

# Taking on the big challenges

OUR BUSINESS MODEL AND HORIZON 2020 STRATEGY ARE FOCUSED ON MAKING A DIFFERENCE IN THE WORLD'S MOST PRESSING ISSUES



## CLEAN AIR

While regulation has gradually led to reduced air pollution over the past 30 years, many opportunities remain for further emissions reduction given the major challenges to human health from poor air quality.

### WHAT IS THE POTENTIAL IMPACT?

Combustion engines produce toxic emissions such as nitrogen oxides (NO<sub>x</sub>), hydrocarbons and particulate matter, making road transport a major source of air pollution. According to 2016 data analysis published by the World Bank, air pollution is the fourth deadliest health risk worldwide, triggering one in ten premature deaths. A 2016 UNICEF study revealed that around 300 million children live in areas where the air is toxic – exceeding international limits by at least six times.

### WHAT IS UMICORE'S CONTRIBUTION?

We are one of the world's leading producers of catalysts and catalytic filters used in emission abatement systems for light and heavy-duty vehicles, on-road and off-road. Our catalysts and particulate filters convert fossil fuel pollutant emissions into harmless gases and trap the particulate matter, enabling our customers to meet present and future environmental standards. Our products have prevented hundreds of million tonnes of harmful pollutants from being emitted into the air.

In 2017, we opened a new production plant for emission control catalysts in Rayong, Thailand, serving the hub of Southeast Asia's automotive industry. To better address the global needs of our Korean automotive catalyst customers, we acquired full ownership of Korean automotive catalyst joint venture, Ordeg Co. Ltd. We also expanded catalytic solutions for on-road and non-road heavy-duty diesel by integrating Haldor Topsoe's DeNO<sub>x</sub> technology.

### WHAT IS THE STORY IN 2017?

Worldwide, the trend towards more stringent automotive emission legislation and targets has continued. In Europe, building on the 2015 Euro 6 norm which limits the permitted level of NO<sub>x</sub> for diesel cars, cities are leading on action for clean air.

The automation and electrification of transport has dominated the public debate on closing the global emissions gap, while new measures on driving emissions push industry for innovation in emission control system design, including catalysts and catalytic filters.

### UN SUSTAINABLE DEVELOPMENT GOALS (SDGs)



Umicore is working to meet the growing demand for clean mobility and clean air and striving to ensure resource efficiency, resilience and sustainability in industry's supply chain.

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## VEHICLE ELECTRIFICATION

The transport sector is responsible for over 14% of global anthropogenic greenhouse gas emissions. Electrified mobility will play a key role in reducing both CO<sub>2</sub> and NO<sub>x</sub> emissions, improving air quality and reducing dependence on fossil fuels.

### WHAT IS THE POTENTIAL IMPACT?

The transport sector is the fastest growing source of global greenhouse gases, the largest share of which come from road transport. Electrified transport is essential for meeting global ambition of reduced emissions and clean air by combining energy efficient systems with renewable energy sources to offer clean, quiet, powerful transport.

### WHAT IS UMICORE'S CONTRIBUTION?

Umicore is one of the world's leading producers of cathode materials for lithium-ion batteries. Cathode materials are key in determining the power and energy density of rechargeable batteries, and hence the maximum driving distance in the case of electrified vehicles. Our nickel-manganese-cobalt (NMC) cathode materials are a reference in the industry.

To meet the growing market demand, we announced an investment programme of € 300 million between 2017 and 2019 to further increase our production of NMC cathode materials for lithium-ion rechargeable batteries. This programme entails further

investments in Cheonan (Korea) and Jiangmen (China). Combined with the € 160 million investment announced in 2016, this will result in over a six-fold increase in total capacity by 2020 compared to 2015 levels.

### WHAT IS THE STORY IN 2017?

In 2017, the number of electrified vehicles (EV) continued to grow, with over two million EVs on the road. This number is expected to increase exponentially in the coming years.

Several countries and regions have drafted ambitious vehicle emissions reduction targets. In Europe, EU legislation requires fleet average to be achieved by all new cars of 95 grammes of CO<sub>2</sub> per kilometer by 2021. As part of the 2016 European Strategy for Low-Emission Mobility, in the fourth quarter of 2017 the European Commission released its second clean mobility package which included a legislative proposal with new targets for the EU fleet-wide average on CO<sub>2</sub> emissions of new passenger cars and light commercial vehicles from 2025 and 2030.

The package includes a flagship initiative to support European battery development and innovation.

Incentives favouring electric vehicles are increasing around the world. In 2017, China – the global leader in electric car and bus sales – announced a fossil-fuel car manufacturing phase-out that starts at a 10% production minimum of “new energy vehicles” in 2019 and increases targets for following years.

### UN SUSTAINABLE DEVELOPMENT GOALS (SDGs)



Umicore is working to optimise resource use and reduce pollution, and provide solutions for a cleaner and more resilient future.

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## RESOURCE SCARCITY

Trends such as continued population growth, urbanisation and more affluent lifestyles are driving ever-higher demand for resources. This poses the question – how will we meet future demand?

### WHAT IS THE POTENTIAL IMPACT?

Demand for specialty and precious metals will also be driven by reducing the environmental impacts of society, through the development of technologies such as rechargeable batteries. On the one hand, mining metals from primary sources has significant environmental impacts, including a high CO<sub>2</sub> footprint per tonne of recovered metal. Easy-to-mine deposits are becoming increasingly scarce and ore bodies poorer. On the other hand, many specialty metals required for new, environmentally-friendly technologies can only be produced as a by-product of other metals.

### WHAT IS UMICORE'S CONTRIBUTION?

Our facility in Hoboken is the world's largest and most complex precious metals recycling operation, processing over 200 types of raw material and recovering over 20 different metals. These raw materials range from mining and industrial residues to "End-of-life" materials, such as electronic scrap and spent rechargeable batteries. Treating complex materials from these above-ground sources is increasingly important and Umicore is growing its

capacity to cater to rising demand. As part of our closed-loop business model, most of our business units also recycle industrial residues from customers. Umicore's recycling not only offers environmental and ethical sourcing benefits, but also increased resource security.

### WHAT IS THE STORY IN 2017?

Eco-innovation and circular economy were key 2017 considerations while globally, the UN SDGs became the benchmark reference for both political and industrial strategies. The European Commission mobilised circular economy stakeholders in addition to delivering options for the improved legislative interface of chemicals, products, and waste and a monitoring framework for circular economy. Additionally, the G7 committed to an alliance on Resource Efficiency and the mission of the B20, in support of the G20 business community, was initiated with resource efficiency as a concrete priority action.

### UN SUSTAINABLE DEVELOPMENT GOALS (SDGs)



Umicore is determined to foster sustainable growth and champion its circular business model.