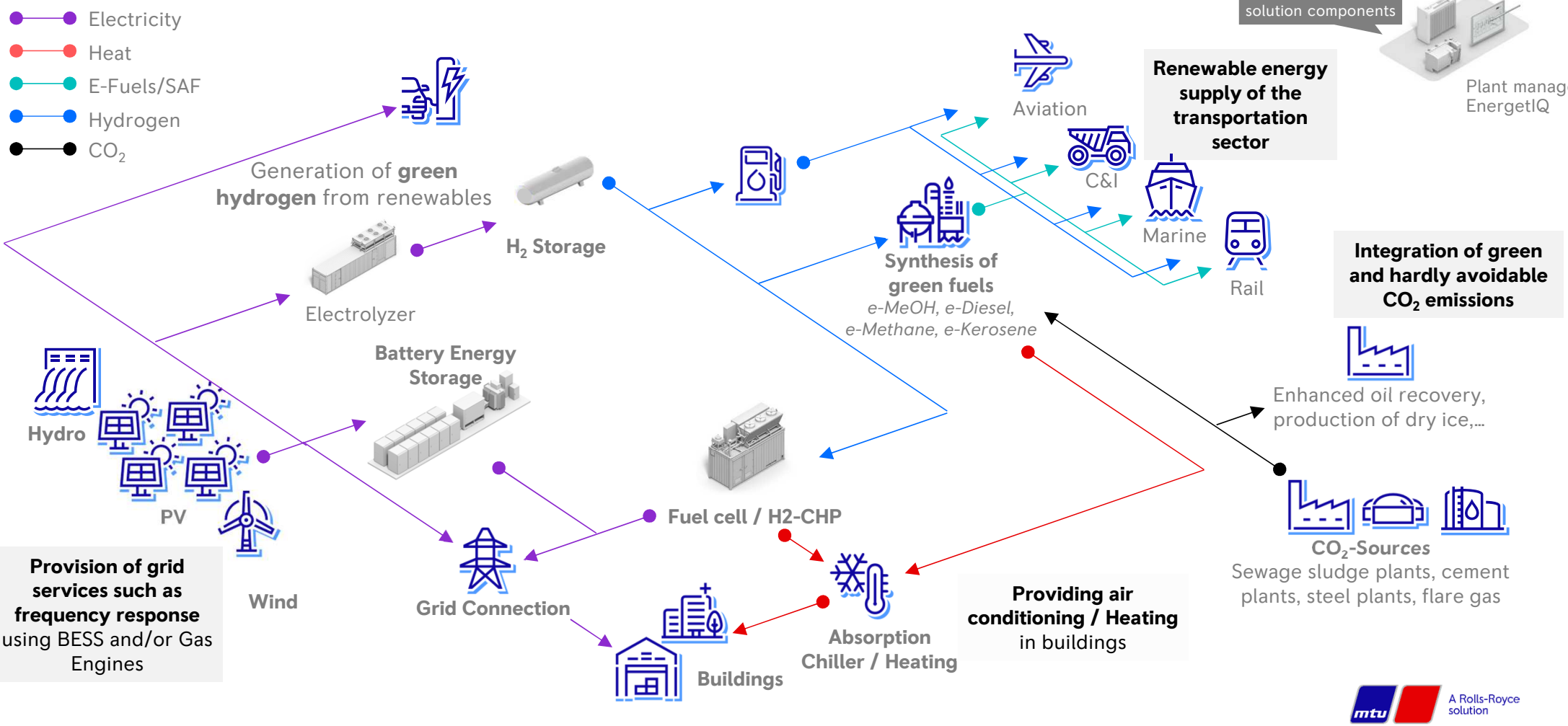
Engineering and manu-facturing
- In-house OE development
- Customizing-based 'Tech-Baukasten'
- Manufacturing in line with ***mtu*** standards
- Factory acceptance testing

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

Financing services
- LoC-based financing & ECA[2]-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

Die Zukunft Grüner Energiesysteme I Sektorkopplung nachhaltiger Systeme



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Quatier
Industriequatier
Netzanbindung
Microgrid
FC / H2-CHP
PV-Analge
Landstromversorgung
Speicher
Ladestationen
Krananlagen
H2-Fuel Station
Landstromversorgung
Landstromversorgunh
PV-Alange
Industriequatier

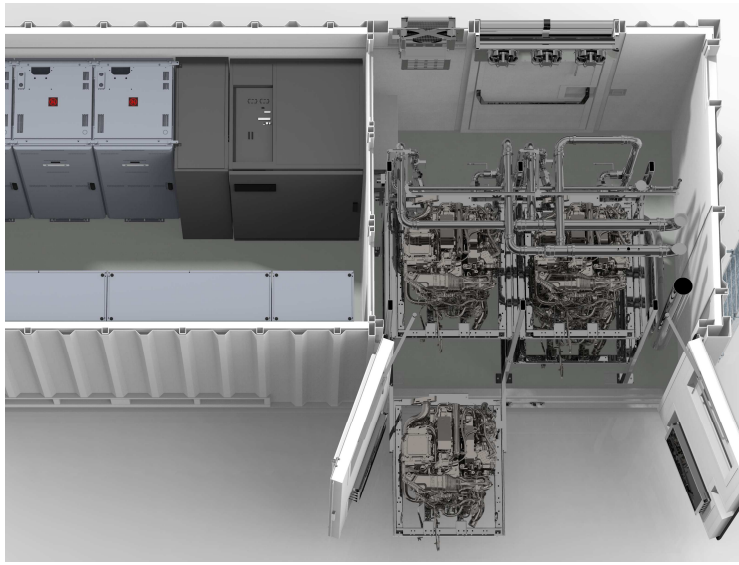
PEM Brennstoffzelle

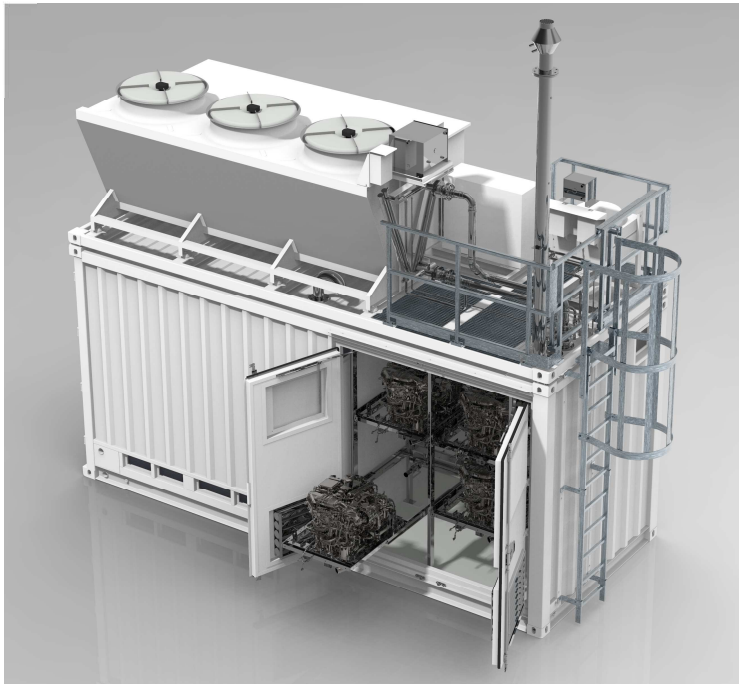
Integriert

Da er unter freiem Himmel ohne jegliche Infrastruktur außer Wasserstoff betrieben werden kann, ist das eigenständige Brennstoffzellen-System die ideale Landstromversorgung für den Hafen.

Flexibel

Ausgestattet mit hochmodernen Li-Ion-Batterien kann das Brennstoffzellen System flexibel auf verschiedene Anwendungsfälle des Kunden angepasst werden.





Zukunftsweisend

Mit diesem System demonstrieren wir wie eine moderne Hafenversorgung komplett CO2 Neutral realisiert werden kann.

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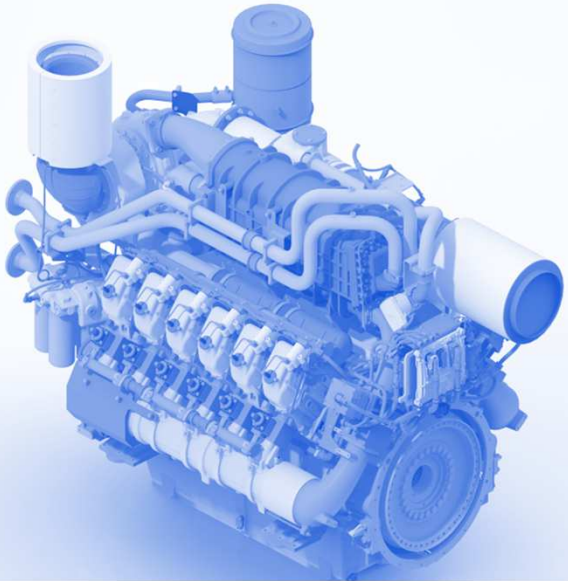
H2 BHKW

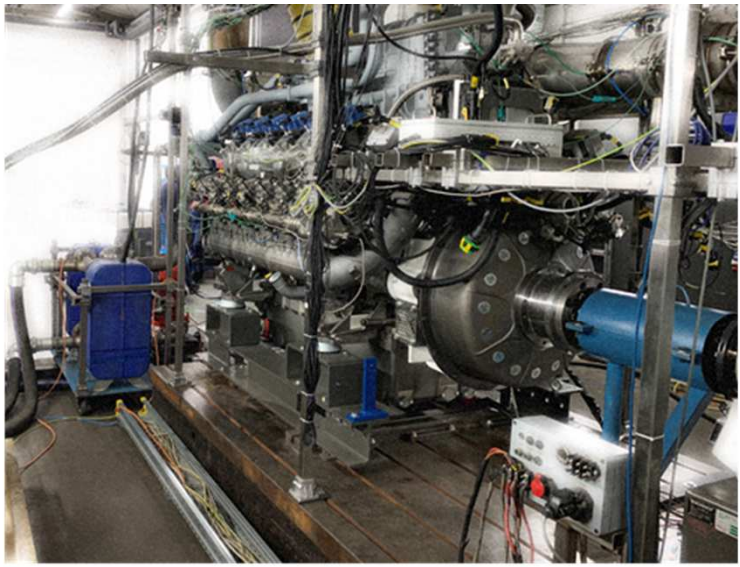
Basierend auf erprobter Technik

Basierend auf der BR4000 besticht der Wasserstoffmotor mit hoher Verfügbarkeit, Robustheit und Effizienz bei gleichzeitig Einsatz modernster Komponenten und Steuerungen.

Nachrüstbar

Bestehende Systeme können auf modernste Wasserstofftechnologie umgerüstet werden somit sind unsere Lösungen zukunftssicher.





Effizient und Flexibel

CO2 neutrale Wärmenutzung und Stromerzeugung. Flexibel einsetzbar auch mit schwankenden Wasserstoffqualitäten.

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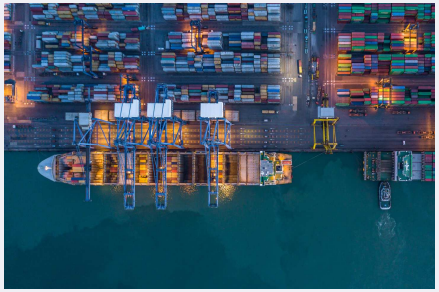
Danke
A Rolls-Royce solution

Infrastructure



Changing from energy consumer to (renewable) energy producer for own consumption and 3rd party sale

Old world
Multi-modal, multi-carrier operations

New world
Local provider of renewable energy hub

	Stationary solution	Mobile solution	Integrated solution for Stationary & Mobile
	Diesel backup for stationary electricity 	Diesel engines for mobile applications at harbor 	Green energy solution for stationary energy supply and propulsion of mobile applications (e.g. cranes, trucks, tug-boats etc.) 
Customer require-ments	▪ Mobile (e.g. handling equipment, trucks, movers, etc.) and stationary (power generation, cranes, etc.) consumers ▪ Large consumer of diesel & grid-electricity to ensure stable operations		▪ Trend towards own renewable production of energy &. hydrogen (e.g. Duisport) ▪ Supply of own power consumers and provision of H2 to 3rd parties; build-up of local renewable hubs
Required solution	▪ Diesel for movers, trucks, etc. ▪ Diesel for backup power ▪ Combined heat-and-power solutions		Integrated H2-based multi-modal solutions, ▪ Electrolysis to convert power into storable gas, i.e. H2 (no H2 infrastructure in place) ▪ Compression, Storage solutions: incl. H2 storage & battery solutions ▪ Power supply via fuel cell or H2 recip ▪ H_2-based mobile & stationary applications: H_2 ships, movers, trucks, cranes

! Local production & storage of renewable energy via H2

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