

Feature 3 Untapped Potential of GX (Maximizing Environmental and Corporate Values)

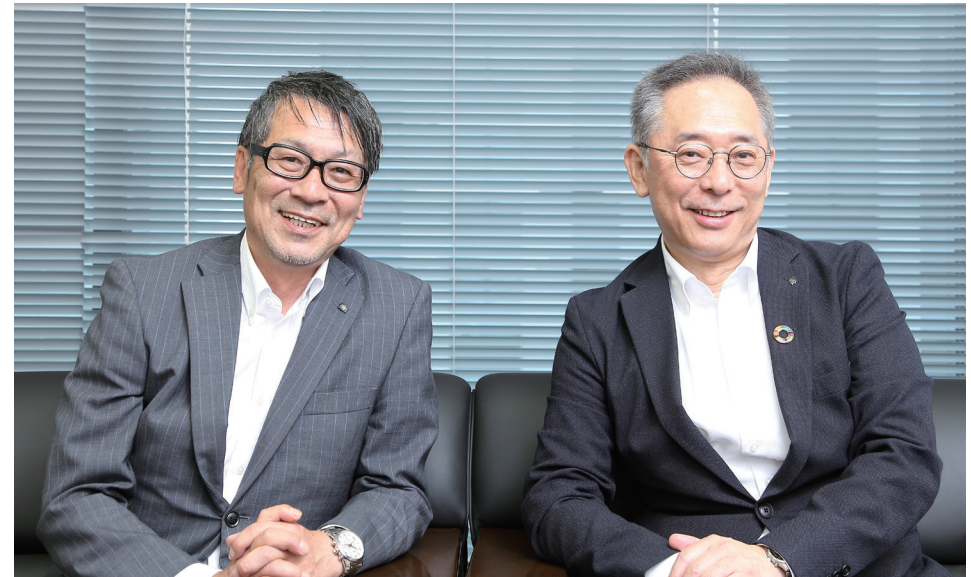
Feature Interview

GX Strategies to Maximize Environmental Values and Corporate Values A Path to Realizing GX — A Conversation between Masaru Shimazaki and Katsuhiro Kawamura

The Nikko Group has positioned the development and social implementation of environmentally friendly products as one of its key growth strategies in its new Medium-Term Management Plan and 2030 Vision. Katsuhiro Kawamura, General Manager of the Low Carbon Task Force (LCTF) and the officer in charge of development at the Nikko Group, was joined by Masaru Shimazaki, Executive Officer and Chief of the Technical Division at Taisei Rotec Corporation, for a discussion on the current state of the road pavement industry amid the transition to a decarbonized, recycling-oriented society and on the forefront of technological development driving GX (green transformation).

Taisei Rotec Corporation **Masaru Shimazaki** Executive Officer, Chief of Technical Division
Nikko Co., Ltd. **Katsuhiro Kawamura** Executive Officer, General Manager of R&D Center, Technology Division, and General Manager of Low-Carbon Task Force

Date: June 11, 2025 Location: Conference Room, Taisei Rotec Head Office



The road pavement industry at the crossroads of strengthening national resilience and advancing GX

Shimazaki (Taisei Rotec): Japan's Ministry of Land, Infrastructure, Transport and Tourism (MLIT) is Taisei Rotec's largest customer. The current agenda of the Japanese government includes realizing a decarbonized, recycling-oriented society and establishing sustainable infrastructure by strengthening national resilience. Other pressing issues include addressing the shortage of field operators and aging workforce. Companies in the road pavement industry are developing technologies to address these challenges. In fact, the national government has also begun providing support through subsidies and public calls for technological solutions. However, new environmentally friendly construction methods and materials have yet to be incorporated into pavement work specifications at the ordering stage. Consequently, the conventional approach of removing damaged surface courses and repaving remains the norm.

Kawamura (Nikko Group): That is precisely the gap between system and technology. In reality, unique technologies developed by individual companies are rarely evaluated at the ordering stage, which I believe stifles innovation across industries. A major shift in the current approach is needed; incorporating environmental performance into evaluation criteria would accelerate the adoption of innovative technologies.

Challenges of warm mix asphalt pavement and plant technologies

Shimazaki: Taisei Rotec is advancing a wide range of decarbonization initiatives, including the efficient use of renewable energy at offices, in addition to the on-site reduction of CO₂ emissions. That said, because asphalt mixture plants, which are at the core of our pavement business, generate substantial CO₂ emissions, this is an urgent issue. The heating process alone accounts for 80% of the total emissions. Therefore, we are promoting a fuel transition from

heavy oil to LNG and other alternatives, alongside the introduction of warm mix asphalt technology. We are also advocating work style reform by introducing a five-day workweek while keeping in mind the need to balance this with costs.

Kawamura: The Nikko Group is developing GX-related technologies across multiple categories, including fuel transition (gas, biomass, hydrogen, and ammonia), warm mix asphalt, and plant structure reengineering. In particular, we have completed the development of combustion burners that use hydrogen and ammonia as fuel, and their commercialization is now within sight. However, the adoption of these latest burners may take time due to the comparatively high cost of these fuels and the slower-than-expected development of supply infrastructure.

Regarding the warm mix equipment, we are promoting a mechanical model because of its high recycling ratio. Although additive-based models, which are more common overseas, tend to be more economical, we believe that the mechanical model is

better suited to Japan's construction environment. Looking ahead, we will continue to allocate resources to the development of next-generation warm mix equipment.

Reforming the bidding system and accelerating the development of new technologies

Shimazaki: Japan's public works ordering system shifted to a performance-based evaluation model approximately 20 years ago. Under this system, bidding companies were supposed to have the freedom to choose product structures and materials. However, in practice, they have seldom been properly evaluated within the general competitive bidding system, which prioritizes public interest and fairness, because technologies were difficult to compare directly.

More recently, the MLIT Road Bureau and other authorities have resumed reviewing technical standards, signaling a potential shift toward incorporating decarbonization and recycling technologies into evaluation criteria. If this happens, it will likely encourage the adoption of new technologies that improve drainage performance, mitigate heat island effects, and promote environmentally friendly pavement while accelerating innovation aimed at achieving a decarbonized society.



Kawamura: This marks a major turning point for equipment manufacturers, including Nikko. Previously, standardized products were the norm. However, going forward, we will need to customize products to meet each customer's specific technical requirements. We believe that achieving positive differentiation through cocreation will be the key.

The shape of the future as seen through technology demonstration and cocreation initiatives

Shimazaki: In designing the demonstration plant currently operating at the Next-Generation Technology Research Center in Satte City, Saitama, we worked closely with Nikko to share a clear vision and build a plant tailored to our unique specifications. Since then, we have been conducting experiments to develop environmentally friendly products and advanced fuel transition. In the future, we plan to focus on technologies for moisture control of dried aggregates, as well as on preprocessing and postprocessing technologies. We would be delighted if Nikko could develop a distinctive plant exclusively for us, in addition to standardized models, as environmental technologies begin to be incorporated into bidding evaluation criteria.

Kawamura: We fully recognize the need to evolve from a mere equipment manufacturer into a partner that co-creates technology. What is now required of us includes technological development focused on energy conservation itself, a fundamental review of plant structures, and intelligent operational management enabled by digital transformation (DX), as well as the promotion of warm mix asphalt and fuel transition.

Barriers to diffusion and implementation: The hard reality of economic viability

Kawamura: The government and road pavement companies are acutely aware of the importance of GX. However, progress has been slow, mainly due to the bidding system and high fuel and equipment costs. To encourage broader adoption of costly clean fuels by minimizing fuel consumption, the Nikko Group has identified low fuel consumption and energy conservation as a key action agenda and is pursuing initiatives from the ground up. As part of this effort, a comprehensive review of existing plant structures was launched in 2024. This is not merely a minor adjustment but a full-scale project to achieve both decarbonization and energy conservation by fundamentally reexamining our design philosophy.

Shimazaki: Still, only a few local municipalities and prefectural governments, including Tokyo, currently mandate the use of warm mix asphalt equipment. However, once a legal framework is established and the benefits of warm mix asphalt become widely recognized, its adoption is expected to spread nationwide.

Work style reform and smart plants

Shimazaki: Plant operators work on a five-day schedule, but balancing this schedule with weekend construction demands remains a challenge. The labor shortage is also becoming increasingly severe. Although GX is important, the implementation of labor-saving measures and automation at the plants is an urgent priority.

Kawamura: The introduction of DX is a highly effective approach to address these challenges. Through remote monitoring and visualization of early signs of malfunction, more efficient maintenance and operation can be achieved. We plan to proceed with the development of smart plants anyone can operate while continuing to train the necessary human resources.

In sum: Achieving technological innovation and economic rationality simultaneously

Kawamura: A decarbonized society cannot be achieved through philosophy alone; it becomes sustainable only when economic rationality supports it. The Nikko Group will continue to focus on joint development and on providing customized products tailored to specific customer needs and standardized products. If these products are truly easy to use and profitable, we believe that a genuine win-win relationship can be established.

Shimazaki: Those of us in the pavement industry cannot survive unless we continue to drive technological innovation within the public works framework. Looking ahead, we aim to build new social infrastructures in close collaboration with equipment manufacturers as the entire industry works to support systems that fairly evaluate environmentally friendly technologies from the ordering stage.



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GX Strategies to Maximize Environmental Values and Corporate Values Redefinition and Cocreation—The essences of GX — A Conversation Between Hirochika Moriyasu and Katsuhiro Kawamura

The Nikko Group is advancing initiatives to enhance both environmental and corporate values through its GX strategies. For this special conversation, Katsuhiro Kawamura, General Manager of Low-Carbon Task Force and the officer in charge of development at the Nikko Group, was joined by Hirochika Moriyasu, Managing Executive Officer of Maeda Road Construction Co., Ltd. Mr. Moriyasu, who has long been engaged in quality control and assurance and now serves as Director of the company's Technical Research Institute, discussed with Mr. Kawamura how GX connects road infrastructure to a decarbonized, recycling-oriented society.

Maeda Road Construction Co., Ltd.	Hirochika Moriyasu	Managing Executive Officer, General Manager of Technical Research Institute, Technology Headquarters, and in charge of CSR/ Environment in General
Nikko Co., Ltd.	Katsuhiro Kawamura	Executive Officer, General Manager of R&D Center, Technology Division, and General Manager of Low-Carbon Task Force

Date: June 11, 2025 Location: Conference Room, Maeda Road Construction Head Office



GX's approach to leveraging road stock

Moriyasu (Maeda Road Construction): The shift toward a decarbonized society is accelerating, and the GX perspective has become indispensable for the road industry. For example, while transitioning to renewable energy sources, such as hydrogen, ammonia, and other alternative fuels, is important, the enormous stock of paved roads stretching over 1.2 million kilometers across Japan must not be overlooked. We believe that the effective use of this asset in the spirit of recycling will become increasingly important in the future.

Kawamura (Nikko Group): I fully agree. For the Nikko Group, which develops and manufactures asphalt mixture plants, one of the key challenges of GX is whether we can effectively use recycled materials without compromising quality. Although it may be easier said than done, we recognize that technological innovation that achieves decarbonization and resource conservation is essential.

Plants that do not easily break and are simple to use and recycle are needed.

Moriyasu: Maeda Road Construction has high expectations for the Nikko Group to develop technologies for plants that are easy to maintain and prevent damage to recycled mixtures, in addition to achieving operational optimization through labor saving and automation. We believe that recycling technology is not only about recycling materials but also about recreating value.

Kawamura: Feedback from the field like this is vital for our future product development. Some degree of damage is unavoidable with conventional direct-fired burners. With this in mind, our development team is working to minimize quality deterioration by reexamining heating methods and advancing thermal control technologies. Innovative heating methods, such as microwave-based systems, are also being explored, although cost remains a major challenge at present.

Moriyasu: That is precisely the point. Although this may sound ambitious, once large-scale microwave-based asphalt heating technology is put into practical use, the concern over CO₂ emissions from the manufacturing process of recycled mixtures could potentially be eliminated altogether. For this to become a reality, technological innovations—including fuel transition—must advance in an integrated and economically viable manner.

The future of roads: From mere transport infrastructure to a foundation of value creation

Moriyasu: As the spread of self-driving vehicles reduces the number of active traffic lanes, not all roads will be maintained to the same standard. Conversely, pavement demand may rise again as functional pavements, such as those equipped with power-feeding surfaces for electric vehicles, become more common. The roads of the future will no longer be mere roads, but value-creating infrastructure. Accordingly, we believe that collaborating with partners from other sectors will be crucial.

Kawamura: Precisely. We should prepare for collaboration with electronics manufacturers, the automotive industry, and telecommunications companies. From an environmental standpoint, paved roads will need to incorporate advanced functions, such as mitigating urban heat island effects, preventing flooding from cloudbursts, providing sound insulation, and featuring surfaces that protect animals from burns on their paw pads.

Confronting structural risks



**Maeda Road Construction Co., Ltd.
Hirochika Moriyasu**
Managing Executive Officer, General Manager of
Technical Research Institute, Technology Headquarters,
and in charge of CSR/Environment in General

Moriyasu: It has been approximately 60 years since the Tōmei Expressway and Meishin Expressway opened, yet the basic structure and system of asphalt plants have remained largely unchanged. In my view, this lack of evolution has slowed technological innovation and limited the industry's future potential.

Kawamura: That is true. Nikko is no exception; we have mostly delivered standardized plants. The asphalt plant market has been oligopolistic, and the development of customized products for individual users has often taken a back seat. In the future, flexible technological solutions that directly respond to on-site needs will become increasingly essential.

Structural Issues and Institutional Barriers Hindering the Promotion of GX

Moriyasu: One of the challenges in asphalt pavement work is that proprietary technologies and patents are not always adequately recognized or valued due to the nature of public works. Given the growing societal demand for decarbonization and disaster resilience, I believe that it is time that environmental performance be adopted as a standard criterion in the bidding process.

Kawamura: Absolutely. If the bidding process evolves, the pace of product development will likely follow suit. For Nikko, this

would create greater opportunities to showcase the energy efficiency and low environmental effect of our products and technologies, ensuring returns on our technological investments.

Regional gaps and life cycle perspectives

Moriyasu: Although national and prefectural roads have been well developed, the construction and maintenance of roads by local municipalities are often postponed because of financial constraints. Unless the entire industry works together to build a life cycle-oriented value chain, encompassing construction, use, maintenance, and recycling, achieving true GX will remain difficult.

Kawamura: A transformation of the business model to include waste processing and recycling industries is needed. Beyond decarbonation, we also expect increasing opportunities to apply our technologies and equipment—for example, in disaster debris disposal and the rapid restoration of damaged infrastructure.

Developing the next generation of field operators while accelerating DX

Moriyasu: Labor shortages have become a chronic problem. As more of our operators now come from other industries, we may not be providing them with sufficient on-the-job training. I would love to see a training program like the Nikko Academy you once organized make a comeback, perhaps on a larger scale.

Kawamura: We strongly recognize the importance of training operators and machinery management specialists while promoting automation through DX. Providing structured training opportunities that allow participants to learn from the fundamentals will help us to differentiate ourselves. I believe that this is essential to expand Nikko's fan base.

Striking a balance between GX and profitability: Future prospects

Moriyasu: Asphalt demand in Japan peaked at approximately 80 million tons in 1992 and has since declined by half. The shift in demand from new pavement to repair work is one factor

behind this drop. In recent years, rising personnel and material expenses have further intensified the burden on the industry. To ensure both continuity and profitability under these circumstances, the bidding system must be revised so that it properly values the introduction of environmentally friendly technologies or to establish an entirely new framework.

Kawamura: GX-compatible products often increase costs in the short term, but they ultimately build trust and create long-term value. In the end, fostering a culture in which users are willing to pay for environmentally friendly products will be key. As I mentioned earlier, consider paved roads designed so that pets' paws do not get burned. If users are willing to pay for such roads, we can accelerate the development of new technologies and generate even greater value.



**Nikko Co., Ltd.
Kawamura, General Manager
of Low-Carbon Task Force**

In conclusion: Aiming for growth as a cocreation partner

Moriyasu: A decline in gasoline demand will affect asphalt supply in the long run. If that happens, we may need to reconsider the materials used in road construction. We also intend to explore new materials and recyclable mixtures rather than relying solely on existing technologies.

Kawamura: Achieving carbon neutrality in asphalt plants is an extremely difficult task. Because it is quite difficult, accomplishing it would revolutionize the industry. We hope to continue working with you as partners who envision the infrastructure suited to the GX era and co-create value.

Moriyasu: Roads form the backbone of social infrastructure and will not disappear. However, roads will not last forever if the industry remains unchanged. Consider the film camera industry: Some companies clung to conventional technologies and declined, whereas others leveraged their technological assets, achieving continued growth. Perhaps we now stand at a similar crossroads.