The purpose of Nippon Paint Group is enriching our living world through the power of Science + Imagination. It describes our commitment to creating innovations that bring benefits to our society, by using our technical strengths and intellectual assets, including intellectual property, organizational capability, and technology networks, across Nippon Paint Group. One recent example is that, since the outbreak of COVID-19 pandemic in 2020, the Group has significantly increased investment in anti-viral technology, and developed a range of paint products to address this social challenge.

Our technology mission is to drive and sustain growth and market share in Japan and globally through striving to be a leading technology organization for coatings and its adjacent markets. There are three pillars in our innovation strategy: 1) build adaptive organization; 2) develop core enabling technology competency; and 3) grow into adjacent and emerging markets. It is the implementation of our Group vision for Maximizing Shareholder Value from a technology perspective. We believe that our technology organization’s culture of being customer centric, socially responsible and collaborative is the key driver to success.

Importantly, the technology collaboration and intellectual property sharing among our partner companies around the globe is under the principle of Asset Assembler model, which Nippon Paint Group strategically employs to manage the business of partner companies. The technology teams of partner companies possess high autonomy to effectively address the needs of their respective markets and customers. On the other hand, in order to drive technology sharing and capability leveraging among partner companies, the Global Technology Council (GTC) was established, to promote technology exchange platforms and cross-PC projects. We have built up adaptive ways to enhance global technology collaborations to enhance added value of intellectual property. The technology teams in decorative paints have formed the global technology community to share best practices and leverage capability in joint technology development projects, helping address the needs from local consumers in each respective country. Our major automotive customers are global accounts, and our technical staff in automotive coatings around the globe were unified and became ONE team in 2021 under Nippon Paint Automotive Coatings (NPAC).

### Innovation for a sustainable future

In today’s society, problems that are difficult to solve with past methods are becoming more and more apparent. We will strengthen our innovation output with active utilization of partnerships.

**Significance of R&D activities in our paint and paint related businesses in utilizing and adding value to intellectual property.**

Worldwide there are 3,887 technical staff working in Nippon Paint Group, with 1,171 in Japan. They are our strong innovation power and core competitiveness for achieving sustainable business growth in the marketplace. Our technical staff are working in 50 R&D and technical centers to serve our domestic and global customers and consumers, including our major R&D centers in Tokyo and Osaka in Japan, Shanghai in China, Singapore, Melbourne in Australia, Los Angeles and Cleveland in the US, and Bruxelles in Europe. In 2021, the total technology related expense in Nippon Paint Group is above 24.3 bn yen. In 2021, Nippon Paint Group has filed 200 new patents, and by end 2021 owned 1,000 granted patent rights.

Nippon Paint Group has classified its core technologies related to paint and coatings and manages its intellectual property portfolio in 10 categories, which are polymer chemistry, color science, formulation, curing technology, dispersion technology, application technology, process technology, rheology, weathering and corrosion, and measurement science.

Subject matter experts are working in core R&D teams in the R&D centers, and collaborating with scientists from the global network of technical centers to support product development across the group. Nippon Paint Group possesses a broad open innovation network with universities and academic research institutions worldwide. In 2020, the strategic research partnership with The University of Tokyo was initiated, with the University of Tokyo and Nippon Paint joint laboratory established. The partnership aims to create innovative coating technologies in three fields, infectious disease risk reduction, social cost and environment burden control, and contribution to smart society. In Singapore, NIPSEA Group has been collaborating with the research institutes of A*STAR (Agency for Science, Technology and Research) for decades. Recently, NIPSEA Group has strategically joined hands with A*STAR to develop disruptive technologies in the fields of smart surface enabling autonomous driving, and applying artificial intelligence in coating research.

### R&D organization

Nippon Paint Group (Global)

- 3,887 technical staff
- 50 R&D and technical centers
- 24.3 bn yen technology expense
- 1,000 granted patents

Japan Group

- 1,171 technical staff
- 9 R&D and technical centers

### Core technologies

- Architectural Paints
- Automotive Coatings
- Industrial Coatings
- Decorative Paints
- Formulation
- Weathering & Corrosion
- Polymer Chemistry
- Color Science
- Dispersion Technology
- Marine Coatings
- Protection Technology
- Measurement Science
Management of chemical substances

In 2021, Nippon Paint Group launched the chemical substance management system named “Green 30.” In order to minimize the impact on environment and human health, the system is designed to manage chemical substances not only from Japanese chemical regulations, but also chemical substances of global concern from international treaties such as REACH regulations. We classify the chemical risks in three categories according to the laws and regulations in the countries where our business operates prohibited, restricted for new introduction, and avoided for new introduction. The system started in operation in Japan in 2021, and the practice is being introduced to our partner companies outside Japan.

Alkylphenol ethoxylates (APEO) are surfactants and include a subcategory of nonylphenol ethoxylates (NP/PE). These types of nonylphenols (NP) are being regulated by the EPA and REACH. Nippon Paint has been steadily phasing out APEO-containing surfactants. In 2021, we eliminated the use of the nonylphenol compounds in our products in Europe. Dunn-Edwards continues to phase out APEO-containing surfactants through product improvement and ensures that no new APEO-containing raw materials are allowed in the newly developed products.

In addition, we have been substituting the UV absorbers that are being considered as persistent organic pollutants (POPs). Our next plan is to completely phase them out all products for Europe by the end of 2023. In DuluxGroup, managing the risks associated with hazardous chemicals used in the formulation of the products is an important priority for our businesses. We have developed a management approach to ensure that substances with potential for long term health or environmental effects (chemicals of concern) are identified, with their risk evaluated. Improvement actions, such as formulation changes or improved packaging and labelling, are put in place to reduce or eliminate the risk of harm.

Chemicals of concern are identified from supplier safety data sheets, regulatory lists such as the European “Substances of Very High Concern” and stakeholder sustainability program listings (e.g. Living Building Challenge Red List). Whenever a new ingredient is proposed for introduction, it is reviewed against the Chemicals of Concern criteria and existing listing. If identified as a chemical of concern, a risk assessment is undertaken to determine if the chemical can be safely used in the specific product and by the intended end-user or if an alternative formulation is needed.

Innovations in anti-viral paints

In Nippon Paint Malaysia, Dulux® launched PROTECTON® brand in September 2020, named after the function “PROTECT” people’s lives from threats of viruses and bacteria + to turn the function “OK” to the surfaces of all things. Since then, we have combined all of Nippon Paint Group’s paints, coatings and surface treatment technologies to offer a lineup of products for industrial, DIY and household use. In February 2023, Nippon Paint (NPTU) released “PROTECTON Interior Wall VK Coat” “PROTECTON Floor VK Coat” and “Nippon Paint Automotive Coatings’ “PROTECTON Car Interior VK Coat.” Three of these new products were PROTECTON brand. In addition to the “Interior Wall series” for interior walls, “Floor VK Coat” is a water-based clear paint for floors, is expected to be effective when droplets containing viruses adhere to floor surfaces. “Car Interior VK Coat,” a special product with anti-viral function, will be released in 2023.

In Nippon Paint Group to fight against viruses, Nippon Paint China launched “ClearShield” antimicrobial technology, “VOC Clear, Health Shield”, in October 2021. The innovative coating products are film using the technology have color change resistance and good color fastness performance in accordance with Chinese anti-viral coating code. In January 2021, Nippon Paint China released antimicrobial Kid’s Paint, which can reduce the bacteria St. Aureus, E. Coli etc. and viruses H1N1, H3N2, EV71, H1N1 and COVID-19. Nippon Paint Singapore has also launched “ViraGuard” and “ViraGuard+” coating products, based on the silver and copper technologies, respectively.

Dulux UltraAir®

In response to broader societal concern about indoor air quality, DuluxGroup launched Dulux UltraAir® interior wall paint range. The products have ultra low volatile organic compounds (VOC) and low chemical emissions. Going beyond low VOC, UltraAir™ has achieved GreenGuard Gold certification. This is a third party certification for coatings and interior air application property to the car interior and to reduce the impact to the substances. In addition, our group and the United Kingdom’s government conduct research activities on coatings technologies with anti-viral and anti-bacterial functions to reduce the risk of infections. This is one of the joint research themes under the industry-academic co-creation agreement concluded in May 2020.

It is a joint effort across the globe in Nippon Paint Group to fight against viruses. Nippon Paint China launched “ClearShield” antimicrobial technology, “VOC Clear, Health Shield”, in October 2021. The innovative coating products are film using the technology have color change resistance and good color fastness performance in accordance with Chinese anti-viral coating code. In January 2021, Nippon Paint China released antimicrobial Kid’s Paint, which can reduce the bacteria St. Aureus, E. Coli etc. and viruses H1N1, H3N2, EV71, H1N1 and COVID-19. Nippon Paint Singapore has also launched “ViraGuard” and “ViraGuard+” coating products, based on the silver and copper technologies, respectively.

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In Nippon Paint, we regard that sustainable features are essential factors for our products to benefit human society and thus achieve long-term business success. We define the product sustainable advantages in the principle of product life cycle and according to the framework of The United Nation’s Sustainable Development Goals (UN SDGs). It is a systematical approach, covering the three main stages of product life cycle, e.g. 1. product production, 2. products in application, and 3. products in service.

Furthermore, in each stage, the advantages over the mainstream products in the market are assessed by translating UN SDGs to the attributes of paint and coating products. In the stage of product production, manufacturing efficiency, raw materials, logistics and packaging, are the key aspects for assessment. In the stage of products in application, the advantages are helping customers and consumers when using the products, by reducing energy and material consumption, chemical emissions, and chemical hazards. In the stage of products in service, the products are assessed in product service life, used in clean technologies, contribution to health and well-being, as well as end-of-life treatment.

Under those sustainability principles, Sustainability Scoreboard for new product assessment has been developed and started implementation in NPSI systems of partner companies, Japan and China Group. In 2021, of new product sales of Japan Group and China Group together, 36% were contributed from newly developed sustainable advantages products.

Moreover, Green Design Review has been developed and started implementation into R&D project management systems of Japan Group and NIPSEA. From our project portfolio of Japan Group and NIPSEA, 40% of R&D projects are in the focus areas of creating sustainable benefits according to the Green Design Review principles.

In NPSI, our commitment to Maximization of business and supply chain operation teams, with joint efforts of technical teams with disruptive innovation. NPSI is achieved improvement, to new-to-market products three years. New products are categorized new products commercialized in the past track the sales revenues generated from well-designed NPSI system with tools, to the indicators for measuring technology New Product Sales Index (NPSI) is one of portfolios of Japan Group and NIPSEA, 40%

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