neol
copper
technologies

NEOL | Deck

It’s time for change

Index

Clickable slide numbers

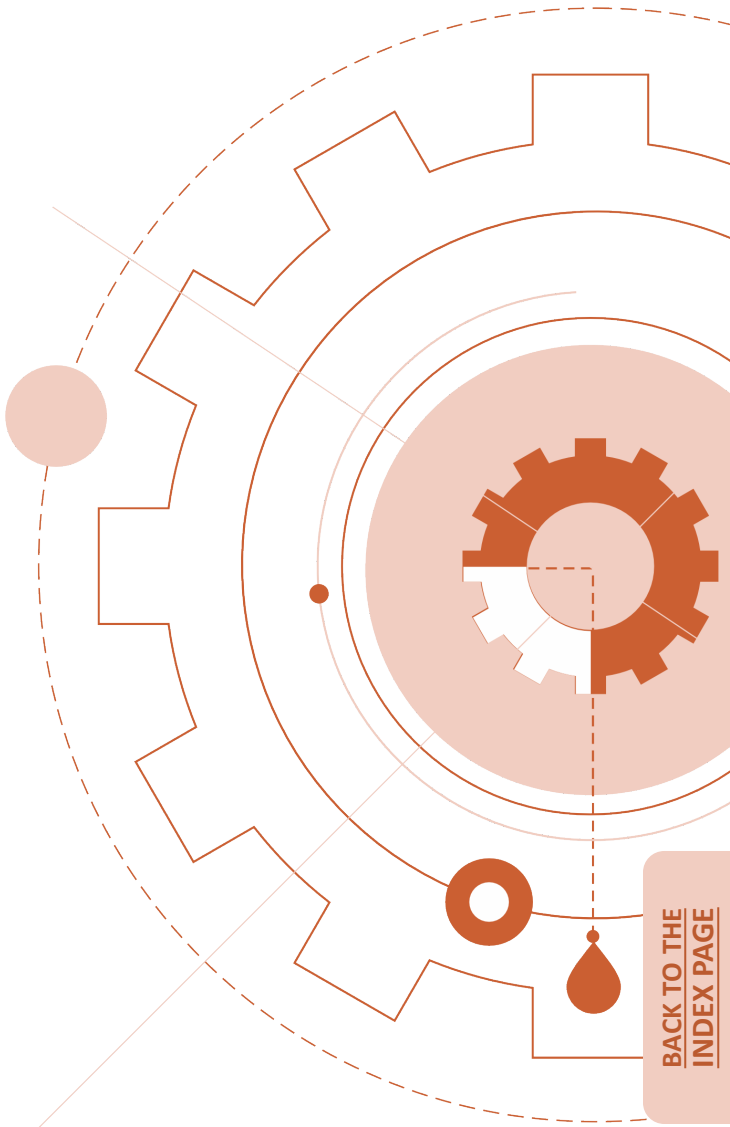
The Introduction

BACK TO THE INDEX PAGE

What do we want to do?

We want to oil the machines and grease the wheels in a way that they don’t age, break, lose energy efficiency and emit toxic substances.

Neol Copper Technologies Ltd is a hard-science company dedicated to developing, testing, and manufacturing innovative technical lubricants and greases. Our lubricants are formulated using synthetic base oils additised with our revolutionary copper filming technology, **CuGlide™**.



BACK TO THE INDEX PAGE

The Problem

Introducing the long-haul truck, built to withstand the rigors of long journeys and prove its reliability day in and day out.

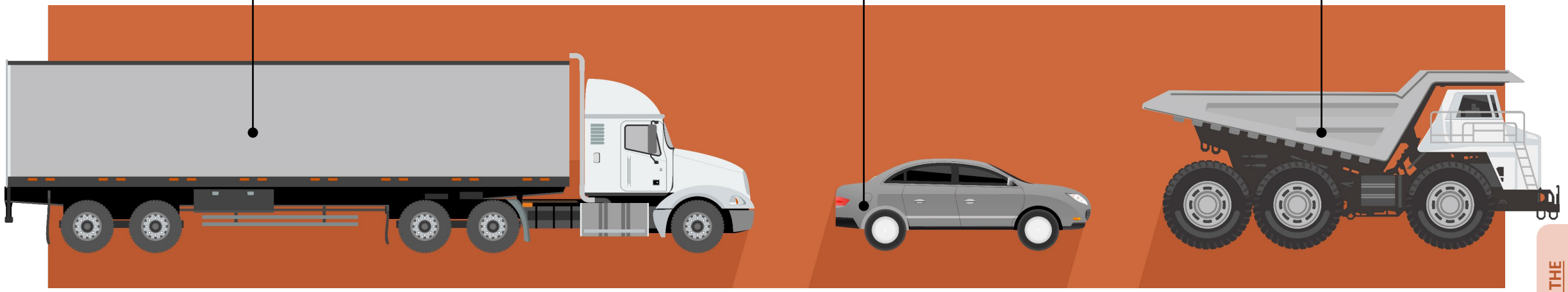
Over a decade of faithful service on the road, this truck's fuel efficiency will drop by 20%.

Introducing the chic and eco-friendly electric vehicle (EV), a perfect blend of style and sustainability.

Its battery will require replacement around the 150,000-mile mark.

Introducing the powerful mining truck, a workhorse engineered to tackle the toughest terrains and heaviest loads with ease.

Due to 24/7 operation in extreme conditions the engine of this mining truck progressively wears and requires major overhaul within 3 years!

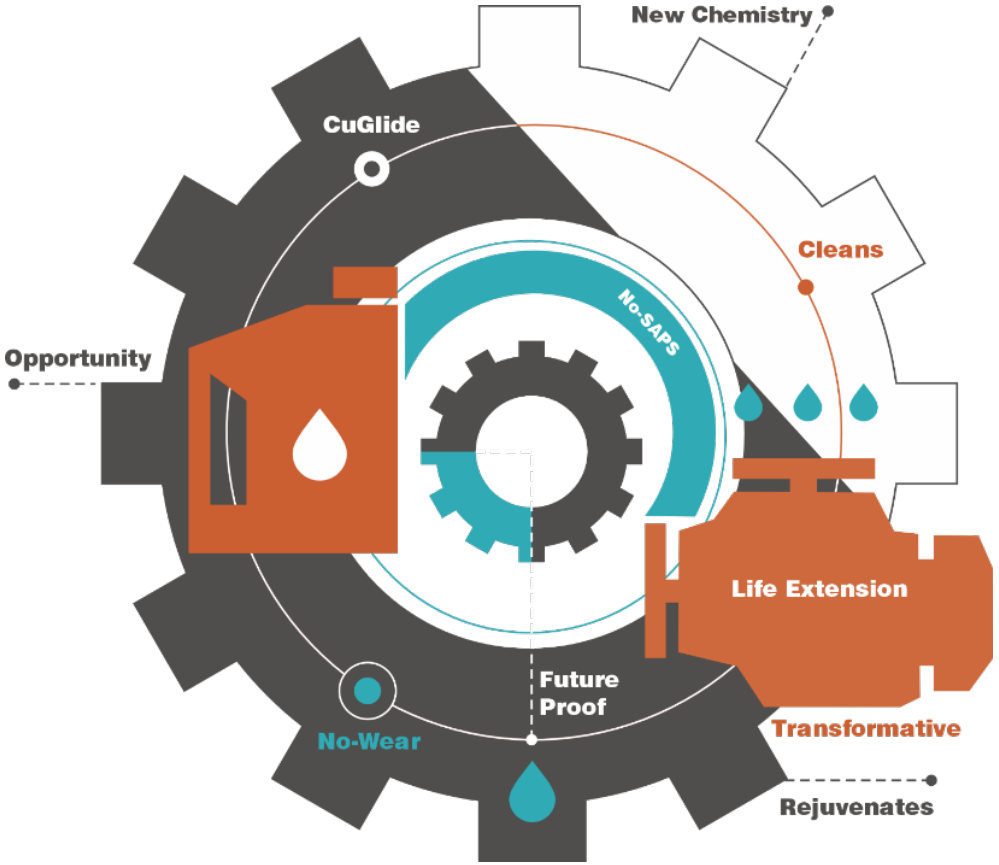


In the world of transportation, we inevitably face the challenges of wear, waste, rising fuel consumption and emissions

BACK TO THE INDEX PAGE

How are we going to solve the Problem?

By transforming technical lubricants



By revolutionising the lubricants industry

Our ground-breaking technology can **transform the global lubricants industry** in the way it approaches anti-wear of machinery, driving positive change and allowing sustainability at no extra cost.

By aligning sustainability with efficiency

With **CuGlide™** inside, **we produce lubricants with exceptional anti-wear, detergency and fuel efficiency properties,** while being free from harmful sulphated ash, phosphorus, and sulphur (no-SAPS).

BACK TO THE INDEX PAGE

Lubricants become SYNOVIAL FLUIDS in metal joints preserving them from wear, failure and loss of efficiency

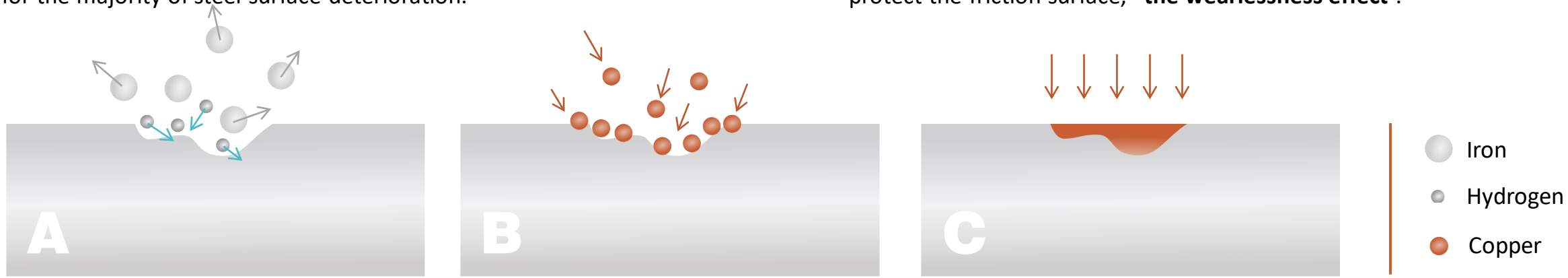
How does it work?

Hydrogen Wear

In the 1950s, engineers discovered that hydrogen was responsible for the majority of steel surface deterioration.

The Wearlessness Effect

Electrochemical properties of copper ions are used to restore and protect the friction surface, "**the wearlessness effect**".



CuGlide™ technology takes advantage of the **"hydrogen wear"** mechanism. Rather than allowing uncontrolled hydrogen invasion of the friction surface, the additive technology first uses its properties to "polish" the friction surface at the elementary level. The hydrogen wear is then terminated with copper ions.

A. Hydrogen displaces steel molecules, accelerating the wear of machine parts.
B. Copper ions are embedded in the crystal lattice of iron in iron-containing alloys, thereby "healing" damaged areas.
C. They gradually form an even copper film covering an entire surface, at which point continued wear virtually ceases.

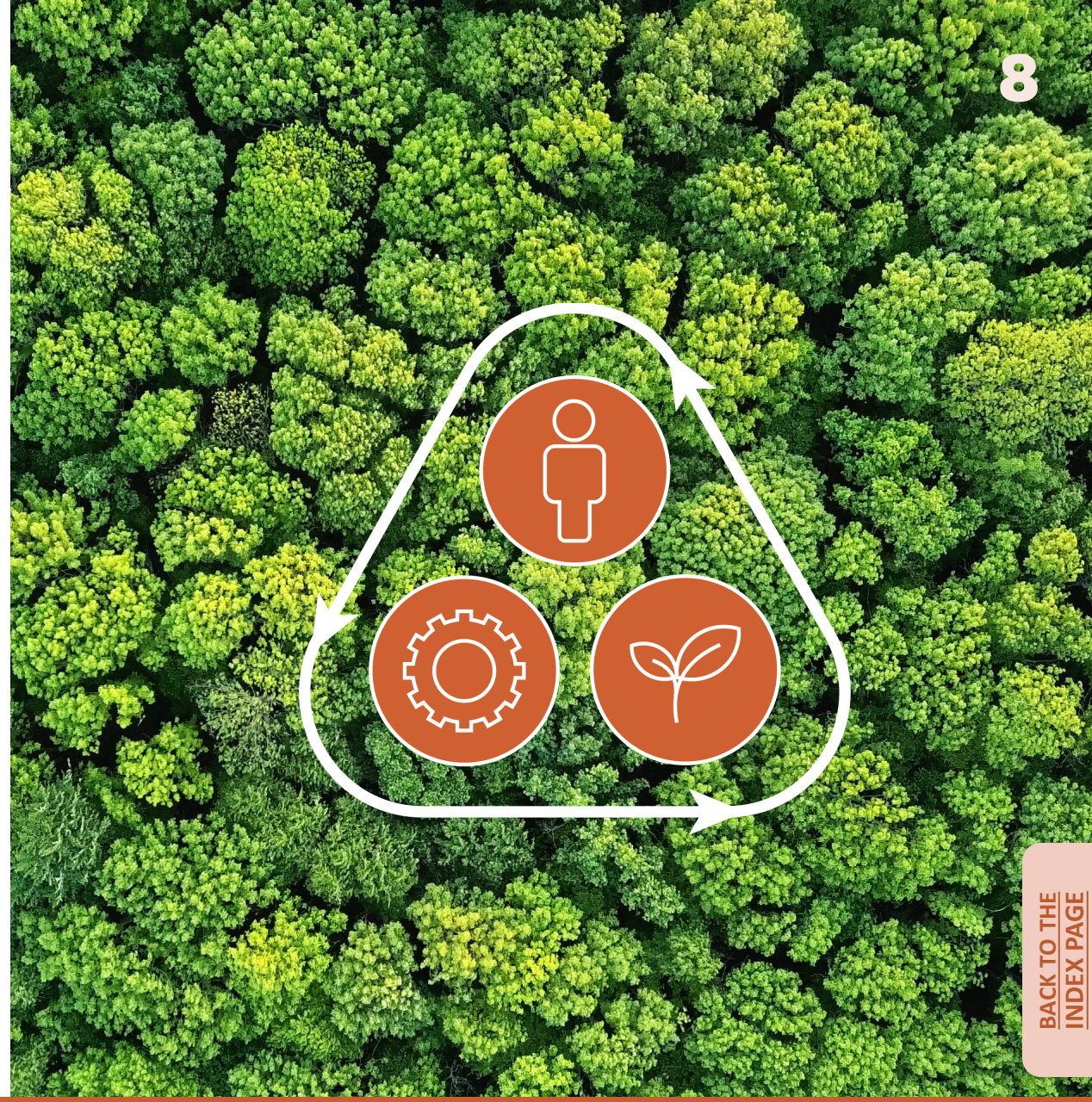
BACK TO THE INDEX PAGE

We harness NATURE'S INTELLIGENCE to protect machine parts

Our Vision

In today’s world, it’s crucial for humans, machines, and nature to be **resourceful.** We all strive to achieve our goals and feel confident along the way. But what's even more important is learning how to **preserve the precious resources given to us by nature**.

At NEOL, we deeply understand the value of these reserves, **which is why we create technologies that extend the lifespan of equipment and help protect both natural and human resources**.



BACK TO THE INDEX PAGE

We want to preserve RESOURCES for a SUSTAINABLE FUTURE

Climate change context

We have been on the quest to find THE SOLUTION – it turns out there is no such a thing

While we are looking for the panacea for the climate change problem, we can't continue treating the wounds by covering them with short-term first-aid plasters.

Most of the gasoline- and diesel-powered machines are not going anywhere for the next decades. **But…**

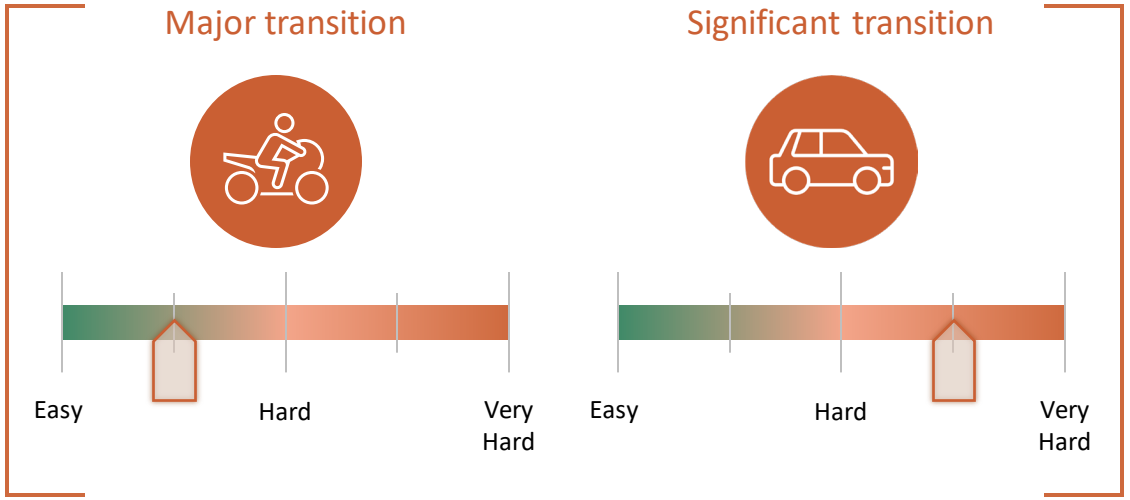
Improving the efficiency of 100 heavy CVs by just 1% equates to 110 cars going ICE to BEV

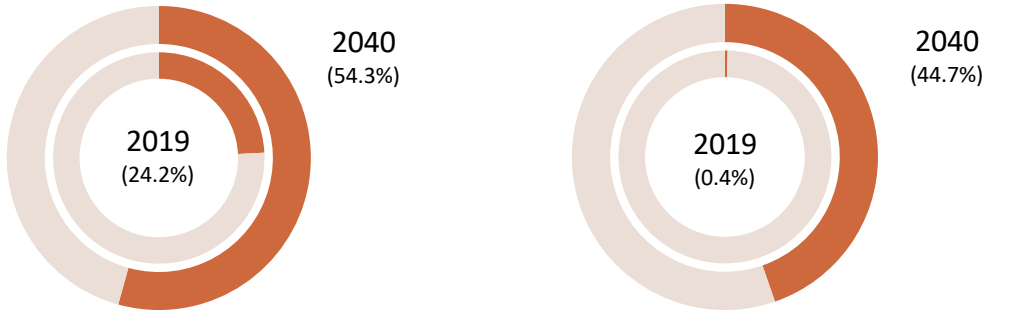
There are SOLUTIONs we can implement NOW

BACK TO THE INDEX PAGE

The energy transition - electrification impact

	Motorcycle	Light duty	Heavy duty	Manufacturing
Ease to decarbonize	Major transition	Significant transition	Partial change	Growth
	Easy – Hard – Very Hard	Easy – Hard – Very Hard	Easy – Hard – Very Hard	No Change
Share of fleet electrified	2019 (24.2%) → 2040 (54.3%)	2019 (0.4%) → 2040 (44.7%)	2019 (0.4%) → 2040 (25.6%)	2019 (0%) → 2040 (0%)





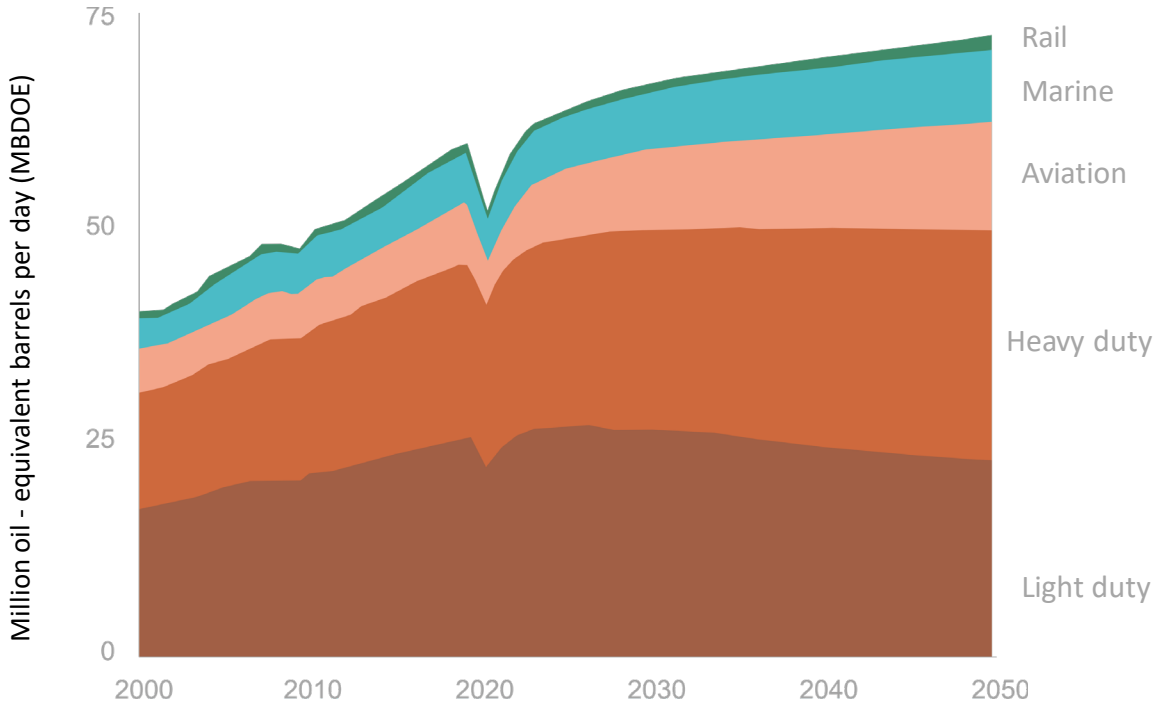
Source: BNET 22-06-01 Long Term Electric Vehicle Outlook 2022 Economic Transition Scenario (ETS).

BACK TO THE INDEX PAGE

Multiple paths are required to effectively tackle global decarbonization

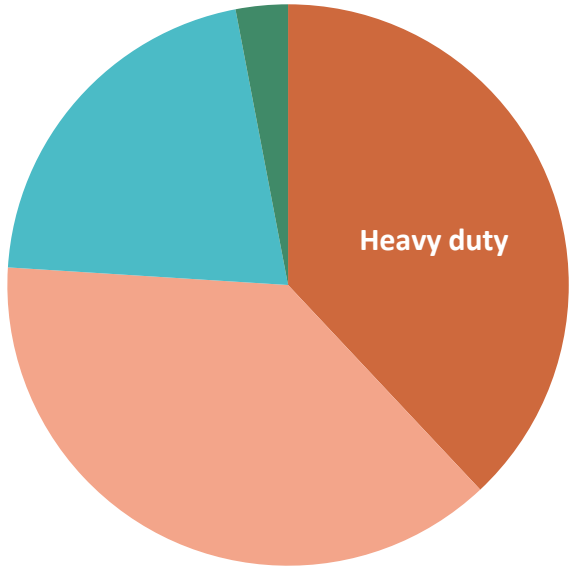
Transport energy demand by application

Energy demand



The biggest growth in energy demand is from the heavy duty linked to macro trends

Growth 2021-2050



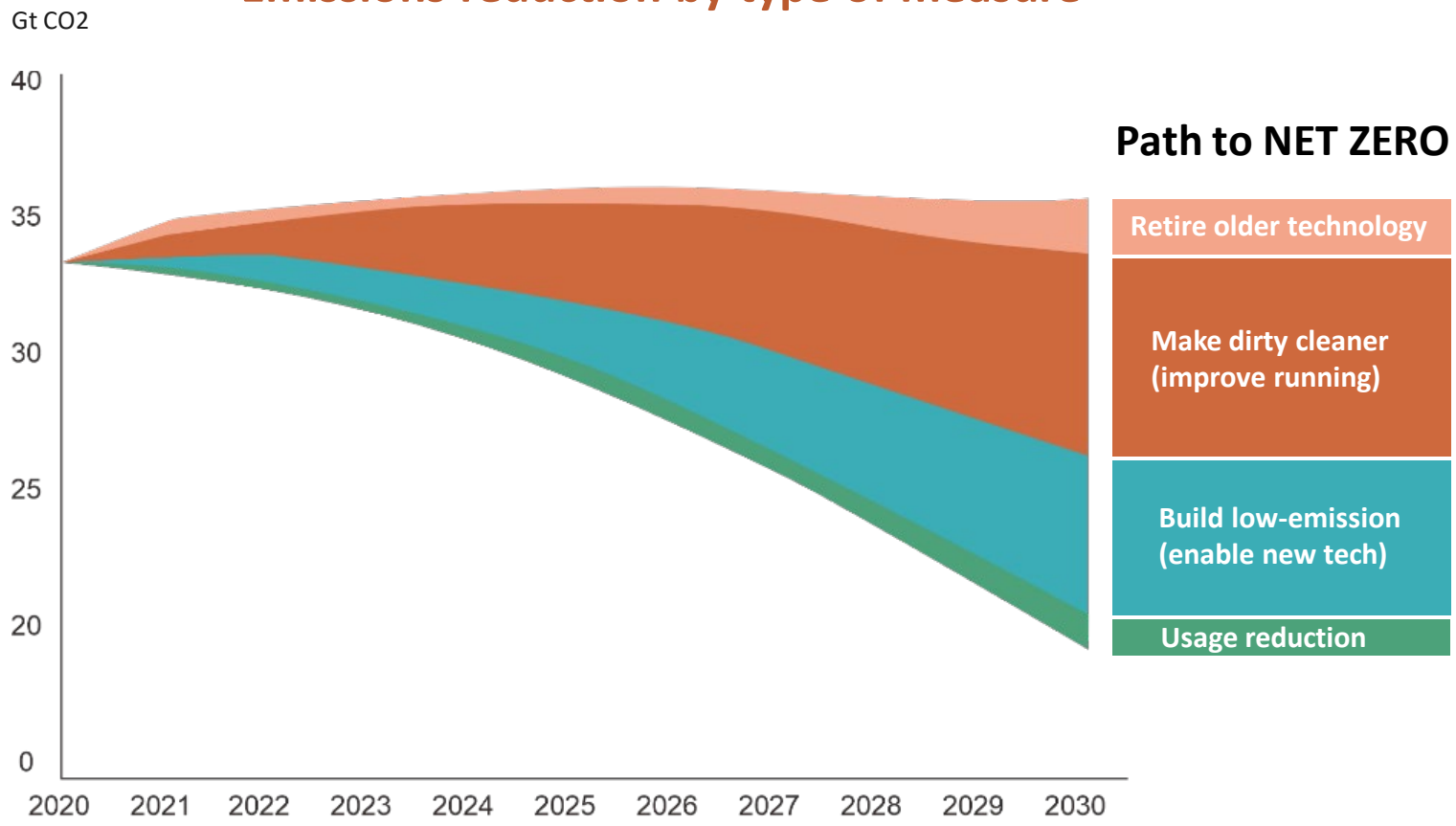
Source: Energy demand: Three drivers | ExxonMobil, Global

BACK TO THE INDEX PAGE

Diesel- and gasoline-powered machines will drive energy demand growth over the next few decades

How do we contribute?

Emissions reduction by type of measure



Path to NET ZERO

- Retire older technology
- Make dirty cleaner (improve running)
- Build low-emission (enable new tech)
- Usage reduction

neol's efforts are aimed at solving this significant issue

Source: IEA (International Energy Agency)

And we want to CONTRIBUTE TO CLIMATE CHANGE FIGHT in the areas where others can't

BACK TO THE INDEX PAGE

The Story

BACK TO THE INDEX PAGE

A story of a man

Every memorable story has a hero

This is Neil. Neil is a manager in the transportation or industrial sector, whether running a trucking company, an agricultural firm, or an energy enterprise.

Neil **makes daily decisions** to protect his businesses and prepare for the future, much like the head of a family. He feels the need to keep everyone safe amidst the looming threat of climate change, striving to be part of the solution rather than the problem.

But at work, our hero is laser-focused on performance, profit, and resilience. Keeping clients happy, jobs safe, and margins protected is crucial. **With increasing expenses, cutting costs is a priority. Equipment must now last longer and operate efficiently**. Fleet managers aim for zero disruptions to asset performance.

And it doesn't end there. Human resources too are in short supply while equipment utilisation becomes more and more complex. Environmental contamination is an on-going concern. And fluctuations in variable costs abound in their usual unpredictable way.

Along this journey, the commercial realities for fleet operators may conflict with their ecological aspirations.

BACK TO THE INDEX PAGE

Neol is here to help

NEOL Copper Technologies has developed a new innovative lubricant technology, and real-world testing continues to demonstrate that engines and gears using CuGlide-powered oils experience a **rejuvenating transformation** in efficiency as the lubricant coats and heals damaged/worn areas, removes sludge and deposits with a cleaning effect, and does not block DPFs or poison expensive catalysts and sensors.

Data from field trials have shown tangible quantitative fuel saving improvements, demonstrating that **NEOL's science can deliver a significant TCO** (total cost of operating) **saving to commercial vehicles** – helping fleets in their quest to manage costs, achieve profitability, keep ageing equipment running for longer and giving a direct impact to their carbon footprint (CO2 reduction).

Increasing the lifespan of machinery provides an opportunity to delay the need for replacement costs and helps our environment by avoiding scrappage of valuable material resources.

BACK TO THE INDEX PAGE

At NEOL we believe there is a WIN-WIN

Our Products

From transportation to industrial technology, EV and H2

Neol offers a comprehensive range of products tailored to various sectors. These products serve as a no-SAPS alternative to conventional oils, providing users with an effective alternative that aligns with decarbonisation and climate preservation commitments.

For commercial vehicles, marine and railroad we offer:

- Engine oils
- Gear oils
- Hydraulic oils
- Greases
- New lubricants for EVs/H2 ICE

And for industry we offer:

- Application greases
- Zinc-free high-performance hydraulic oils
- Reductor and gear oils
- Energy-saving lubricants for stationary diesel generators

BACK TO THE INDEX PAGE

Technology's versatility allows us to THINK BIG

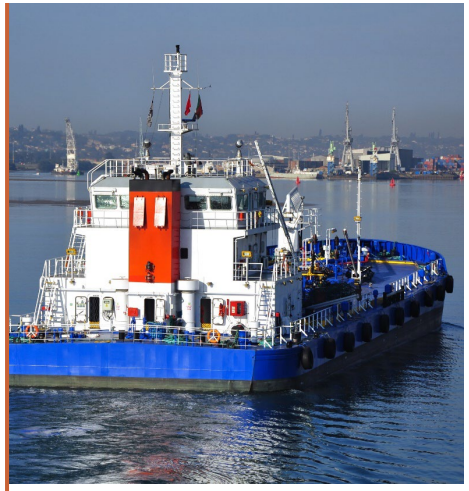
Applications and commercial benefits

Cleaner and healthier engines

- Improved fuel efficiency
  - → Improved TCO & profitability (£)
- Increased power & torque
  - → Increased productivity (£)
- Extended vehicles' useful life
  - → Higher second-hand values (£)

Increased equipment durability

- Hydrogen wear eliminated
  - → Extension of component life (£)
- Reduced friction
  - → Lower operating temperatures & energy consumption (£)
- Increased oil & grease service life
  - → Optimization of maintenance (£)



Increased operational efficiencies

- Longer synthetic lubricant life
  - → Oil service interval extension (up to 3x increase) (£)
  - → Synchronized oil intervals for main & auxiliary engines (£)
- Increased thrust (reduced vibrations in propulsion systems)
  - → Improved power & productivity (£)

Increased operational efficiencies

- Reduced wear and friction
  - → Significant extension of component life (bearings, pistons, cylinder bushings…) (£)
  - → Improved energy efficiency (£)
- Increased grease service life
  - → Optimization of maintenance (£)

BACK TO THE INDEX PAGE

Ecological benefits

Cleaner and healthier engines

- Supporting less wear and greater efficiency of the ICE

  → Reduction of harmful GHG emissions during use

- Focus on fuel efficiency

  → Conserving Earth's resources and minimizes waste

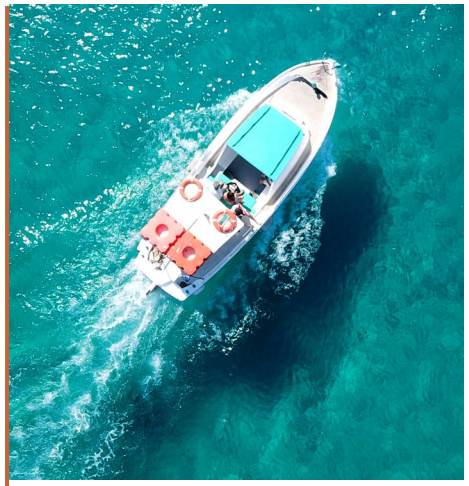
Increased equipment durability

- Reduced wear and tear on gears and bearings

  → Minimising maintenance and replacement (protecting resources)

- Reduced operating temperatures

  → Decreases energy consumption and extends life cycle of lubricating oils and greases (less waste/disposal)



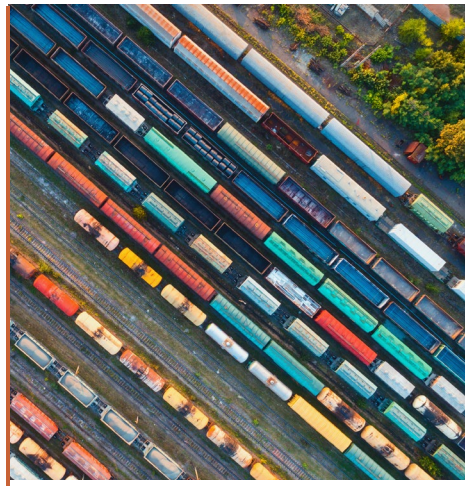
Increased operational efficiencies

- Reduction of friction and wear leads to better fuel economy & lower emissions

  → Improving air quality and meeting environmental regulations

- Reduced level of petroleum pollutants contaminating the water

  → Protects aquatic life



Increased operational efficiencies

- Smooth operation with reduced wear and friction

  → Energy savings and life extension of rail components

  → Prevention of sudden failures or derailments (passenger safety)

- Reduced operating temperatures

  → Extends life cycle of lubricating oils and greases (less waste/disposal)

BACK TO THE INDEX PAGE

The Value

BACK TO THE INDEX PAGE

Where is NEOL?

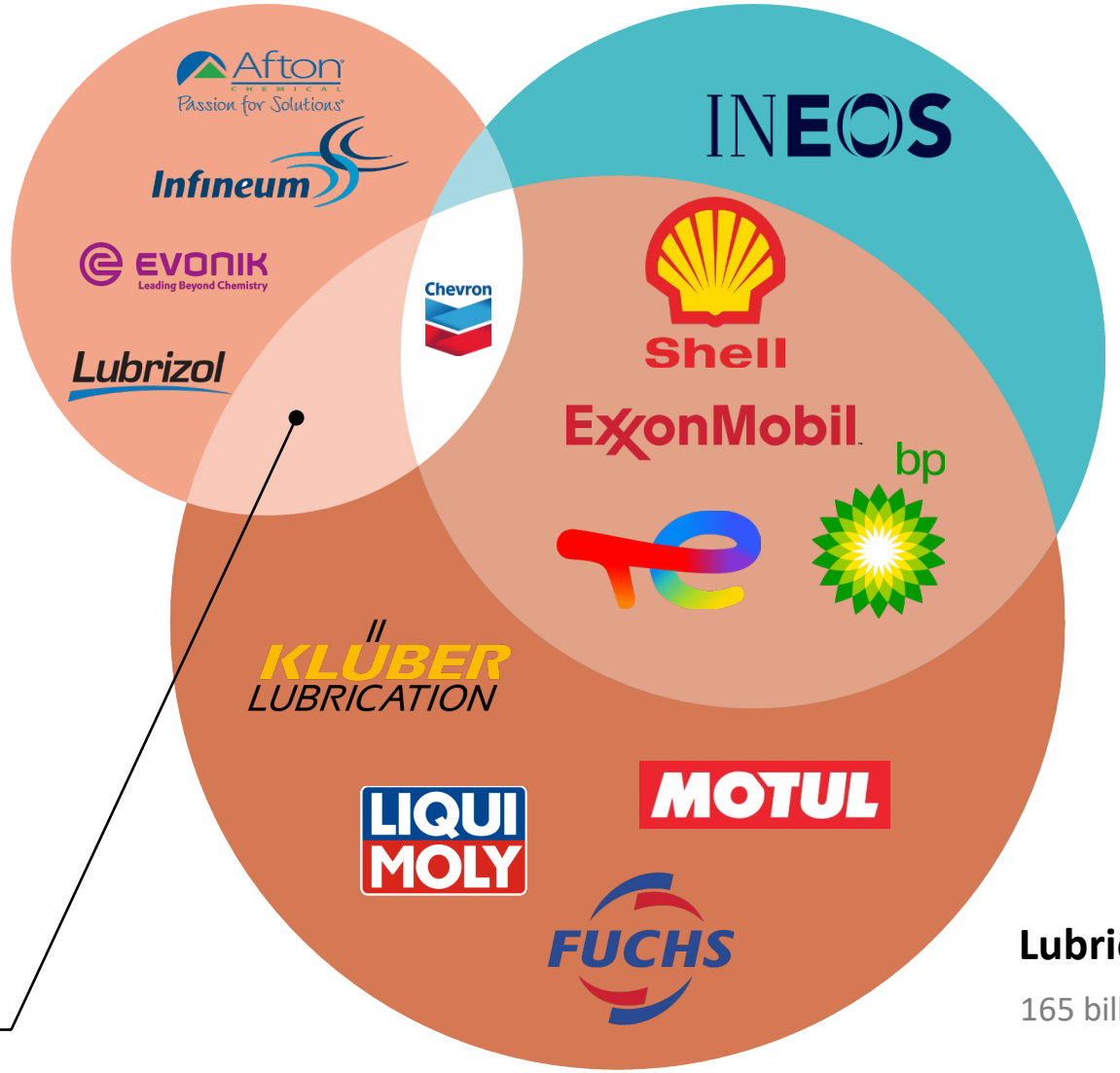
OEMs

Testing Lab

Additives

13 billion USD

Base oils



neol

Lubricants

165 billion USD

BACK TO THE INDEX PAGE

Why us and why now?

Modern ICEs are very efficient. The next step to optimise ICE performance is to introduce a new lubricant solution, which can **maintain the initial engineered fuel efficiency** for longer and **repair the old**. We can maximise the efficiency of current equipment by making it much cleaner and healthier within short timeframe without any substantial changes in technological processes and keeping it new throughout its entire life.

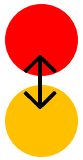
NEOL's technology versatility allows formulation of high-performance life-extending lubricants for such heavy industries as mining, energy generation, commercial transportation, industrial manufacturing. It is a well-known fact that **these industries are extremely hard to bring to net zero, and they will drive growing energy demand in the next decades.** So, any immediate reduction in energy and resource consumption matters a lot.

CuGlide™ also enables formulation of **new generation lubricants** for electric vehicles and future hydrogen-fuelled powertrains (both ICE and hydrogen-electric) where the conventional technology has significant limitations.

BACK TO THE INDEX PAGE

We CAN do something that others CAN'T

What can Neol offer versus industry competitors?

	(Remove) SAPS ↓	(Remove) Zinc ↓	(Rejuvenate) Performance ↑	(Prevent) Wear ↑	Fuel Efficiency ↑	(Reduce) Emissions ↓	(Manufac.) Footprint ↓	Industry Identity ↑	Market Channel ↑	Market Share ↑	Proven & Tested ↑	OEM Qualified -
Neol												
Global Additive Tech												
Alternate Additive Tech												
Comments	**Neol @ <0.1% is Unique** Industry remains static on classic Detergents.	**Neol @ 0% is Unique** Industry continues to depend on ZDDP! Albeit lower levels.	**Neol reduces friction & revives equipment performance.** Standard oils protect – not rejuvenate.	**No wear after rejuvenation is unique.** Wear & tear is a natural occurrence.	**Neol recovers lost fuel economy & power.** Standard oil depend on low viscosity grades and novel friction modifiers.	**Neol:** **Less friction.** **Less wear.** **Higher efficiency.** **Cleaner engines.** **Less fuel.** **=** **Less emissions**	**Unique formulating <7 components** Standard additives utilise 15-20+ components.	Continue to build & communicate the image and brand through media and marketing. *Investment required*	Small scale operating experience. Investment in scale-up and supply chain capabilities. *Investment required*	Opportunity for new entrants to penetrate and be a successful in an established market. *Investment required*	Continue to generate proof of performance data. Real-world & test cells. *Investment required*	Potential for limited OEM approvals. Not a strategic goal Very high £ investment required. High barrier to entry.

BACK TO THE INDEX PAGE

What is our market penetration strategy?

- The market is dominated by large well-established brands like Shell, Castrol, Valvoline, Fuchs, who sell mostly through national distributors, or directly in case of smaller brands like Morris. Customers value good logistics and technical services.

- The primary market barriers are structural: the market is mature, dominated by large corporations, and complicated OEM approval system defines consumer choice. Mitigation strategies involve **recruitment of a professional B2B sales team and conducting real-life application tests** to overcome initial scepticism and demonstrate the efficacy of Neol's innovative lubricants.

- **Neol will adopt a direct sales approach,** targeting fleets with in-house maintenance service, and supporting by PR and advertisement in specialised media.

BACK TO THE INDEX PAGE

How do we create value?

	Oils & Greases	CuGlide	Both
Independent manufacturer	• 8 Potential Markets • 5 Geographic Locations (UK, Australia, EU, US, China or Indonesia • Three Product Categories In Each Market (Engine Oil Transmission or Reductor Fluid, Compressor oil, Hydraulic oil, Application or Semi-liquid Grease. • 1.5 to 3.0% Market Share	Revenue from: • CuGlide Additive Sales or License Payments • Up to 10% of ZDDP market	
	30,000 tons per annum with over GBP 200m implied revenue in 2028	**GBP 400m of potential revenue in 2030**	**Up to GBP 700m potential revenue in 2030**
Partnerships	Sales Revenue from: • White Label lubricants • Share of integrated equipment lifetime service revenue stream ("oiled equipment time" model with filtration or "selling rotations" with SKF)		
	TBC	**TBC**	**TBC**
Asset Sale			
	Sale at DCF value	**Sale to one of Global Players at Exclusivity Premium**	**Sale to broader range of players (incl OEMs or large fleet owners) at Exclusivity Premium**

BACK TO THE INDEX PAGE

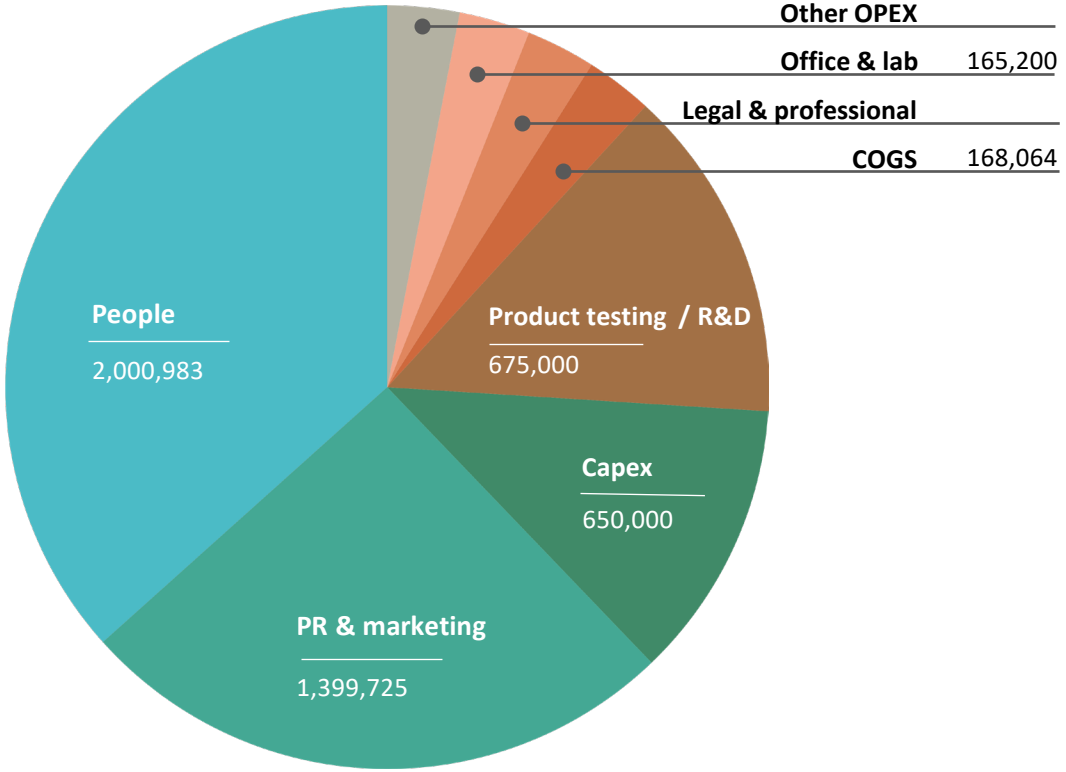
What do we need to be able to do it?

Funding

For now, we need **GBP 5m** to set up a lab with small additive manufacturing capacity in the UK, hire great sales-people and let the whole world know how we can help.

Founders have already invested over GBP 1m in the project.

Use of Funds /GBP/

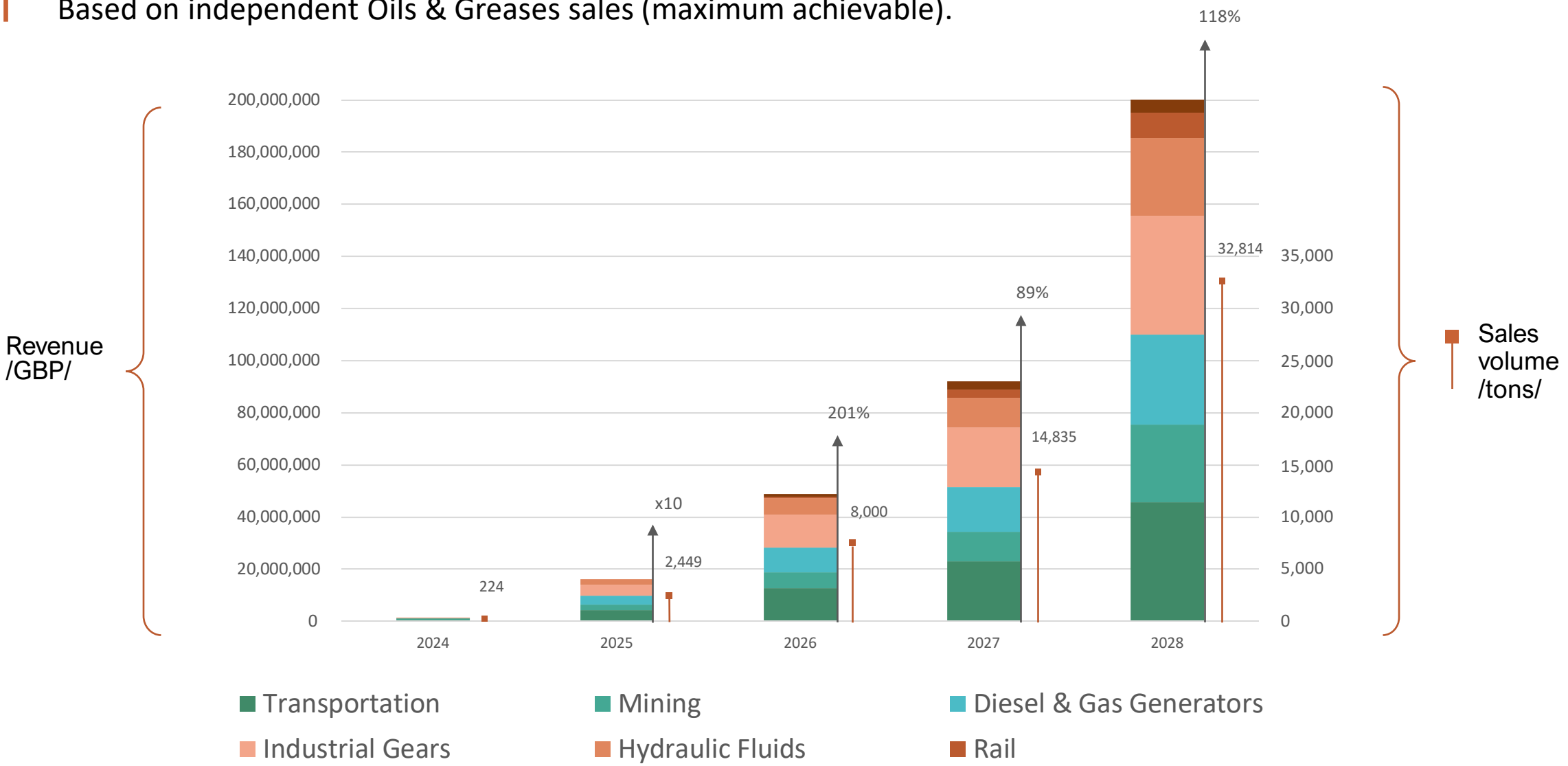


BACK TO THE INDEX PAGE

NEOL is raising its first institutional round

Revenue Model

Based on independent Oils & Greases sales (maximum achievable).

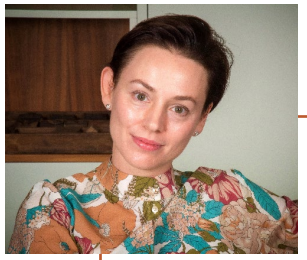


BACK TO THE INDEX PAGE

Our Team

Dr Sergei Mamykin

Chief Scientific Advisor, design engineer and tribologist, developer of CuGlide technology



Leyla Alieva

CEO and Co-founder, team-leader, professional private equity investor and business development specialist

Dmitry Privalov

Principal Co-founder and main investor, experienced mining top manager

Alexey Kotov

Deputy CEO (operations), experienced operational manager and business development professional

David Wilson

Head of Products, highly-experienced industry professional (30 years at Lubrizol Ltd prior to joining NEOL)

Rafe Britton

Technical Advisor, renowned lubrication expert (ex-Mobil application engineer)

Polina Fedorova

Communications Director, experienced PR and communications professional

Marc Hartog

Fractional CFO, highly-experienced strategic CFO with entrepreneurial background

BACK TO THE INDEX PAGE

* Please click on the LinkedIn icon to be directed to the LinkedIn profile

Appendix

BACK TO THE INDEX PAGE

Glossary

ZDDP is one of the oldest antiwear chemical additives and one of the most effective. Under pressure and in the presence of heat, the phosphorus that it carries forms a film on metal surfaces that help protect them against boundary friction. It also helps to prevent oxidation and corrosion. Unfortunately, the chemical is extremely tough on emissions control technologies. Phosphorus tends to poison three-way catalysts and selective catalytic reduction, while ash clogs particulate filters. Moreover, ZDDP forms organic phosphates in exhaust, which are neurotoxic to people. Automakers have been pressing for the reduction of ZDDP in lubricants, but this comes at the expense of anti-wear properties.

SAPS is an abbreviation for Sulphated Ash, Phosphorus and Sulphur content in lubricants.

Hydrogen Wear - wear caused by the release of hydrogen in the friction zone - is the process of wear of metals in the friction contact zone, where the determining factors are the mechanisms of hydrogen embrittlement in microlayers of frictional interaction during hydrogen adsorption on interfaces or diffusion of hydrogen from the bulk of the metal into the zone of frictional interaction.

Selective transfer during friction **/Wearlessness effect/** is a phenomenon that is opposite in nature to wear: if during wear all processes in the friction contact zone are reduced to destruction of the surface, then with selective transfer friction can be accompanied by evolutionary processes, as a result of which the destruction of surfaces becomes secondary. The main thing is the creative nature of friction, which is due to the exchange of energy and matter between the friction unit and the external environment, as well as the collective behaviour of metal ions, from which a thin film is formed that protects the friction surfaces from wear.

BACK TO THE INDEX PAGE

Our History

1956 1958

“Wearlessness effect”* and “Hydrogen Wear of Metals”* phenomena discovered by Professor Dmitry Garkunov and a group of soviet engineers.

1993

Railway engineer Sergei Mamykin meets Prof. Garkunov and begins joint research on the causes of wagon wheel wear on railway tracks. They establish the key reason for wear is hydrogen.

2000 2008

A copper-containing additive to engine oil is tested within Russian Railways.

Its use leads to fuel savings, a decrease in engine oil consumption, and a significant decrease in the engine cylinder-piston group parts failure.

Large-scale tests of the copper-based lubricants are also being carried out. RR's in-house grease plant produces around 10 thousand tonnes of lubricants for wheel-rail contact.

2012

CUPPER LLC is founded by Dr. Mamykin. It manufactures copper-based lubricants for technical sports.

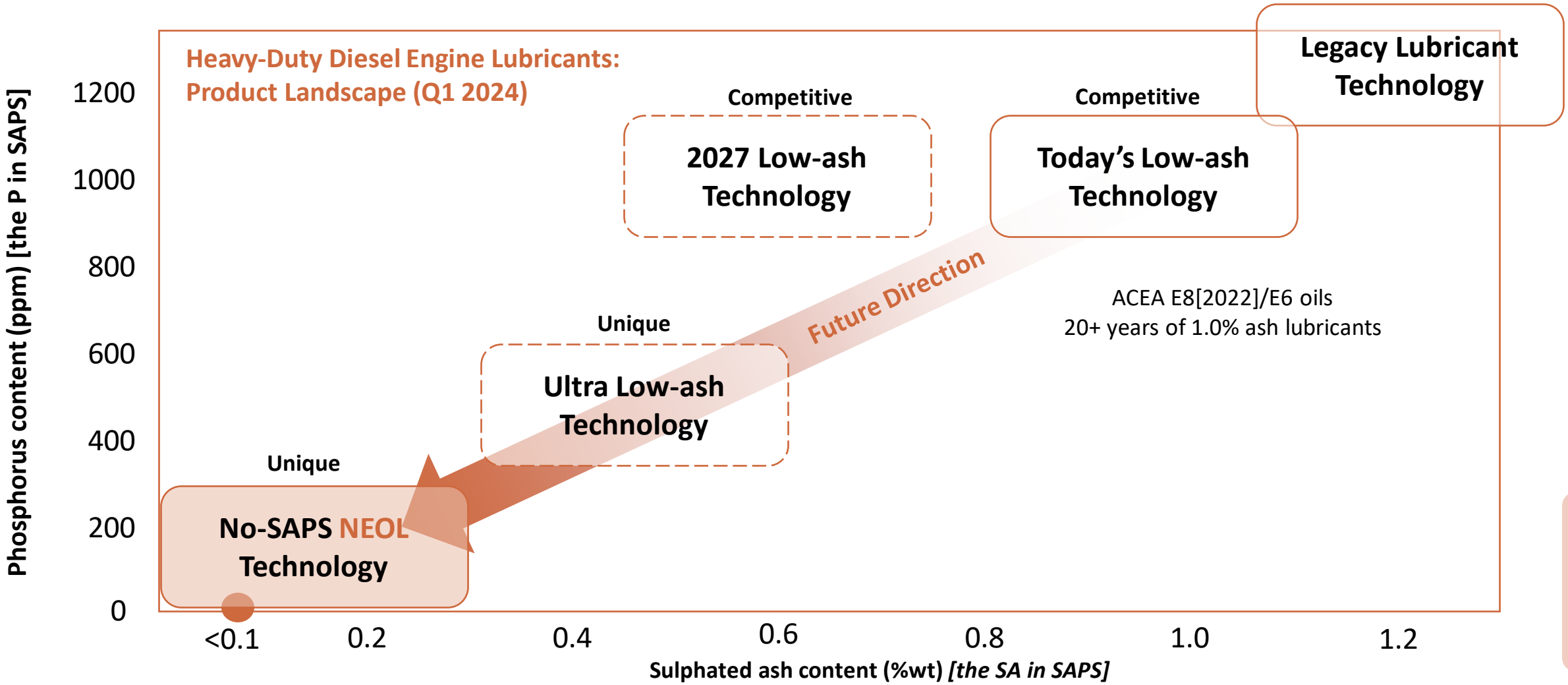
Over the next decade, it grows into an independent manufacturer of oils and greases, selling to over 50,000 private vehicle owners, commercial fleets, and locomotive manufacturers.

2023

NEOL Copper Technologies Ltd (UK) is founded by two UK-based entrepreneurs and former CUPPER LLC executives, with full support of Dr. Sergei Mamykin.

BACK TO THE INDEX PAGE

The Holy Grail of engine lubrication



BACK TO THE INDEX PAGE

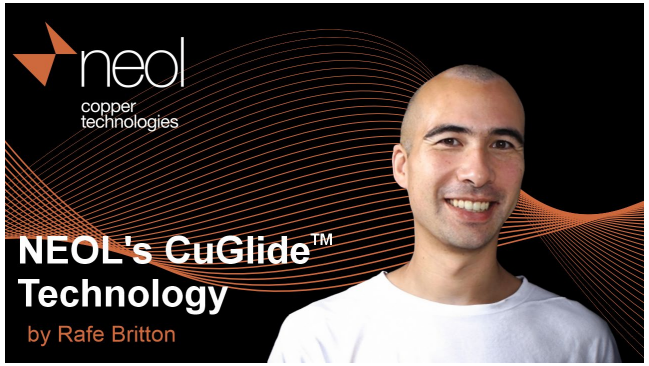
Industry Insights

Watch Expert Videos

Discover how NEOL is paving the way towards a sustainable future through innovation in technical lubricants.

Rafe Britton* explains how NEOL's CuGlide Technology solves the issue of hydrogen wear. Learn how to harness Mother Nature's intelligence to enhance machine reliability.

Rafe Britton* explains how NEOL's copper filming technology works. He compares CuGlide- vs ZDDP-based anti-wear technologies.



Rafe Britton* delves into the phenomenon called "the hydrogen wear of metals," which serves as the starting point for NEOL's CuGlide Technology.

BACK TO THE INDEX PAGE

* Rafe Britton, the Lubrication Expert, is known within the industry for his @LubricationExplained YouTube channel and podcast

It’s time for change.

www.neol.world