



SUSTAINABILITY STORIES

ISSUE 4, NOVEMBER 2023

THE ROAD TO CARBON NEUTRALITY

INTRODUCTION



Welcome to Issue 4 of NXP's Sustainability Stories, where we showcase how NXP is inspiring a new sense of purpose around sustainability – with innovations aimed at stretching the boundaries of what has been done before.

NXP is on an exciting journey of transformation. We've set ambitious ESG goals and implemented a variety of sustainability programs across our businesses. Our people are inspired, passionate, and putting their bright minds to work so we can make a difference in the world.

This issue of *Sustainability Stories* spotlights ways our teams are innovating to address some of the sustainability challenges we face. The lead story, "On the Road to Carbon Neutrality," focuses on how we're developing a sustainability ratings system to help our customers build more sustainable products.

We also explore how our engineering teams are making advancements that will deliver better battery technologies, make oceans cleaner, and enable a better understanding of how NFC technology can positively impact the environment. Furthermore we share how we're reducing our own waste and energy usage, and being intentionally inclusive to create an innovative and collaborative environment at NXP.

You can catch up on key milestones of our journey in our [2022 CSR](#), as well as our [website](#), [blog](#), and [social media](#). We'll publish our 2023 CSR in the spring and Issue 5 of *Sustainability Stories* next fall.

We believe in a world without barriers, where technological innovation enables people to live and work in a better, safer, more secure, and sustainable environment. We also believe that the role semiconductors can play in helping deliver this world has never been more important or more exciting.

Jennifer Wuamett
*EVP, General Counsel, Corporate Secretary
and Chief Sustainability Officer*



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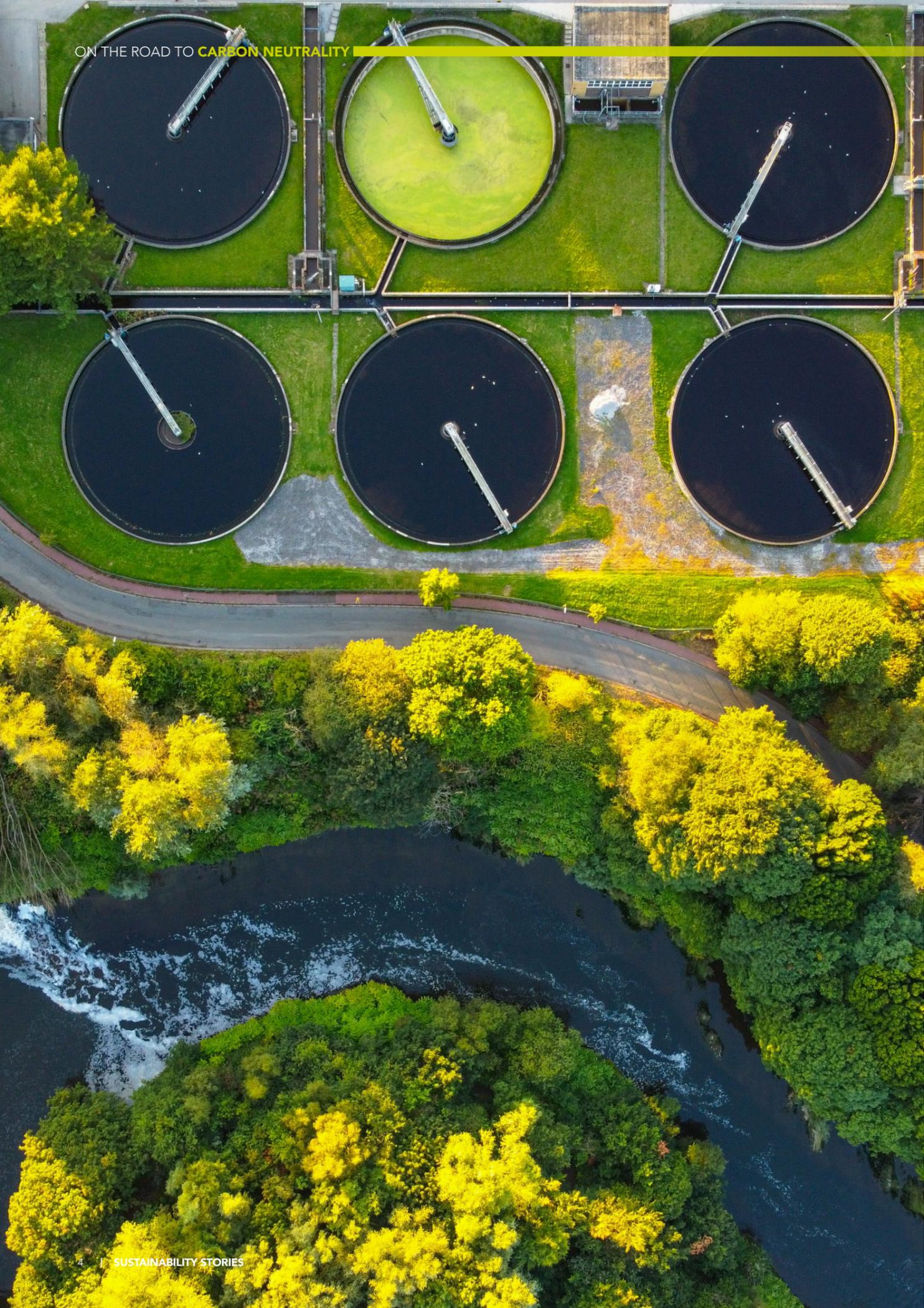
ON THE ROAD TO CARBON NEUTRALITY

At NXP, we are on a journey to innovate change for a better world. Our products power and enable solutions that move and connect us faster, more effectively, and use less energy. Our team continues to innovate those products to make them even smarter and more sustainable. We have committed our proven technology leadership and the passion of our team members to making our corporate purpose a reality for our customers and their customers.

We recognize that there are significant challenges ahead of us, especially in areas of silicon manufacturing that are stubbornly difficult to change. Our carbon emission challenge is no exception. While Goldman Sachs recently [reported](#) that every ton of CO₂ emitted by a semiconductor company

helps avoid five tons of additional emissions by enabling greener and more power efficient end-products, we know we can do more to emit less. We see this as an opportunity to innovate our business, and with our customers, meet the world's ambitious goals for carbon neutrality.

Every ton of CO₂ emitted by a semiconductor company helps avoid five tons of additional emissions by enabling greener and more power efficient end-products.



We've begun a program that qualifies our products and solutions to help our customers map and report on their own sustainability efforts.

Our Operations Roadmap

Our commitment to reducing our carbon footprint involves a company-wide set of principles. They are both operational and aspirational. We thereby have tangible activities to implement and are constantly aware of our greater social purpose.

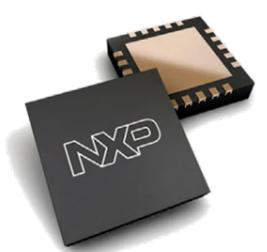
The operational pillars that drive our carbon roadmap start with our commitment to sustainable manufacturing including our reduction of carbon emissions and increased water recycling. This year alone, our Global Operations team has initiated more than 120 projects to deliver it. We're also working on this with our suppliers.

Embracing the intent and spirit of achieving carbon neutrality also informs our governance principles, as our board of directors has oversight on all aspects of our carbon journey.

NXP is proud to publish a detailed, numbers-driven annual [Corporate Sustainability Report](#) ("CSR"), this magazine (see past *Sustainability Stories* issues [here](#)), as well as ongoing

internal and external digital media, such as [these posts](#) on our Smarter World Blog, and ongoing [podcasts](#) (check out "The Quest for Sustainable Food Ecosystems," and "The Road to Sustainability").

Another component of our journey is supporting the carbon neutrality goals of our customers. We're focused on helping them reduce their carbon footprints from manufacturing, as well as the energy consumption, emissions, and resource usage of their products and services. An important component of this is helping them to advance their transition to a circular economy by increasing use of recycled materials, reducing waste, extending product lifetimes, and improving recyclability and repairability.



We've begun a program that qualifies our products and solutions to help our customers map and report on their own sustainability efforts.



*What can semiconductor companies do to reduce carbon emissions?
A lot, it turns out.*



NXP's Sustainable Portfolio

What can semiconductor companies do to reduce carbon emissions? A lot, it turns out; from requiring less energy to make them, to innovating products that use less energy when they operate. We enable our customers to replace carbon-emitting activities with smarter sustainable technology solutions.

The challenge is to quantify these impacts, which is why NXP is looking at our total portfolio of 40,000+ existing products and classifying, measuring, and then scoring them on the sustainability benefits they deliver. Our goal is to distill those benefits into numbers on carbon

footprint and sustainability enablement that can be compared and contrasted, as well as combined to provide unique views into the sustainability impacts of system solutions. We also plan to designate the top-rated sustainability products in each application area.

Providing this level of transparency will help our customers and partners integrate NXP sustainability solutions in their products and offerings, as well as communicate those impacts to their stakeholders. It will also give investors, regulators, and prospective employees a deeper, more detailed perspective on the tangible proof points of our commitment to a sustainable future.

Last month NXP hosted Apple at our corporate headquarters in Eindhoven. The visit was an opportunity to discuss our shared commitment to delivering innovative, secure, and sustainable products to the world. NXP's evolution within Apple's iPhone is an example of what's possible: integration and innovation have resulted in a significant reduction in the footprint of the silicon, the materials used for manufacturing, and a decrease in power consumption and help to contribute to carbon neutral products.

Over time, we plan to extend and integrate this perspective on our portfolio into our own product development and reporting that will inform our strategic portfolio choices and investments. So we, too, will continue along with our customers on the road to carbon neutrality.

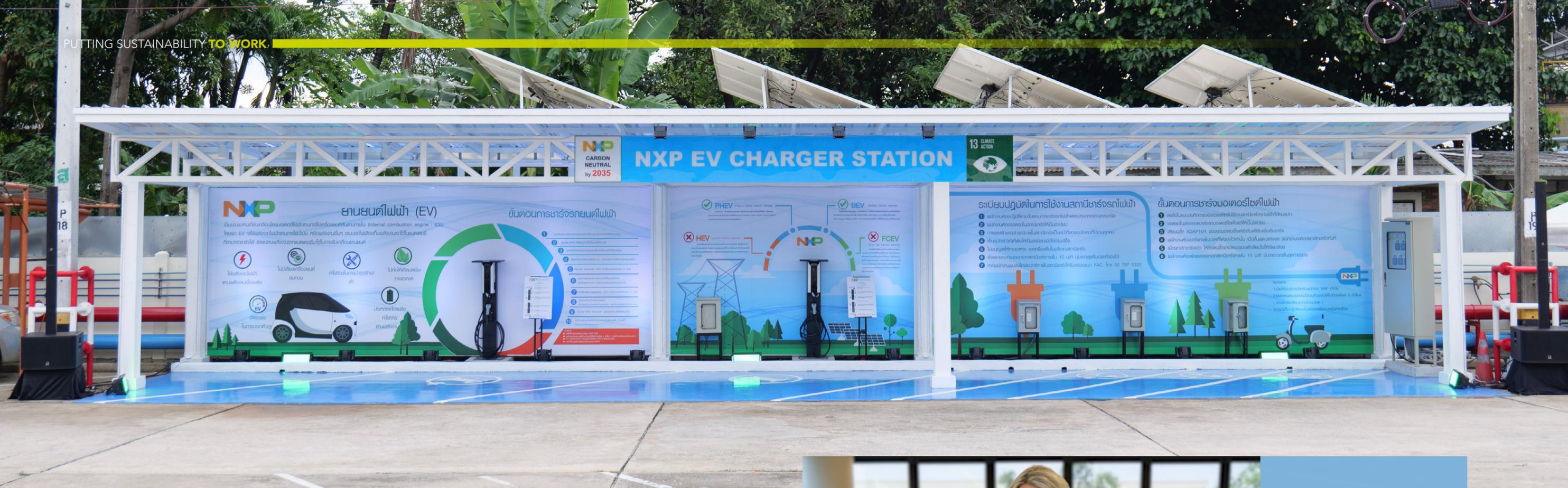
PUTTING SUSTAINABILITY TO WORK IN ASIA

Our path to sustainable manufacturing is yielding carbon reductions through initiatives such as new recycling and alternative energy programs that could have worldwide implications.

NXP's global sustainability strategy depends on the skills and passion of our team members. People achieve goals and put principles into practice. Our team members are innovating carbon reduction solutions and sharing learnings and best practices across sites. This multiplies our ability to effect meaningful change and here are some promising examples coming from our teams in Asia.

Getting a Charge

In Bangkok, our team at NXP's Assembly-Test facility just completed their first solar roof project, which installed approximately 4,600 sqm of panels on roofs that were not obviously conducive to this use. The new system is expected to generate a maximum of 999.9 kWh of electricity that will displace 550 tons of CO₂ each year.



NXP's global sustainability strategy depends on the skills and passion of our employees who are innovating solutions where they work.

In addition, at the site's new EV charging station, employees will be able to charge their EVs and electric motorcycles for free. The installation includes 12 photovoltaic (PV) panels expected to supply 37 percent of the electricity required for the on-site EV charging. Offering the ability to recharge vehicles while at work will enable more sustainable lifestyles, and could speed-up employee adoption of EVs, for a win-win.

The site's new alternative energy source programs are scheduled to go into full operation early next year.

Changing the Rules

Traditionally, semiconductor manufacturing relies on a Gross Leak Test which involves emerging products in a coolant liquid to check their heat seals. While the common heat transfer fluid (HTF) used for these tests is effective, it has high Global Warming Potential (GWP) if released into the environment. The challenge of reducing or eliminating its use requires innovating new methods to produce the same reliable results.

NXP's team in Malaysia did just that. As a result of multiple lab tests, alignment with customers, hard work, and determination, they eliminated the



JENNIFER WUAMETT
GENERAL COUNSEL, CORPORATE SECRETARY AND CHIEF SUSTAINABILITY OFFICER
NXP SEMICONDUCTORS

See some of the recent highlights of our sustainability journey in this video featuring Jennifer Wuamett, NXP's Executive Vice President, General Counsel, Corporate Secretary and Chief Sustainability Officer, including a visit to see our Bangkok team's rooftop solar installation.

need for the Gross Leak Test (and HTF of course), while still yielding the same results. The more environmentally sustainable approach went live earlier this year and is being shared with our other operations.

Tackling a Thorny Challenge

The waste by-product of chip manufacturing, usually called "sludge," consists of water and particles of various materials that could be hazardous to the

environment if not contained. Reducing and repurposing it is a thorny technical challenge for the semiconductor industry.

NXP's facility in Taiwan is making meaningful progress addressing this challenge. The team is working with a third-party partner to process its sludge and extract minerals, including recovering refined copper which is sold and used by other manufacturers. They've increased their waste recycling rate to above their 92 percent target, while processing remaining waste in innovative ways.



EVERYDAY INCLUSION

Putting Our DE&I Goals Into Practice



Sherry Alexander, NXP's Vice President and Head of Diversity, Equality, and Inclusion (DE&I), is expanding NXP's DE&I programs and initiatives to support an environment of inclusion in today's multicultural workforce and make NXP the technology company where the most talented people across the globe choose to work.

Promoting a truly inclusive environment is a journey. When we think about inclusion at NXP, it's about accepting everyone, and welcoming different ideas and perspectives. It's about having a genuine feeling that it's not only okay to speak up – it's expected.

We want every team member around the world to feel like NXP is the place where they want to be and where they feel they belong. Where they can collaborate with colleagues locally and globally, push the boundaries of technology, and grow their careers. Trust and respect are not only the foundation of our company values, they are essential for an inclusive environment. It's about the behaviors we demonstrate, the processes we put in place, and the environment we cultivate.

Setting Goals, Ensuring Accountability

As a global technology company, NXP has an established diversity, equality, and inclusion (DE&I) policy along with aspirational goals aimed at increasing representation at all levels across the company (you can see them here: nxp.com/diversity).

We embrace the voices of our team members in our diversity efforts through our Employee Resource Groups and by developing action plans based on feedback from our company-wide engagement survey, among other methods. Additionally, we engage the top leadership across our businesses to ensure accountability for our progress.

True inclusion requires demonstrated, intentionally inclusive practices, and embracing everyone as they are, uniquely.

Being Intentional About Inclusion

At NXP, we embrace inclusive practices and policies to embed inclusion deeper within our company. For instance, through our practice of Inclusion Insights, we begin formal team meetings with brief conversations about an inclusion topic or with someone sharing a relevant experience. Since implementing the initiative, team members have shared that these discussions have had a positive influence on their lives in and outside of the workplace.

We encourage team members to be more self-aware when it comes to their personal bias and preferences, proactively assert themselves when it comes to opportunities, and be open to different people and ways of thinking. True inclusion requires demonstrated, intentionally inclusive practices, and embracing everyone as they are, uniquely.

Every team member within NXP has a direct impact on the work environment, but that's especially true for managers. Therefore, through our company-wide NXP Manager Intensive (NMI) and unconscious bias training, we're fostering leadership from the framework of our core values, which are built on a foundation of trust and respect.

Prioritizing Women and Minorities at NXP

While we focus on the development of all our team members, we pay special attention to the development of women and minorities who are underrepresented in our industry. We partner with professional associations like the Global Semiconductor Alliance (GSA), National Society of Black Engineers (NSBE), Society of Hispanic Professional Engineers (SHPE), and the Society of Women Engineers (SWE). We also focus on inspiring younger women and minorities by promoting awareness of the unique benefits of a STEM education and career.

In September, NXP was recognized as one of three finalists for GSA's Women's Leadership Initiative (WLI), Designing the Difference Award. This award recognizes companies making a significant and measurable impact on advancing the industry through diversity and inclusion.

We're on a journey to advance and sustain a collaborative and engaging environment globally where everyone is equipped to innovate, and contribute to making the connected world better, safer, and more secure.



NXP is working with other technology leaders to support the EU's plan for more environmentally sustainable and circular products. Key to this initiative is using Near-Field Communication ("NFC") to make product histories and performance data readily and securely accessible to manufacturers, consumers, and recyclers.

DIGITAL PRODUCT PASSPORTS & SUPPLY CHAIN TRANSPARENCY

Imagine if your car or home appliance could tell you where it was made, where its parts came from, and what impacts those steps had on the environment, or if decades later, authorities knew exactly what's required to recycle or disassemble the device?

The EU has proposed a framework for significantly improving the energy performance, sustainability impacts, and recyclability of nearly every category of physical goods sold in its member countries. It's called the [Ecodesign for Sustainable Product Regulation](#)

("ESPR") and providing that visibility to businesses and consumers will help them make better, more informed purchase decisions.

We're working on providing that visibility through a "Digital Product Passport" that attaches such information to products and then allows users, customs officials, and recycling facilities to use mobile devices to scan them using NFC technology.

NFC chips can contain information locally – something called "the edge"

of computing networks, where many of our products thrive. This results in a lower carbon footprint because there's less need to connect to the cloud. That means the data is also available more quickly and, since NFC is a standard connectivity technology already in mobile phones, accessible to the greatest number of people.

Using NFC to embed information in products would also ensure that they were identifiable for decades, and not depend on what was available from their makers.

NXP has been a leader in NFC technology since our predecessor company Philips Semiconductors co-invented it with Sony in 2002. We offer a [robust portfolio](#) of NFC tags and labels, charging, sensing and reader technologies. We're working with other leading members of the [NFC Forum](#) to help make this versatile and reliable technology available to support the EU's plans for greater supply chain transparency.

Sustainable AI

CLEANING UP FARMS

NXP is proving that the benefits of AI can be brought to remote locations that are “at the edge” of energy availability and network connectivity. Through collaborative partnerships, we’ve been working on novel uses of intelligent vision applications to meet extremely rigorous requirements and new challenges. The successes of projects like these demonstrate the opportunity for sustainable commercial applications while solving real-world environmental problems.

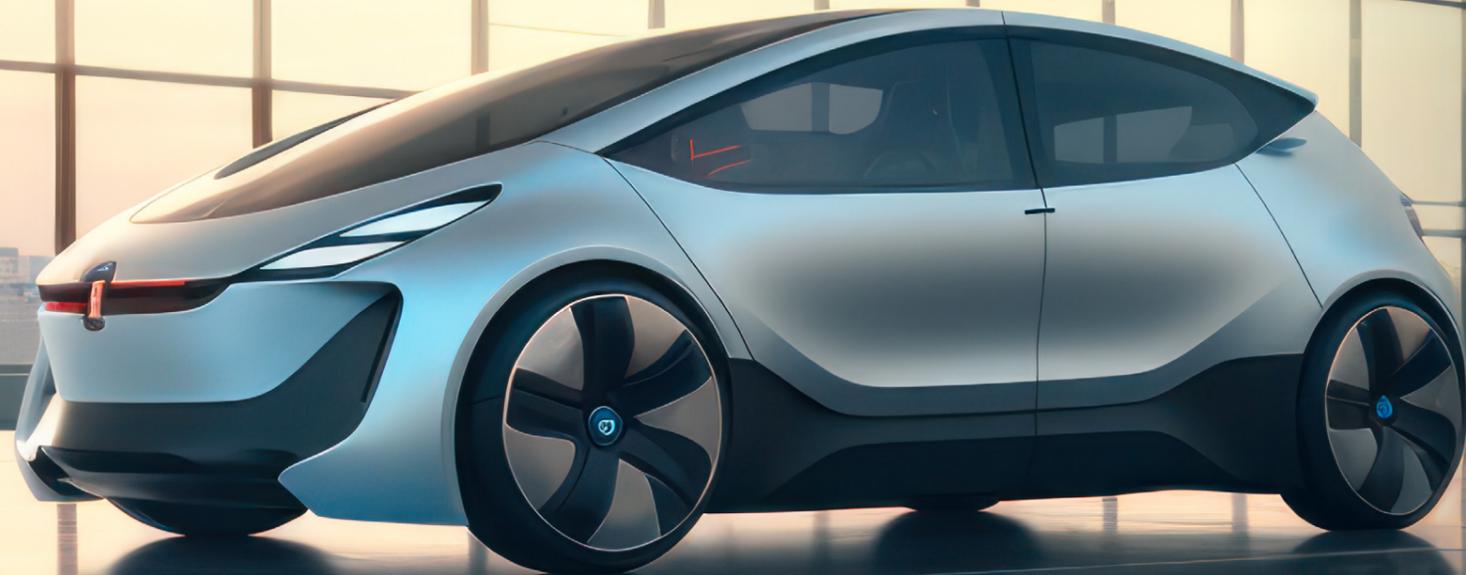
There are [approximately](#) 570 million farms around the world. Most of them are “smallholders” with farms covering less than two hectares, and many of them are in the poorest areas and far from energy and networking resources. Finding ways to help them improve their yields is both a sustainability and moral challenge that could have an impact on farms of any size.

NXP is partnering with an agtech firm called [Aigen](#) and [Au-Zone Technologies](#) to test a solar-powered, medium-sized robotic platform for weed detection and management.

Farmland can be incredibly nuanced, and our [i.MX 8M Plus](#) solution is perfect for the job! It’s being used to analyze high-resolution data from the camera for the purpose of finding weeds. Training the models for such analyses is a complicated process, but successful detection and mapping is the key to enabling physical removal that replaces the need for pesticides.

Global pesticide usage is 4 million tonnes globally and growing, according to [this study](#) published in 2022. Herbicides account for half of that consumption. The implications for smarter weed detection and management are huge.

One of the areas in which we're sharing our leadership is in innovating next generation electric vehicles ("EVs").



INNOVATION FOR PUBLIC GOOD: INNOVATING NEXT GEN EV TECHNOLOGY



NXP's Public Cooperation Programs ("PCP") team draws on the company's expertise and resources to participate in dozens of projects around the world intended to invent or refine the development of new technologies, including many sustainable solutions. These efforts aim to contribute to NXP's alignment with numerous [United Nation's \(UN\) Sustainability Goals](#) as well as NXP's mission to work together to accelerate breakthroughs that advance our world.

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Better Batteries

Batteries are key to decarbonizing transportation and to helping meet the EU's goal of becoming an economy with net-zero greenhouse gas emissions by 2050. A robust European battery industry is working to support the electrification of society and the economy.

NXP is participating in a project to develop a more advanced battery management system (BMS) to both improve current modeling approaches (charging, use, and reuse/recycling) and help the industry prepare for upcoming advancements in Lithium ("Li") battery materials.

NXP is participating in a project to develop a more advanced battery management system (BMS)

The project, called **NEXTBMS**, is a collaborative effort involving top experts from over a dozen organizations that span seven countries. NXP is **a leader in BMS** and our solutions are already serving as the **platform for Volkswagen** and other automakers. We're working with the other participants to explore ways to enhance the physiochemical processes that underly Li batteries. We're also looking at ways to optimize sensors

and measurement techniques, and to advance physical cell configurations to improve battery state prediction.

The global market for Li BMS **is expected** to more than triple in size by 2030, from an estimated USD\$8.25 billion last year to USD\$26.46 billion. NEXTBMS plans to complete the work in 2026 and expects the results will impact battery usage in a wide variety of transportation and energy storage sectors.

Smarter EVs

Future mobility solutions will rely on electrification for propulsion as well as for sensors, connectivity, environmental controls, and autonomous driving.

They'll operate more efficiently and safely because their suspensions will adjust to weight loads and changing road conditions through innovations such as the use of ECAS (Electronically Controlled Air Suspension) technology.

*NXP has joined 41 technology partners from businesses and research institutions of 10 countries in a consortium called **AI4CSM** (which stands for Automotive Intelligence 4 Connected Shared Mobility) to develop advanced electronic components and functional architecture for future mass-market ECAS vehicles.*



We're supporting the project with a number of our key innovations starting with the design of prototype solutions for environment perception and path planning. We are also developing advanced algorithms for a distributed radar system and architecture, as well as AI algorithms for Image Signal Processors (ISP) optimization of camera data within the automotive intelligence consortium.

AI4CSM:

AI4CSM receives grants from the European H2020 research and innovation programme, ECSEL Joint Undertaking, under grant agreement No.101007326.



NEXTBMS:

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LOOKING AHEAD TO 2024

Health and Wellbeing Companions at CES



NXP is at the forefront of innovating solutions that can help people lead healthier lives.

Technologies to support preventative care and a healthy lifestyle depend on advancements in artificial intelligence, intelligent sensing, and sustainability, including power use and battery life.

At our *Health and Wellbeing* exhibit at CES 2024, a proving ground for breakthrough innovations and technologies, we'll be showcasing how we're advancing health and wellbeing companions including smart watches, hearing aids, patches, injectors, and more.

Multi-week Battery Life

Solutions like our [i.MX RT500](#) crossover MCUs address the evolving and demanding needs of wearables without sacrificing battery life.

Intelligent Sensing for Health Management

Our motion, pressure, and temperature sensors, backed by connectivity tools like our Bluetooth® [QN9090/30](#), put smarter sensing capabilities into small devices.

Advanced AI-Driven Analytics

NXP's [elQ® machine learning software](#) development environment allows personal smart tech to do its "thinking" on-site and in real-time.

Data and Device Security

More digital health data requires greater security and privacy protections, and our EdgeLock® security portfolio provides it across IoT devices and the cloud.

This is just a small sample of the sustainability technologies NXP will be showcasing at next year's CES. We'll be featuring an Autonomous Home experience and an exhibit of our microgrid innovations for more advanced energy resilience and efficiency. You can also see and learn how we're revolutionizing battery management system communications with new wireless solutions.

For more information, visit [NXP at CES 2024](#) on our website. We hope to see you there!

NXP in the air



HoverGames

FOURTH ANNUAL CHALLENGE: CLEAN ENERGY AND WATER

NXP is hosting a **global challenge** to innovate ways to use drones and rovers to improve energy efficiency and the availability of clean water.

Coders, developers, and innovators are invited to join us for a fast-paced, hands-on program to pursue solutions that can be put to use quickly and at scale. Past challenges have produced smart drones that analyze leaf and soil quality on farms, and a flying locator system for use by fire departments in emergencies.

We provide drone or mobile robotics development kits, support and

encouragement along with our partners, and then award cash and access to developer events to the winners.

Participants bring their curiosity and passion for promoting positive environmental change, and develop new relationships and skills.

And the world gets closer to meeting its sustainability goals.

If you're interested in joining us or would just like to know more, please visit [HoverGames](#) on our website.

New stories will appear regularly during the year on our [website](#) and we encourage you to share your thoughts or email us at csr@nxp.com.

#NXPSUSTAINABILITY #WEARENXP



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