

John Crane Deep Dive

New energy solutions



Frank Ma, VP New Energy Solutions, John Crane

- John Crane - 9 years across various roles including:

- VP of New Energy Solutions

- VP and GM of Filtration Solutions

- Strategy and M&A Director

- Previously held roles at Boston Consulting Group and General Electric Power Systems

- MBA - London Business School
- MSc Mechanical Engineering - Georgia Tech
- BSc Aerospace Engineering - Cornell University



Executive summary

Evolution of energy sources will happen – even if the pace of change is uncertain

John Crane already active in both conventional and new energy, and is well-positioned in all energy transition scenarios

Our existing portfolio helps our energy and industrial customers decarbonise existing operations, while becoming more efficient and reliable

We are also critical in the deployment of new energy markets; particularly carbon capture, utilisation and storage (CCUS), hydrogen and low carbon fuels

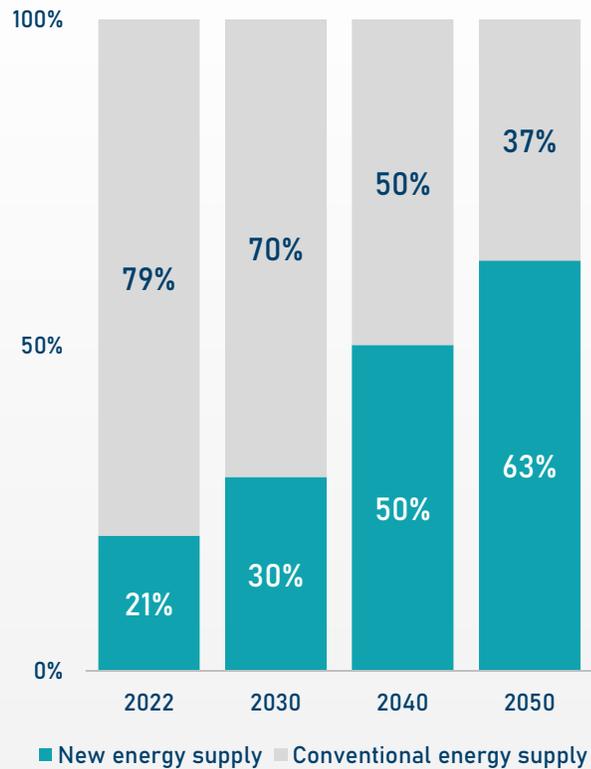
We are partnering with customers to scale up new technologies that meet future requirements

Overall, we are well positioned for today and the future to maximise the opportunity ahead

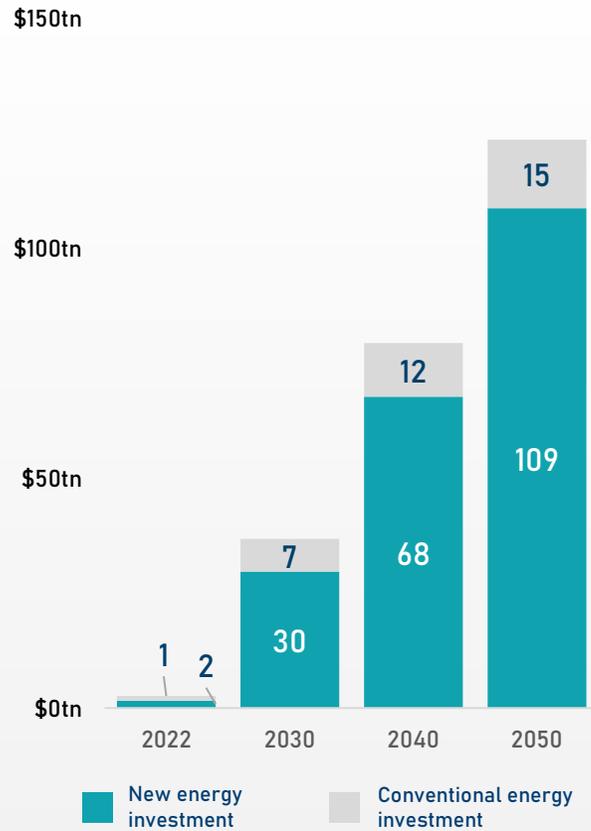


Evolution of energy to meet decarbonisation goals

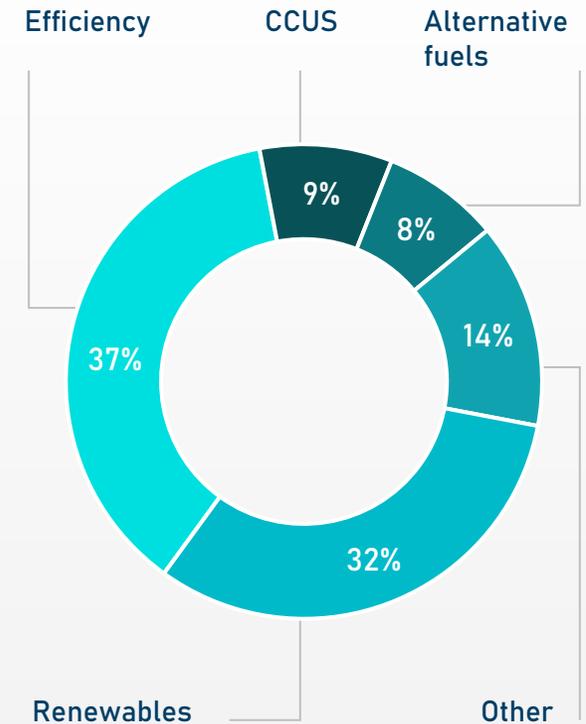
Composition of energy supply¹



Total cumulative energy investment from 2022¹



Planned carbon emission reductions by 2050 by technology



Our energy transition solutions

Energy & industrial decarbonisation



Energy efficiency



LNG¹ as bridge fuel

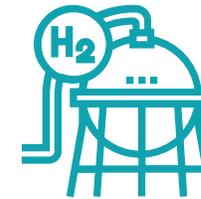


GHG emissions

Scaling high growth new energy markets



CCUS²



Hydrogen



Bioenergy & SAF³

Proven portfolio of solutions to support our customers' energy transition journey

New technologies and services to scale ecosystem

~30% of John Crane sales come from products and services that provide decarbonisation benefits

Improving our customers' energy efficiency

- Our end markets are spending ~\$45bn p.a. on energy efficiency, which is expected to double to achieve net zero targets
- Pumps, compressors and other rotating equipment accounts for 25-50% of our customer sites energy consumption
- Today, we help our customers to reduce energy consumption using existing products and solutions

John Crane Diamond



Case study

- Pulp & paper operation in the USA
- Our Diamond solution increased mean time between failures from 10 months to 4 years (4.8x uplift)
- Improved reliability, lowered water demand and increased efficiency

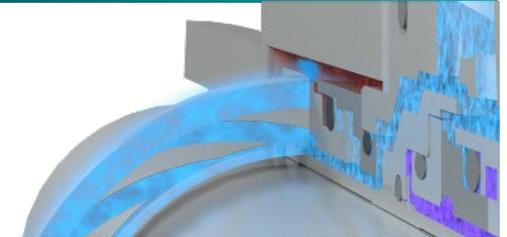
Pump Gas Seal



Case study

- O&G operator in the USA
- Upgrade to Type 2800 pump gas seal
- Over 90% reduction in energy consumed compared with wet contacting seal

USP¹ Seal



Case study

- O&G operator in Middle East
- Upgrade to Type 8600 USP
- Saves ~1 million litres water p.a.
- Upgrading all pumps estimated to save \$2m over 6 years in energy cost

Enabling LNG for energy security

- LNG is critical for energy security and as a bridge fuel to a low-carbon energy system
 - ~50% reduction in CO₂ and ~80% reduction in nitrogen dioxide emissions vs. coal
- Demand expected to grow into the medium-term
- John Crane is a market leader, with 80% of global LNG export facilities using our gas seals, and large installed base of filtration
- Mission-critical nature plays to our strengths:
 - Challenging applications
 - Global network of service centres
 - Low emissions LNG

Servicing a major LNG facility to minimise downtime & enhance energy security



Case Study

- LNG operator in the Gulf Coast (USA), with a facility generating ~\$15m revenue per day
- Our agility and breadth of service capability enabled us to rapidly install new dry gas seals
- Minimising downtime and ensuring energy security

Delivering significant reductions in GHG emissions

- Reducing GHG emissions offers an economical pathway to decarbonisation
- GHG emissions leaks account for 3-4% of total gas production, translating to revenue loss of up to \$30bn
- Regulation is accelerating and prompting action from key O&G players
- John Crane has been reducing emissions & leaks for decades, with proven cost-effective solutions

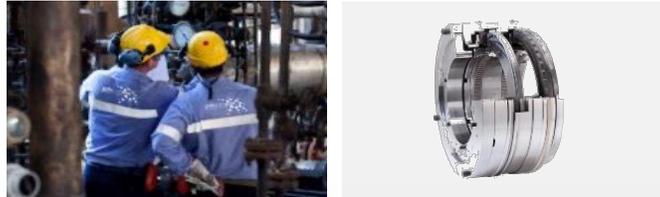
Dual Pressurised Seal



Case Study

- Driven by Clean Air Act 1990
- Installed thousands of low emissions seals
- Reduced millions of tonnes of emissions since 1990s

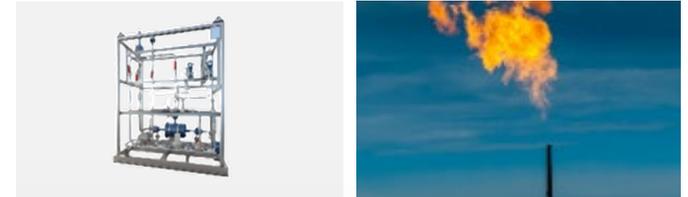
Retrofitting Compressors



Case Study

- Reduce methane leaks by up to ~95% vs wet seals
- Over past 10 years, upgrades are reducing ~280,000 tonnes of CO₂ p.a.

Seal Gas Recovery System



Case Study

- Recover valuable process gas and reduce emissions
- Significant reduction in GHG emissions that would have been flared

We are investing in future emissions reduction services and technologies

We are well positioned in CCUS

- Market is here today across multiple energy producing regions
- We have been active in CCUS for decades as a market leader with c.80% of CO₂ injected underground using John Crane seals
- We are also engaged in 50+ CCUS projects
- Large scale projects predominantly from O&G companies – we are leveraging our relationships and asset base to win
- CCUS sites in O&G have similar aftermarket dynamics as our traditional business
- Investing in new technologies such as supercritical CO₂ seals through a c.£1m grant from the UK Department of Energy Security & Net Zero (DESNZ)

Captured CO₂ (Total market, million tonnes CO₂ per year)



CCUS projects (market)

	Oct. 2022	Oct. 2023	% Change
Announced projects	173	278	+60%
Investments announced	\$114bn	\$171bn	+50%

- ~70% of projects are in feasibility stage
- JC opportunity funnel increased by ~3x in LTM

Our solutions are critical to scale clean hydrogen ecosystem

Forecast hydrogen supply
Million tonnes of H2 per year



Clean hydrogen

- Majority of current green hydrogen projects are smaller scale and in feasibility stages; larger projects expected to be operational by 2030+
- Several large-scale blue hydrogen projects underway around the world. John Crane is active in this area

Conventional hydrogen

- Currently accounts for ~99% of all hydrogen made, but will be displaced over time by clean hydrogen
- John Crane has large installed base in conventional hydrogen

- John Crane has been serving customers in hydrogen applications for over 40 years
- Clean hydrogen market is a small proportion of total market today, but growing quickly
- Our solutions are critical to scale clean hydrogen ecosystem, in particular in midstream (pipelines, ammonia and liquid hydrogen)
- Currently engaged in 20+ green and low-carbon hydrogen projects
- Investing in new technologies, materials and capabilities to meet challenging future technical needs

New energy in action

CCUS: Largest offshore CCS project in the world, based in Malaysia



Background

- Largest offshore CCS project in the world
- Up to 3.3 million tonnes of CO₂ will be captured and sequestered into depleted gas fields

John Crane solutions

- Providing 24 dry gas seals and 12 filters for large number of CO₂ compressors
- Strong relationship with OEMs and end customer to win project

Hydrogen: Blue hydrogen flagship project in the Gulf Coast, USA



Background

- Project is a \$4.5 billion flagship blue hydrogen project based in the US
- Facility to produce ~650,000 tonnes of blue hydrogen p.a., with ~95% of CO₂ captured

John Crane solutions

- Providing mechanical seals, systems and gas filters for rotating machinery
- Well-positioned to capture future aftermarket once facility is operational in 2026

Closing remarks

Energy transition is a \$100 trillion megatrend that will drive growth in both decarbonising existing operations and scaling new markets

We are a market leader with proven solutions helping our customers to decarbonise

The breadth of our technical expertise and capabilities enables us to be agile and responsive to changing new energy demands

We are partnering with customers to develop future technologies that will meet new market requirements and demand

We are well positioned for today and the future to maximise the substantial energy transition opportunity ahead

