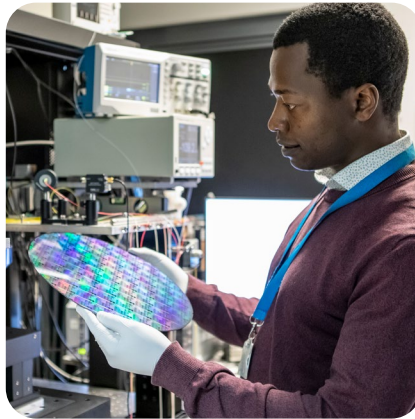
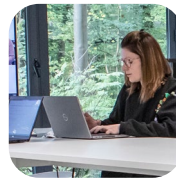




Sustainability report

2022

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A message from our CEO



In 2022, humanity was faced with a global “polycrisis”, with multiple negative trends feeding off each other to weave an almost inextricable web.

The emergence of a global “polycrisis”

One positive note from 2022 saw the coronavirus pandemic finally losing some momentum – albeit at a cost of over six million deaths worldwide. However, this crisis was immediately replaced by mass geopolitical, environmental, economic, and financial turmoil. On top of all that, the breakout of war in Europe served to disrupt our lives even further.

A silver lining

And yet, every cloud has a silver lining. Despite all of these setbacks, society has continued to make significant strides over the past 12 months, fueled by increased levels of technological ingenuity, resilience, and willingness to work together. At the same time, ambitions around sustainability (both regional and global) have also been brought into focus. Take, for instance, the launch of REPowerEU (May 2022), the EU Green Deal to render the EU climate neutral by 2050, or the EU Corporate Sustainability Reporting Directive (CSRD).

One of the most significant global success stories came with the triumph over the coronavirus pandemic. That’s not to say, however, that the virus has gone away completely, since future outbreaks cannot be ruled out. However, according to the World Health Organization, the end of the pandemic phase of the virus is well within our sights. This is a great example of how concerted global efforts to contain the virus are paying off.

“2022 saw nothing less than the emergence of a global “polycrisis” – with multiple negative trends feeding off each other to weave an almost inextricable web.”

Issues around climate change and energy were also high on society’s radar. In this field, we have really begun to tap into the potential of renewable energy sources, as well as more sustainable production processes.

Take, for example, European – and Belgian – ambitions when it comes to green hydrogen, an essential ingredient toward eventually rendering heavy industries (such as long-haul shipping, or steel and cement production) carbon neutral. It is a technology in which imec has a significant vested interest, with our research on nanomaterials potentially contributing to more cost-effective production of this green energy source in the long run.

The decision by the European Union to ban sales of new gasoline and diesel cars from 2035 is another important step. It is a decision that is being closely monitored by climate experts as well as car manufacturers and their (chip) suppliers, with electric cars containing twice as many microchips as traditional models.

This growing reliance on chip technology also comes with a need to reduce the semiconductor industry’s own carbon footprint – a challenge that the industry is taking very seriously. An example of this enthusiasm can be seen in this ecosystem’s active participation in SEMI’s “Semiconductor Climate Consortium,” or indeed in imec’s “Sustainable Semiconductor Technology & Systems (SSTS)” program.

Finally, we have the ever promising Chips Act, which has the potential to unite what is becoming an increasingly divided world. I see this becoming the blueprint for addressing the many challenges facing society.

“Working together makes us stronger. Ultimately, this will enable us to overcome the challenges ahead and create a better world.”

A golden future ahead

Does this mean that all our problems are over? Of course not. The coming months are going to be tough, what with the worrying further deterioration of the climate and related crises, more global unrest, economic uncertainty, alarming inflation rates, etc.

In other words, there is still much work to be done to turn last year’s silver lining into a golden future for all of us. However, by working together, we become stronger. Ultimately, this will enable us to overcome the challenges ahead and create a better world. This is what makes imec unique.

2022 showed us that sustainability is not something to be pursued for “compliance” reasons, but rather that it has, and will continue to have, important strategic implications. After all, sustainability and system resilience are inextricably linked.

With pride and confidence,

Luc Van den hove
President and CEO imec

1. Imec – a driver of sustainable growth

1.1 At imec, we're shaping the future

Imec is the world's largest independent research and innovation center for nanoelectronics and digital technology. The combination of leadership in microchip technology and in-depth expertise in software and ICT makes imec unique. With its world-class infrastructure and local as well as global ecosystems in diverse sectors, imec delivers breakthrough innovations in areas such as healthcare, food and agriculture, mobility, logistics and manufacturing, energy, and education.

Founded in 1984, imec is an independent research center. Radical, innovative solutions are not developed overnight, and do not arise from any individual expertise or singular technology. Instead, they come about at the end of a lengthy process of collaboration, of combining expertise and domains, and making scientific and technical breakthroughs. For example, almost every computer chip seen today contains technology that can be traced back to imec. At the same time, imec has managed to bring together innovation, talent, and capital from around the world.



Imec has its headquarters in Leuven (Belgium), research sites spread across Belgium, the Netherlands, and the United States, and representatives on three continents.

Imec is a registered trademark for the activities of imec International (IMEC International, a public utility foundation under Belgian law), imec Belgium (IMEC vzw, supported by the Flemish government), imec Netherlands (Stichting IMEC Nederland, supported by the Dutch government), imec Taiwan (IMEC Taiwan Co.), imec China (IMEC Microelectronics Shanghai Co. Ltd.) IMEC India (Imec India Private Limited), imec San Francisco (IMEC Inc.), and imec Florida (IMEC USA Nanoelectronics Design Center Inc.).

imec key figures



+5,500
employees



+95
nationalities



1,300
WoS publications
in 2021



162
unique patents submitted
by 2022



€846,000,000
turnover
(in 2022)

Global partnerships with



+800
companies



+200
universities



270
startups & scale-ups
imec.istart



21
spin-offs
(2018-2022)



Vision and mission statement

“As a world-leading R&D center for nanoelectronics and digital technology, we strive for the impossible and aim for disruptive innovation. We maximize our social impact by providing smart, sustainable solutions to improve quality of life. At imec, we’re shaping the future.”

“As a trusted partner of businesses, startups, and academia, we bring together brilliant minds from around the world into a creative and stimulating environment. By tapping into our world-class infrastructure, as well as our local and global ecosystem of diverse partners across a wide range of industries, we are accelerating progress toward a more connected and sustainable future.”

It is this vision and mission statement that permeates all of imec’s operations. From the relentless functional miniaturization of semiconductor technology, and disruptive sensor concepts for process optimization and personalization in the pharmaceutical industry, to a broad portfolio of other digital activities: everything is driven by a desire to have a positive impact, and contribute toward a better life within a sustainable society, all based around imec’s groundbreaking innovations.

This is also the foundation for imec’s guiding principles:

- To carry out pioneering and strategic research in the areas of nanoelectronics and digital technologies, in order to develop the building blocks that will contribute toward a better life in a sustainable society.
- To bring new developments to market through partnerships or startups, helping businesses and universities gain access to new technologies.

The above vision and mission statement is put into practice following four key principles, driving imec’s overall business strategy:

1. Over the next 10 years, imec will continue to drive the **functional miniaturization of semiconductors**.
2. Imec will address society’s big challenges by developing **smart applications** using its expertise in digital and advanced semiconductor technology.
3. Imec will act as a driving force for unique **electronic and digital systems innovation** on the basis of ambitious, disruptive advancement that embraces sustainable society.
4. Imec will combine its position as a leader in global technology with **local civic engagement** in high-impact projects in those regions where it is present.

1.2 Value chain – goods and services

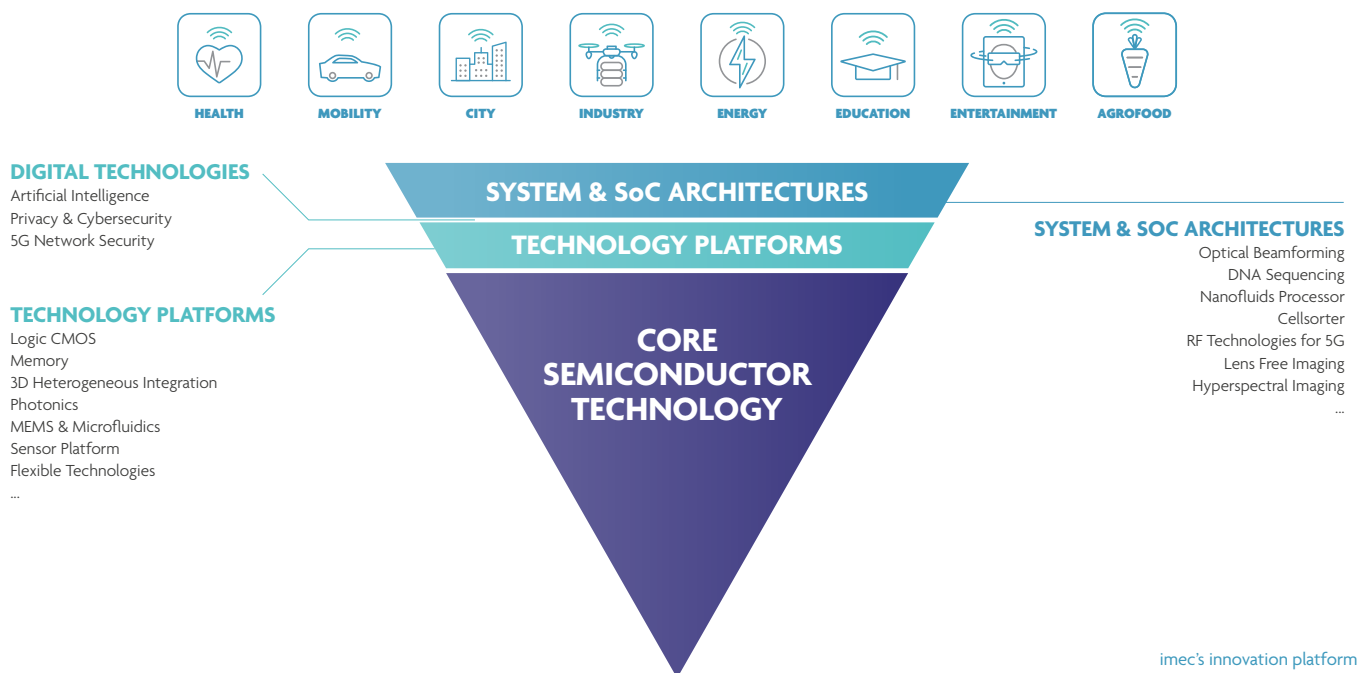
Imec has a unique and advanced infrastructure, with one of the world's largest and most advanced R&D labs in the field of nanoelectronics. It is a lab that aims to turn disruptive research into industrializable chip manufacturing technology, based on leading microchip and digital technology. We call this “from lab to fab”.

Imec's globally integrated ecosystem of innovation and associated collaboration models covers the entire industry value chain. The organization can call on talented individuals and experts in a wide range of fields, from nanotech and Artificial Intelligence (AI), to biotech and renewable energy, to achieve these results.

Imec's offering is a response to the technological challenges facing a wide-ranging and dynamic global industrial landscape, aligned with specific concerns emerging from the policy goals set out by the governments imec works with.

“Imec's unique combination of infrastructure, expertise, and partnerships is the result of decades of building trust, collaboration, and investment.”

Imec applies its expertise in microchip technology to develop diverse technology platforms, combining these platforms with digital technology (such as AI), while also utilizing its systems architecture expertise to facilitate disruptive solutions in the fields of healthcare, mobility, cities, industry, energy, education, entertainment and agrofood. This is central to imec's strategy for innovation management.



1.3 Business models

Imec is known for its technological innovations. From the very beginning, these have stemmed from the organization's innovative business models, designed to promote imec's continued growth. Collaborations are vital to what imec does as an organization. Industrial players, research centers, and academia can work with us in a number of ways, from collaborations in R&D to development services and startup support.

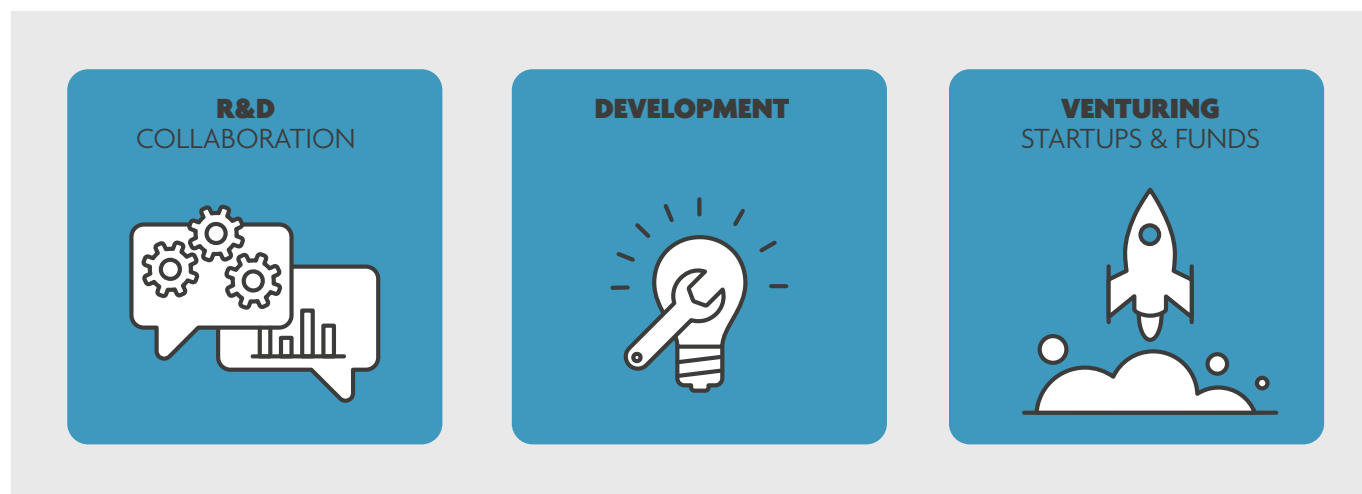
In the early 1990s, collaborations with large businesses – often global players – would start off with a business model wherein partners would pool research costs and share results. Over the years, an increasing number of bilateral collaborations have followed. During this time, imec has become the **R&D hub** for the world of nanoelectronics, with hundreds of collaborations across the entire value chain. All major global players in the chip industry come to imec to research and develop the technologies of the future. Its recent Sustainable Semiconductors and Systems Technology (SSTS) program is a great example of how companies from across the technological innovation ecosystem are looking for sustainable solutions for the next generations of chips.

Thanks to its growing knowledge and extensive number of collaborations, imec has been able to use its expertise in nanotechnology in an increasing number of different fields. The organization has been making breakthroughs on a global scale, particularly in healthcare and life sciences. Furthermore, imec develops disruptive technologies that enable sustainable innovations in areas such as renewable energy, low-power communications, agrofood, and smart mobility.

Imec brings together global industry leaders from across the entire semiconductor value chain, startups, academia, and knowledge centers for R&D in nanoelectronics and digital technology including advanced semiconductor scaling, silicon photonics, smart health solutions, smart energy, smart mobility and smart cities, artificial intelligence, and solutions beyond 5G and sensor technologies.

In addition to its R&D offering, imec utilizes its expertise and extensive international industry network to **support innovation in both smaller organizations with limited internal R&D resources as well as their larger counterparts**. This support spans from the initial ideas to full-fledged end products, i.e., from product or chip design to prototyping, testing and optimization, and manufacture.

Finally, imec supports technological **startups** with its tailored offerings. Imec.xpand, an independently managed value-adding venture capital fund, supports deep-tech startups, with imec's technology, expertise, networks, and infrastructure being used to make a difference. The imec.istart program is a business accelerator program providing technology entrepreneurs with specialized coaching, facilities, and general support to help them grow their businesses.

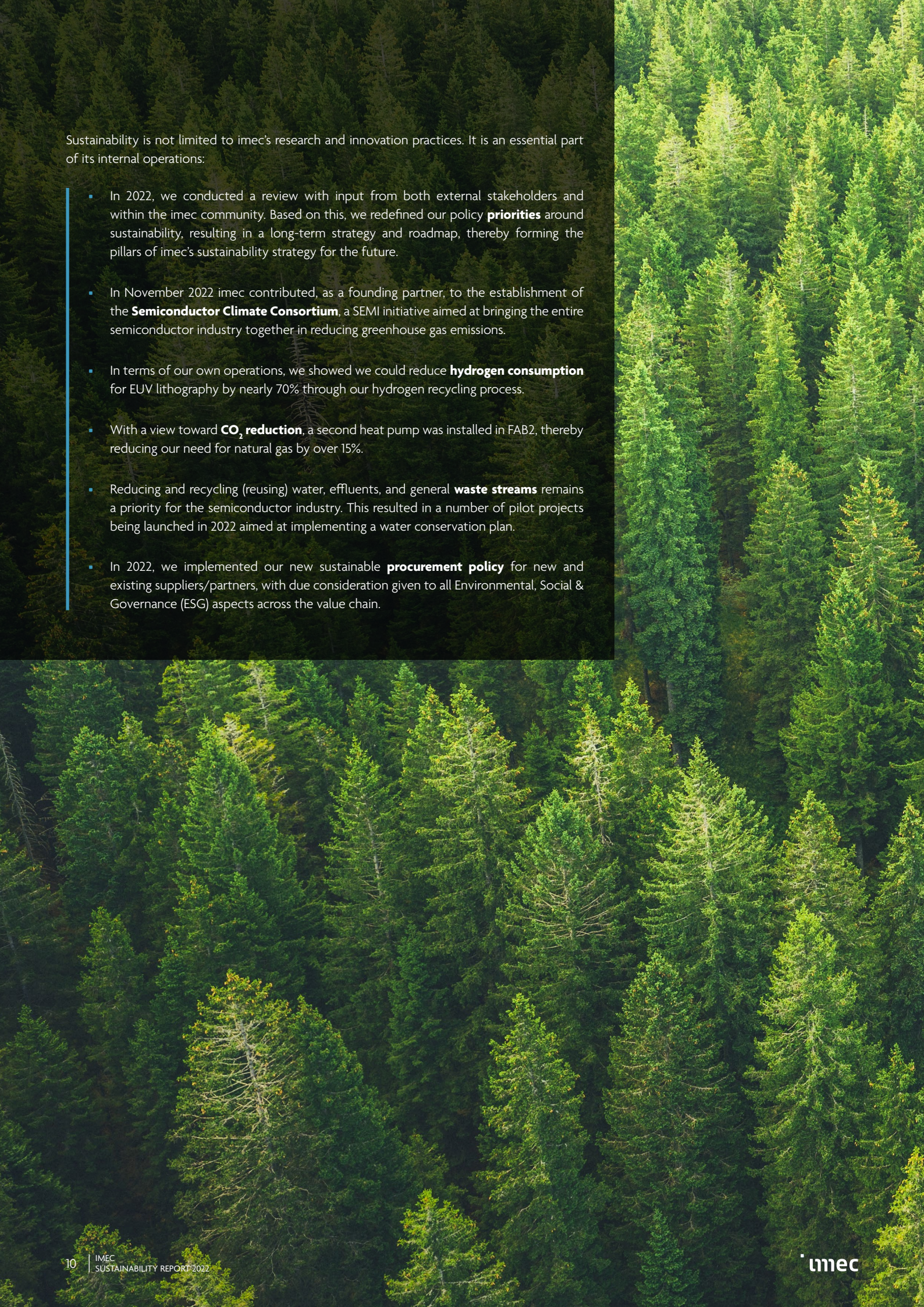


Imec's business models are a response to industry demand, ensuring a smooth transition from the organization's R&D to impactful products and services.

1.4 Highlights of our efforts in sustainability for 2022

Research and innovation are the beating heart of imec as an organization, enabling us to build the world's most advanced technological platforms. Today, imec is ready to take the next step – system innovation, in collaboration with various sectors, such as the pharmaceutical, automotive, or hydrogen sectors. While the complexity of deep-tech innovation is enormous, building prototypes that demonstrate the potential of nanotechnology to imec's partners allow for quicker entry into the market. All this with an eye for efficiency and sustainability.

- In late 2021, imec started its Sustainable Semiconductor Technology and Systems (SSTS) research program to help **quantify and reduce the chip industry's carbon footprint**. Given the amount of industry interest, with more than 10 partners joining the program in 2022, this has proven a real success story. In 2022, imec also launched its imec.netzero platform, helping to determine the environmental impact of production processes for future technology nodes.
- A major highlight in 2022 came with the demonstration of an **energy-efficient electro-optical transmitter receiver** comprising a silicon photonics chip with a 3D-assembled FinFET CMOS chip, its use of highly compact optical components facilitating a high bandwidth density of more than 0.8 Tb/s per mm.
- At EnergyVille, a collaboration between KU Leuven, VITO, Hasselt University, and imec on **energy research**, we were able to demonstrate in 2022 that our nanomesh material improves the current density of electrodes made from nanomesh by a factor of 100 compared to today's standard materials. This renders our material highly suitable for electrochemical applications, such as electrolyzers for green hydrogen production. Through HYVE, a joint venture pairing imec with four strategic investors, this technology will be scaled up and commercialized.
- In 2022, we developed a powerful new chip that can process and transmit more signals from our Neuropixels brain probes, and this with greater efficiency. In doing so, we are providing a boost to global scientific **brain research**, which should lead to breakthroughs in research into neurodegenerative diseases, such as Parkinson's and Alzheimer's. The Neuropixels probes are the result of an international collaboration, in terms of funding, as well as design and development.
- In 2022, the **early-stage deep-tech investment fund** imec.xpand moved up a gear. The independently managed fund works closely with imec, investing in startups that make significant use of imec's knowledge, expertise, network, and/or infrastructure. It was able to raise its second fund back in September and €220M had already been raised by the end of December. This is an Article 8 fund that actively supports environmental and social objectives.
- In 2022, the technology around **solid-state lithium batteries** developed by imec over the past decade was successfully transferred to imec spin-off SOLITHOR, which was also included in imec.xpand's portfolio. The company will produce and commercialize reliable, economical, high-energy, and high-capacity storage solutions, thereby becoming a key player within the European battery value chain.



Sustainability is not limited to imec's research and innovation practices. It is an essential part of its internal operations:

- In 2022, we conducted a review with input from both external stakeholders and within the imec community. Based on this, we redefined our policy **priorities** around sustainability, resulting in a long-term strategy and roadmap, thereby forming the pillars of imec's sustainability strategy for the future.
- In November 2022 imec contributed, as a founding partner, to the establishment of the **Semiconductor Climate Consortium**, a SEMI initiative aimed at bringing the entire semiconductor industry together in reducing greenhouse gas emissions.
- In terms of our own operations, we showed we could reduce **hydrogen consumption** for EUV lithography by nearly 70% through our hydrogen recycling process.
- With a view toward **CO₂ reduction**, a second heat pump was installed in FAB2, thereby reducing our need for natural gas by over 15%.
- Reducing and recycling (reusing) water, effluents, and general **waste streams** remains a priority for the semiconductor industry. This resulted in a number of pilot projects being launched in 2022 aimed at implementing a water conservation plan.
- In 2022, we implemented our new sustainable **procurement policy** for new and existing suppliers/partners, with due consideration given to all Environmental, Social & Governance (ESG) aspects across the value chain.

2. Imec's sustainability strategy

2.1 Imec's values – shaping our long-term sustainability strategy

Imec strives toward sustainable development for the benefit of both current and future generations. This obliges the organization to think ahead regarding the choices it makes in the further development of the semiconductor industry in terms of the impact on people, the environment, and society. As an R&D hub, imec is ideally placed to inspire and involve the entire value chain in the search for sustainable and innovative technologies and solutions.

Imec's motto, "embracing a better life", was not chosen lightly. It reflects the organization's long-term vision of pursuing a sustainable world through technology and innovation, one perfectly in line with its own core values – connectedness, excellence, integrity and passion.



CONNECTEDNESS



EXCELLENCE



INTEGRITY



PASSION

Until recently, while sustainability was an ever present element in imec's various activities, the organization was lacking an overarching sustainability strategy, covering the entire value chain and integrated within the business. This is something we addressed in 2022:

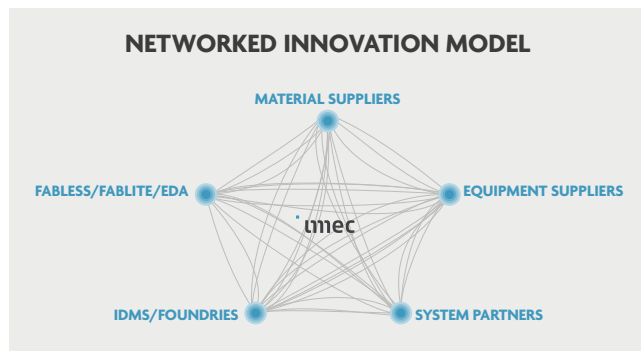
- Both risk and impact analyses were conducted at the top management level. New **risks** in the area of sustainability (ESG) were assessed and integrated into the existing Enterprise Risk Management portfolio, while existing risks were reviewed in the light of ESG. A similar exercise took place for impact, assessing how imec can generate the greatest **positive** overall impact while minimizing any negative impact.
- The above led to the creation of a list of topics that were presented to imec's **stakeholders**, both externally through interviews, with representatives of the various categories of stakeholders, and through an internally-conducted survey.
- The outcome provided a clear picture of imec's **sustainability priorities**. The previous materiality analysis dated back several years and therefore needed to be reviewed.
- The final step was to set both long-term **ambitions** and shorter-term goals for each of the priorities identified. This was undertaken in the first quarter of 2023.

During this entire strategic exercise, the organization also started looking ahead to future reporting guidelines, the Corporate Sustainability Reporting Directive (CSRD), which will apply to imec starting in 2026, as well as the EU Taxonomy.

2.2 Imec's stakeholders – spread across the entire value chain

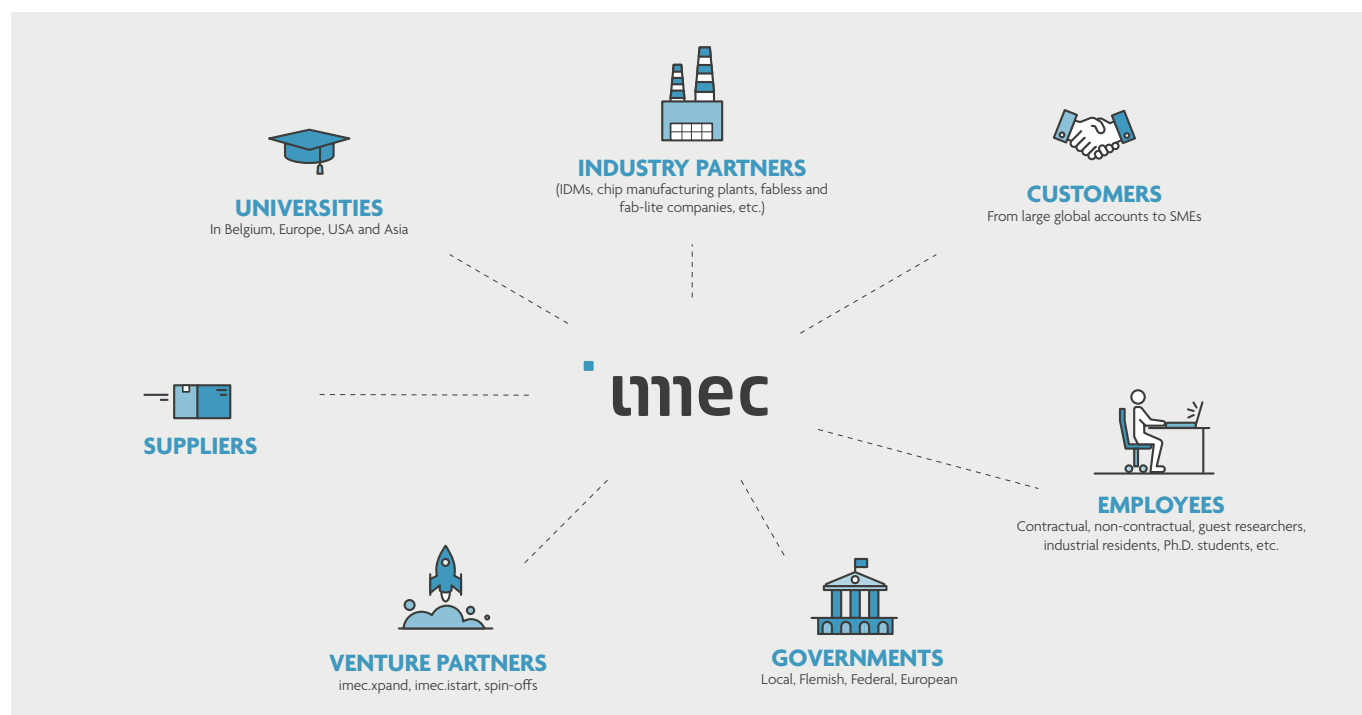
Imec aims to use its core business, research and innovation, to respond to the many societal challenges emerging worldwide, through technology designed with the future in mind. Besides the urgent nature of these global social problems, the increasing demand from employees, prospective employees, and partners also clearly demonstrates that pursuing a sustainable society is the only correct approach. These demands from all its stakeholders help imec define and prioritize its sustainability strategy and policy, ambitions, as well as both short- and long-term actions.

Imec – connecting all key links within the microchip value chain: leading device and materials suppliers, integrated device manufacturers (IDMs), chip manufacturing plants, fabless and fablite companies, electronic design automation companies, and application partners for pioneering R&D activities. By bringing these top players together, imec is changing its innovation model from a sequential model – transferring innovation from one link of the value chain to another – to a network-based model. It all starts from system-level requirements and tries to identify how innovative processes and materials should be developed.



Together with its over 5,500 colleagues across the globe, imec is taking on the challenges of tomorrow by ensuring good health, safe transportation, sustainable energy, and so much more. Providing great care for this excellent **workforce** is therefore one of imec's top priorities. The teams' rich diversity, deep expertise, and drive to work on the future of tomorrow are therefore a strength to be cherished.

Imec works with over 200 universities around the world. These **academic partnerships** fuel its long-term pipeline and establish a fundamental understanding of research. In its R&D pilot line, imec transforms academic innovations into industrial-scale innovations. This is made possible by the significant proportion of leading **equipment and material suppliers** that form part of imec's supplier hub. Together, they develop new concepts, as well as industry-leading technology platforms. These platforms also provide support to startups, who would often otherwise not have access to such top-level technology. When promising developments have potential at the system level, imec's experts can also build bridges to prospective **venture partners**.

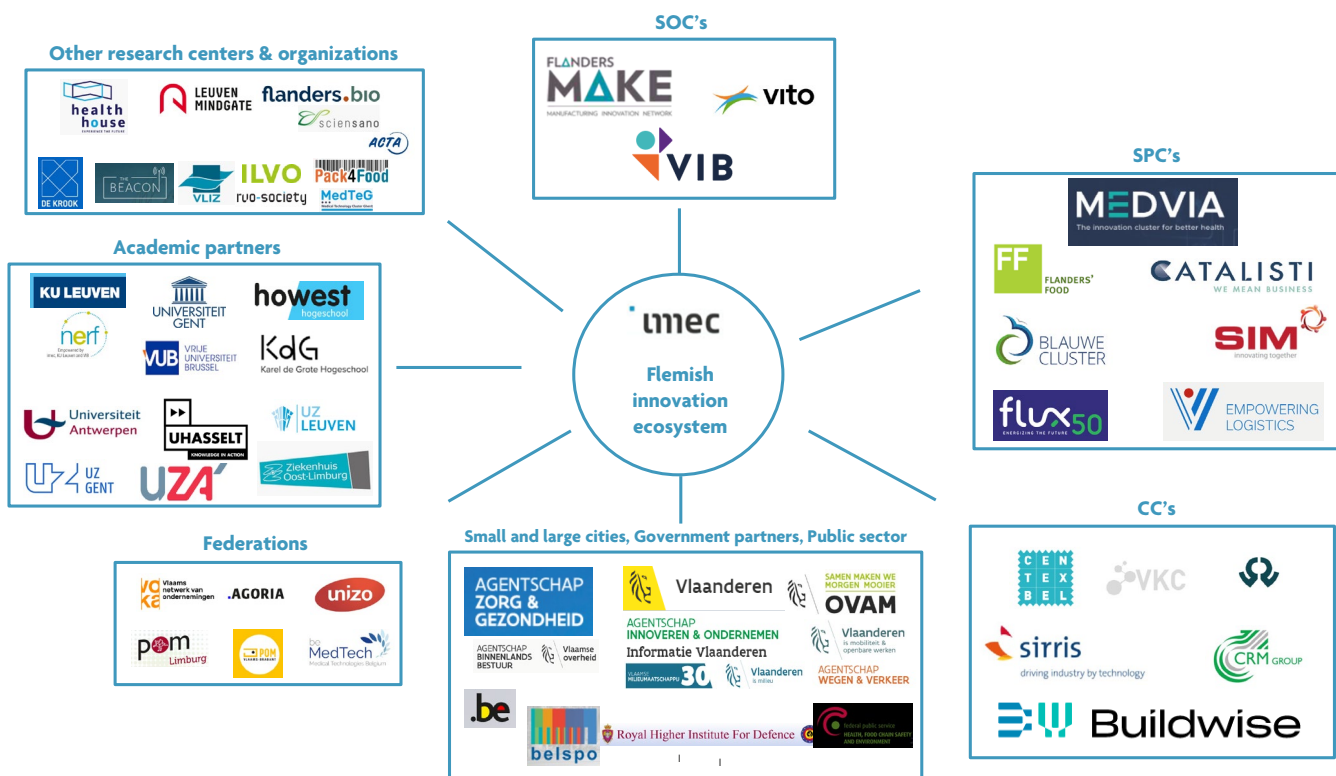


Within both its Flemish and international contexts, imec engages in numerous initiatives in which it is broadly committed to sharing its knowledge and expertise. From this position, imec is also able to gain a broad understanding of the societal challenges prevailing at a local level, as well as the goals that organizations within the semiconductor sector want to set in terms of sustainability. These include:

- SEMI SAC – Sustainability Advisory Council
- SEMI SCC – Semiconductor Climate Consortium
- IEEE IRDS – International Roadmap for Devices and Systems
- ESIA – EU Semiconductor Industry Association
- SIA – US-based Semiconductor Industry Association
- GSA – Global Semiconductor Alliance
- Leuven 2030

The Flemish ecosystem

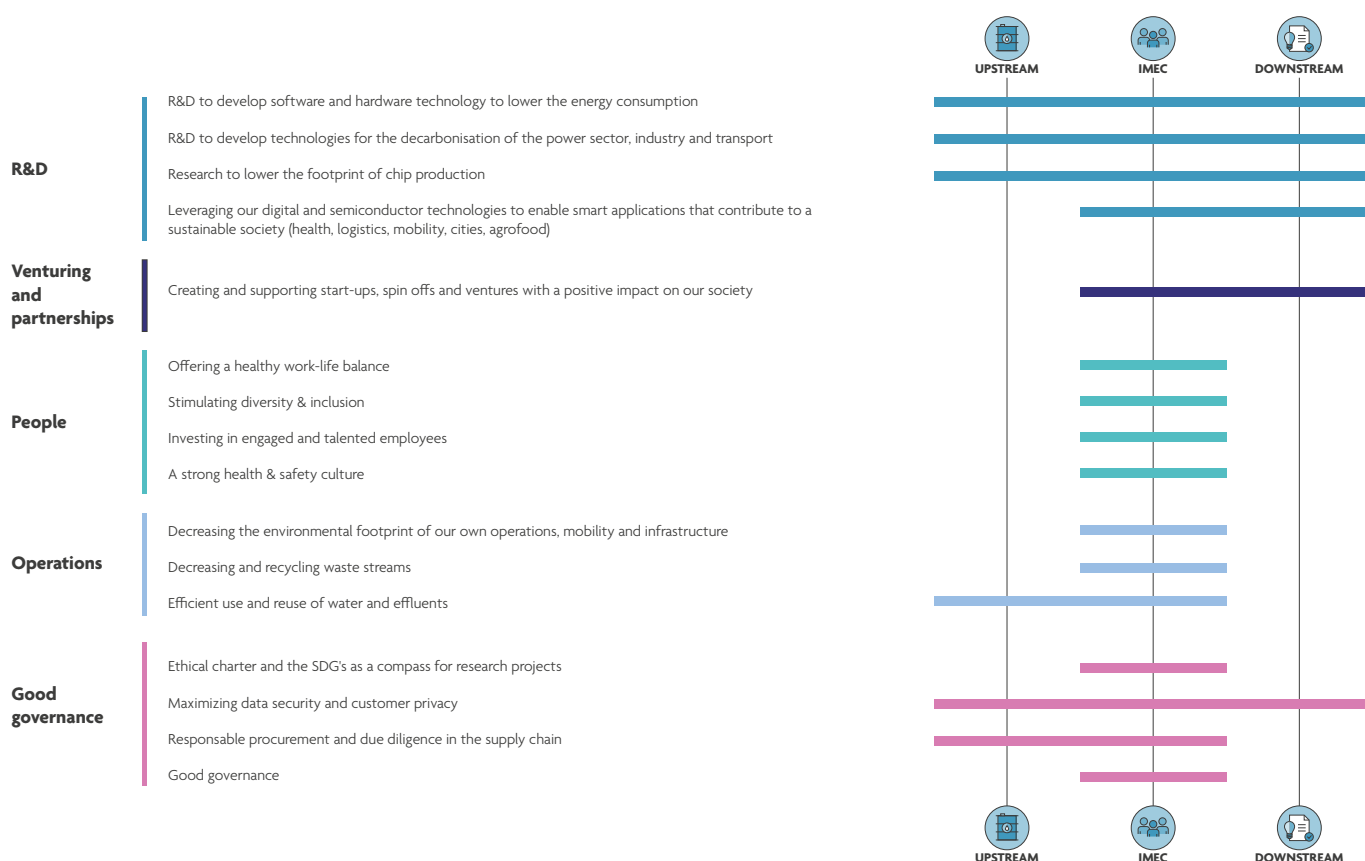
Since its inception in 1984, imec has been supported by the Flemish government, which has allowed it to conduct long-term research. Imec is part of the Flemish innovation ecosystem, working with key organizations so that technology and knowhow are transferred to industry and non-profit organizations, thereby enhancing its overall impact.



2.3 Key risks and impacts across the value chain

Partly prompted by the global trends in terms of climate regulations, the coronavirus pandemic, and increasing demands from stakeholders, but equally by the potential impact of our research on issues of sustainability, imec decided to update its priorities or material topics last year. As part of this exercise, a thorough risk and impact analysis was conducted throughout the value chain, both from a financial perspective and in terms of overall impact. This was not only about the role imec could play in making chip production more sustainable, but also about the risks the organization faces throughout the supply chain when it comes to mining for scarce minerals or using harmful chemicals and gases. Besides, it considered the impact imec's research and technology could have on future users or applications. Questions surrounding the environment, social aspects, as well as good governance – in other words, ESG – were discussed. New risks in the area of sustainability were assessed and integrated into the existing Enterprise Risk Management portfolio, while existing risks were reviewed to account for ESG.

The materiality analysis conducted by imec in 2022 produced a list of material topics, which was submitted to imec's stakeholders. In addition to risk and impact, an analysis of financial impact was also initiated in this process. This will be refined in 2023.



In 2022, imec obtained the officially recognized UN SDG Pioneer certificate, following a 3-year process under the Voka Charter for Sustainable Enterprise program (Voka Charter Duurzaam Ondernemen – VCDO).

2.4 Sustainability priorities as a basis for an integrated sustainability policy

These sustainability priorities form the basis of an integrated sustainability policy in which policies are directly linked to imec's entire organization and overall strategy. This should result in an ambition and action plan that defines ambitions, with associated goals, actions, owners, KPIs, etc. This will be further developed in 2023.

As a participant of the Voka Charter for Sustainable Enterprise (VCDO) program, imec has already been setting goals, inspired by the various United Nations Sustainable Development Goals (UN SDGs) for years, as well as identifying priority areas where it could play a reinforcing role. This materiality analysis also links to these previously mentioned UN SDGs. The financial and impact materiality analyses will be finalized in 2023.

Sustainability priority	Material topic	Impact domain	Value chain impact	Main SDG contributions
How we generate a sustainable impact on society through our R&D (see section 3.1)	R&D to develop software and hardware technology to lower the energy consumption	Climate change & energy		
	R&D to develop technologies for the decarbonisation of the power sector, industry and transport	Climate change & energy		
	Research to lower the footprint of chip production	Pollution - water use - resource use and circular economy		
	Leveraging our digital and semiconductor technologies to enable smart applications that contribute to a sustainable society (health, logistics, mobility, cities, agri-food)	Climate change & energy, water use, biodiversity and ecosystems, health & wellbeing		
How we generate a sustainable impact on society through our venturing and partnerships (see section 3.2)	Creating and supporting start-ups, spin offs and ventures with a positive impact on our society	Employment, diversity & inclusion		
	ESG governance for ventures and start-ups	ESG governance for ventures and start-ups		
How we work sustainably with our people (see section 4.1)	Offering a healthy work-life balance	Employee health & wellbeing		
	Stimulating diversity & inclusion	Diversity and inclusion		
	Investing in engaged and talented employees	Diversity and inclusion		
	A strong health & safety culture	Employee safety		



Sustainability priority	Material topic	Impact domain	Value chain impact	Main SDG contributions
How we work sustainably in our operations (see section 4.2)	Decreasing the environmental footprint of our own operations, mobility and infrastructure,	Climate change	  	    
		Energy		
	Decreasing and recycling waste streams	Pollution	  	 
		Responsible material and resource use for both hazardous and non hazardous materials		
How we work sustainably by good governance (see section 4.3)	Ethical charter and the SDG's as a compass for research projects	Mobility	  	 
		Waste		
	Maximizing data security and customer privacy	Water management	  	 
		Waste		
How we work sustainably by good governance (see section 4.3)	Ethical charter and the SDG's as a compass for research projects	Ethics	  	
		Ethics		
	Maximizing data security and customer privacy	Data security & privacy	  	 
		Data security & privacy		
How we work sustainably by good governance (see section 4.3)	Responsible procurement and due diligence in the supply chain	Responsible procurement	  	  
		Responsible procurement		
	Good governance	Governance	  	  
		Governance		



Following this, the governance structure for implementation, monitoring, and reporting will be reviewed.

In 2022, sustainability was added as a separate pillar to imec's corporate objectives (the Balanced Score Card) and, thanks to its refreshed sustainability policy, this can serve as a foundation, and a continuous source of inspiration.

3. How imec is having a sustainable impact on society

3.1 Through research and development (R&D)

From its central role as a global R&D hub and an ecosystem comprising hundreds of partners, imec's task is to maximize the positive impact of future chip technologies, while avoiding any negative effects or risks. We aim to achieve this not by taking small steps, but by disruptive innovation.

While imec's advanced infrastructure is perfectly suited for this, it goes beyond that. Both nano and digital technologies are making their mark in just about every sector and application, opening up unprecedented opportunities at the intersection of life sciences, healthcare, energy, agrofood, education, logistics, cities, communities, etc. This is driven by a will to contribute to a better life within a sustainable society, based on imec's groundbreaking innovations.

The urgency is there, as well as the will and knowledge to change, all the way "from cradle to cradle".

"We're proud that we've included sustainability as an explicit pillar within our corporate balanced scorecard. It's something we're looking at throughout the organization, encouraging everyone to step forward and take action. Everyone is encouraged to assess their own individual impact, as working toward a better planet starts at the individual level. By doing this as a group, the resulting output is greater than the sum of its constituent parts. This equally applies to imec's own research and ecosystem. It's great that everyone at imec is embracing this, encouraging each other to keep this up on an ongoing basis. This is how we will achieve a multiplier effect."

Rudi Cartuyvels, executive vice president & chief operations officer imec



Imec's ambition to make a substantial contribution toward creating a sustainable society through research and technology is reflected via the four policy areas below, each one with an ambitious action plan behind it:

Goal of the imec R&D pillar	Ambition
Developing software and hardware technology to help lower energy consumption	Pave the way toward more energy efficient semiconductor products and systems
	Develop new hardware and software to improve energy efficiency in cloud and edge AI
Developing technologies to help decarbonize the (energy) industry and transportation	Lower the cost of green hydrogen produced via electrolysis using imec's nanomaterials
	Reduce CO ₂ emissions from industrial processes using imec's nanomaterials
	Contribute toward electrification within the transportation sector through solid-state battery technology
	Contribute toward making solar power the dominant (and green) energy source
Quantifying and reducing the chip industry's carbon footprint	Document the environmental impact of future technology production for all imec research programs
	Integrate environmental impact research into all current research programs
	Share knowledge on the environmental impact of imec's production of semiconductor technology with our partners and the wider public
	Integrate principles of material circularity and chip life cycle analysis into program management in order to increase opportunities for recycling and reuse
Leverage our digital and semiconductor technologies to facilitate the production of smart applications that contribute toward a sustainable society (health, logistics, mobility, cities, agrofood)	Develop applications that have a disruptive impact on society, thereby rendering it more sustainable
	Develop applications that contribute toward the climate goals set by the European Green Deal
	Develop applications that facilitate a more fine-tuned monitoring of sustainability parameters

Sustainability is high up on imec's agenda. Imec's unique role, together with the help of its wider ecosystem, makes it possible to act **NOW** in developing new technologies, not when it is too late. Only then one can create an impact and accelerate progress, which is needed more than ever. Even within our own organization, it is important that all departments, right down to each and every individual, pull in the same direction.

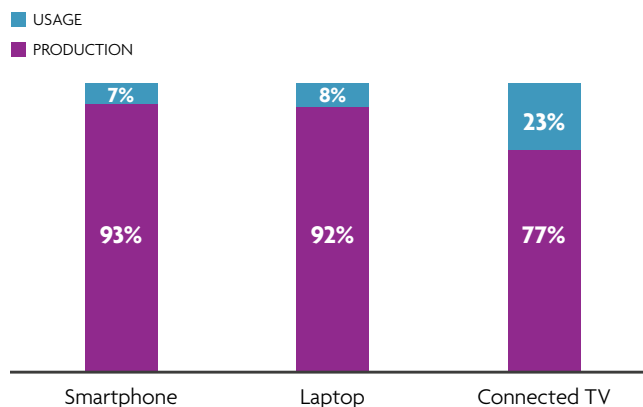
3.1.1 R&D to develop software and hardware technology to lower energy consumption

While both imec's and the semiconductor industry's scaling activities lead to increased efficiency, figuring out how to efficiently translate this into a computational and systems architecture is an additional challenge in itself. The continual scaling of current solutions in a linear fashion is not a viable option, partly because of the high energy consumption and time required for system training (learning about the new AI model). Any solution to further scale this application requires interdisciplinary collaboration (co-design) throughout the different layers of the system.

Today, at least 75% of the carbon footprint generated by technological devices such as cell phones, laptops, and TVs lies in the production phase of their life cycle.

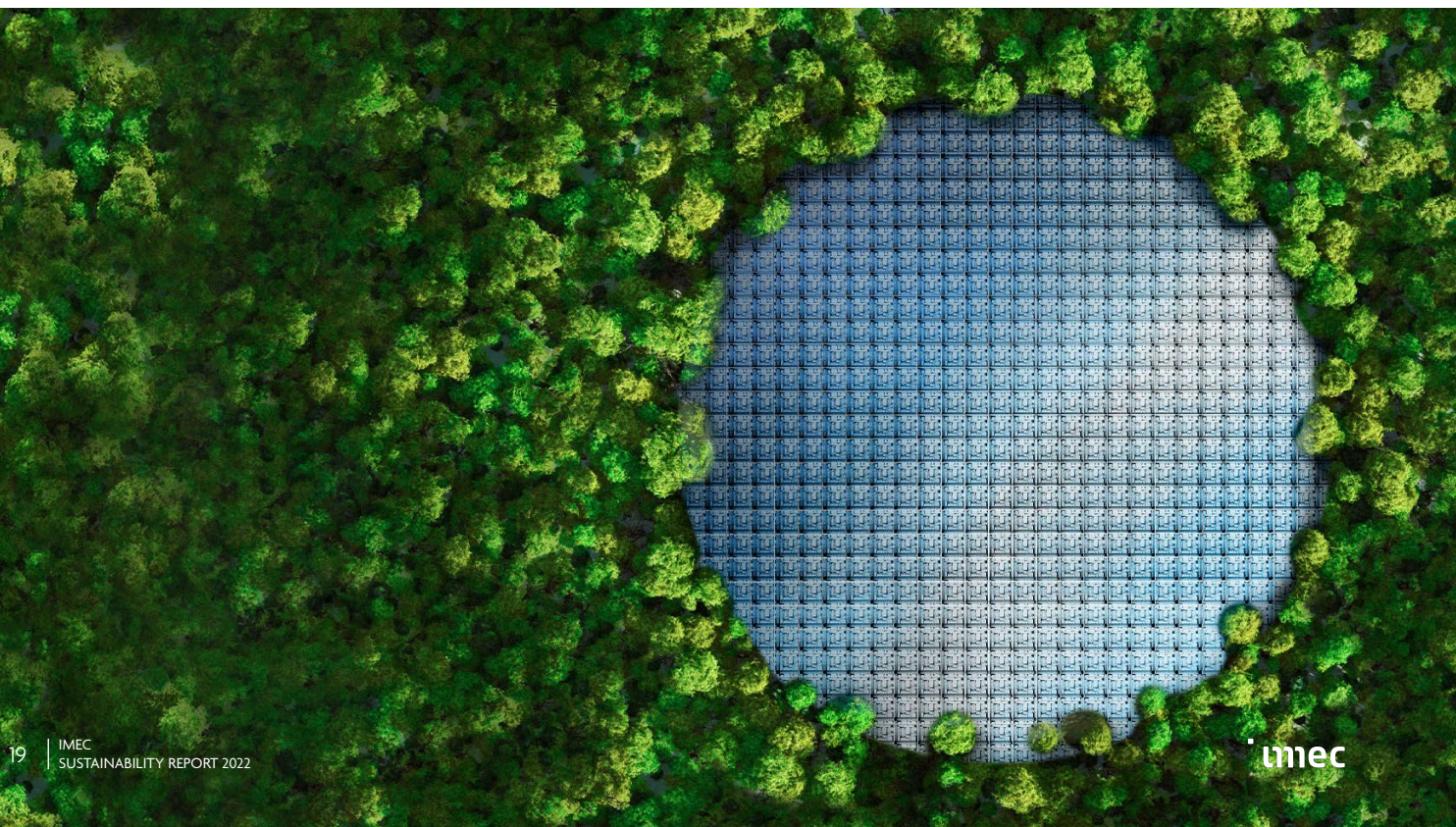
All the more reason, then, that research looking into the carbon footprint of semiconductor technology should also pay attention to energy efficiency and process emissions in **semiconductor products and systems**. That is why imec is working on a separate energy efficiency roadmap in tandem with those within the wider technology program. Here, teams are aiming to quantify the energy improvement potential, given a particular functionality on the imec logic technology roadmaps.

CO₂ EMISSIONS OF CONSUMER GOODS: PRODUCTION DOMINATES



Sources:

1. Ercan, M. et al. (2016). Life cycle assessment of a smartphone. Ericsson Research, Sony Mobile Communications. ICT for Sustainability 2016.
2. Andrae, A.S.G., Edler, T. (2015). On Global Usage of Communication Technology: Trends to 2030. Challenges.
3. Samsung (2017). Energy Guide of the "55" Class J6201 Full HD LED TV". EnergyGuide Label.



It is still not clear in what direction software for complex computation will evolve. Typically, the hypothesis of “scaling theory” is assumed, which indicates that deep learning is still very important. This brings us to the importance of research on AI. Here, we arrive at the importance of AI in all this. You can make systems smarter both by making them bigger and adding more parameters to them. However, this leads toward systems that can almost exclusively be trained by some of the largest organizations or companies on Earth. This places limitations on potential, while also having a huge negative impact on energy consumption and the associated carbon footprint. Consider the energy consumption of those large data centers, which today represents up to nearly 80% of the entire data center carbon footprint, including the production of the data centers themselves. To get a linear increase in calculation capacity, you will need an exponential increase in the required capacity. This means that AI is inevitably destined to hit a wall at some point soon. The right solution will not only be found in software, but rather in a combination of hardware and software, where people look to develop new AI hardware and software with improved energy efficiency in terms of cloud and edge AI, by a factor of 1,000.

When talking about AI and machine learning, the principle of “neural networks” quickly comes to mind. These are calculation systems that mimic the human brain in how it seeks to recognize patterns in large or complex data sets. While they are an indispensable tool for handling complex operations, they place a great deal of strain on computer hardware and consume a lot of energy. Imec’s machine learning program has been a source of inspiration for its ecosystem from the earliest stages of its activity by demonstrating that such neural networks can be implemented more efficiently when built upon a fundamental understanding of emerging memory technology (as available at imec). In this respect, imec has realized groundbreaking research results, while also having lofty ambitions for further improving energy efficiency.

Although this is achievable through further development of in-memory computing concepts, it requires a holistic approach that incorporates algorithm optimization, system architecture integration, designing of analog computing cells and arrays, and optimization of devices and technology to facilitate their implementation. Imec’s machine learning program is designed to address these elements in parallel, ensuring an integrated approach. Moreover, we look at the entire system. For example, the Compute Systems Architecture program places the focus on developing a holistic new system that can address future AI workloads much more sustainably by removing cross-system bottlenecks.

AI often operates off sensor data. Through cleverly combining sensors with AI processing of these sensors, we can also make significant gains in terms of energy efficiency. By processing data locally, we avoid having to send data back and forth over the Internet, which also has an impact on energy consumption. In addition, by cleverly combining AI and sensor technology, we are able to make significant gains not only in terms of speed, but certainly also in terms of sensor cost and energy consumption. Given its knowledge of AI, sensors, and calculation methods, imec is ideally placed to handle this combination.

“AI is doomed to fail if it’s not sustainable. It requires us to increase computing power by a factor of 100 every two years. Here, we run into the limitations of Moore’s law, and the hardware does not follow. Through our research, we can help keep the system democratically accessible, at low cost and with a low energy consumption. This is for the better, for all.”

Prof. Steven Latré, imec fellow AI



3.1.2 R&D to develop technologies for the decarbonization of the power sector, industry and transport

To achieve both European and international goals of becoming carbon neutral by 2050 at the latest, fossil fuel usage must continue being reduced. Together with decreasing our reliance on nuclear power, this **energy transition** requires a dramatic increase in renewable energy sources. The challenges here are not only in the area of energy generation, but also in energy management, storage, and conversion, where a balanced approach to sustainability is required throughout the entire value chain of any proposed solutions, covering their entire life span. At the same time, it is also essential to keep our energy demands under control.

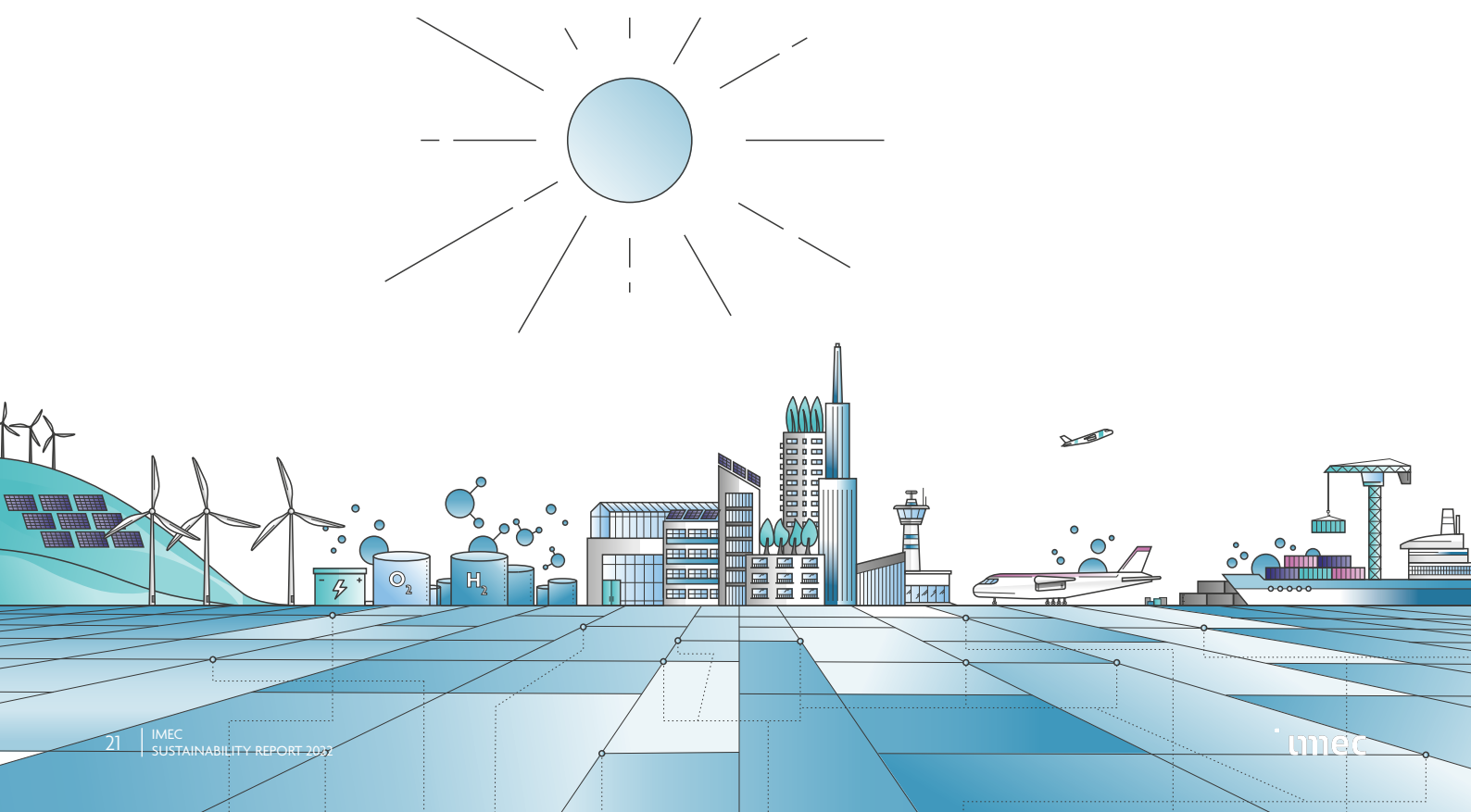
The huge growth within the green energy sector also creates challenges and risks related to the raw materials needed for production, such as indium, silver, and bismuth in photovoltaic (PV) technology, as well as platinum and iridium in electrolysis. In the case of batteries, the dangers and effects associated with the mining and use of both cobalt and lithium need to be considered.

Consequently, imec is working on the four challenges around energy: generation, management, storage, and conversion. Large-scale production of green hydrogen and green hydrocarbons is becoming an essential element for the decarbonization of industries. Imec is deploying its expertise in nanotechnologies to facilitate radical innovation in energy conversion to chemical energy in the following ways:

Lower the costs of green hydrogen produced via electrolysis using imec's nanomaterials. At EnergyVille, in collaboration with KU Leuven, researchers were able to demonstrate in 2022 that our nanomesh material improves current density in electrodes made from nanomesh by a factor of 100 compared to today's standard materials. This renders our material highly suitable for electrochemical applications, such as electrolyzers for green hydrogen production. For the purposes of both valorization and commercialization, Hyve was founded by imec and VITO (both partners in EnergyVille) and the industrial pioneers Bekaert, Colruyt Group, DEME and John Cockerill.

When it comes to **reducing CO₂ emissions in industrial processes based on its nanomaterials**, imec is conducting conversion activities aimed at achieving more efficient hydrogen generation, independent of rare metals, by means of electrochemical reduction of water. This is a significant step toward the direct electrochemical reduction of organic molecules, which holds promise for full CO₂ circularity. In addition, these same research teams are also focusing on valorizing this technology via industrial partnerships.

Imec is also contributing to the **electrification of mobility solutions through research and development** of solid-state battery technology. When it comes to storage, the focus is on developing innovative solutions for mass electrification of mobility solutions using solid-state batteries – more specifically solid-state lithium-metal batteries – with a superior energy density, improved safety, and a manufacturing approach compatible with current industrial practices. In 2022, the development of such technologies, which imec had been working on for the past decade, was successfully transferred to imec spin-off SOLiTHOR with the aim of carrying out further commercialization.



Based on a firm belief in the importance of solar power (PV), imec research is focusing on **solar as its dominant green energy source**. When it comes to power generation, this entails innovative PV cell and module technology aimed at combining increased efficiency with low-cost and long-term durability, which is compatible with the TeraWatt era. This has two specific objectives: first, to develop highly efficient and cost-effective tandem and triple-junction technologies for terrestrial applications; and second, to prepare solar power generation for the ibid. era by reducing its dependence on rare metals and ensuring the circularity of solar products.

This is something imec is working on both in Leuven and at its EnergyVille site in Genk. At imec Leuven, the focus is on proof-of-concept for highly innovative materials and components that leverage imec's extensive knowledge of nanotechnology and interface control. As for the EnergyVille partnership, this allows us to take our first steps toward scaling up and rapidly penetrating at a system level, thereby contributing to an acceleration of the overall energy transition.

"2022 was a key year, in which it became abundantly clear that sustainability in the energy, industrial, and transportation sectors should not only be pursued for sound environmental and economic reasons, but that it is equally the cornerstone of any smart, long-term strategy in making our societies more resilient to geopolitical shocks."

Prof. Jef Poortmans, fellow and energy program director, imec, and R&D coordinator, EnergyVille

3.1.3 Quantifying and reducing the chip industry's carbon footprint

Semiconductor production is estimated to account for some 0.1 percent of global greenhouse gas emissions in CO₂ equivalents. The global crises of recent years have placed the importance and explosive growth of the chip industry in the spotlight. With a projected eight percent growth in production volumes, along with the additional increase in emissions due to greater complexity of every new technology, it is clear that the semiconductor industry must step up a gear to decrease its carbon footprint. Most semiconductor companies subscribe to the same "net zero" ambition by 2030 or 2050, with many already making substantial efforts to monitor and reduce their greenhouse gas emissions.

Reducing its carbon footprint is a major challenge for the entire industry, requiring a global approach. Semiconductor manufacturing is resource-heavy in terms of energy, water, and raw materials and, also uses various greenhouse gases that can be released into the environment.

To address this, imec has its **Sustainable Semiconductor Technologies and Systems (SSTS)** program, which is translated into four separate ambitions that could involve the entire ecosystem:

- Document the environmental impact of future technology production for all imec research programs
- Integrate environmental impact research into all current research programs
- Safely share knowledge on the environmental impact of imec's production of semiconductor technology with our partners and the wider public, respecting the sensitivity of the data
- Integrate principles of material circularity and chip life cycle analysis into program management in order to increase opportunities for recycling and reuse.

Both a holistic approach and collaboration throughout the production chain are prerequisites to achieving these ambitions, e.g., by monitoring emissions throughout the entire chain. Beyond that, having a uniform and transparent method for collecting and sharing such data is crucial to achieving an orchestrated approach. For example, today, some companies report their carbon emissions figures in relation to their sales, while others plot them against their production volumes.

In 2022, imec launched its imec.netzero platform, providing insight into sustainability data on the production of current and future generations of semiconductor technologies for the program's partners. Working as a "virtual production lab," this model provides a simulation environment for measuring energy and water consumption, the impact of material choices such as rare elements, and greenhouse gas emissions. Using imec.netzero, the environmental impact of manufacturing integrated circuits can be estimated and projected towards the future. Due to the increase in complexity from one technology node to the next, and the strong expected growth of the industry, the emissions are projected to grow significantly over time. Even when the deployment of renewable energy over time is considered, there is a significant gap to the requirements set out by the Paris agreement.

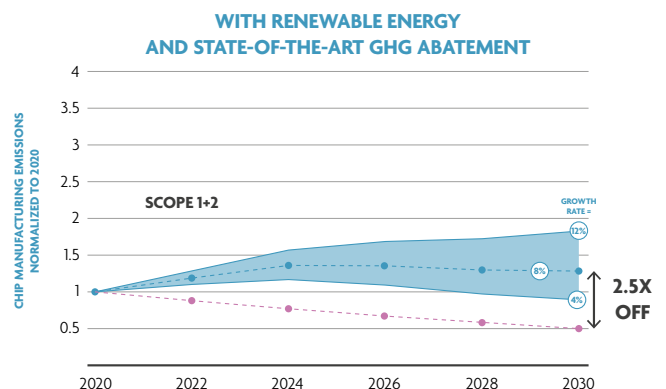
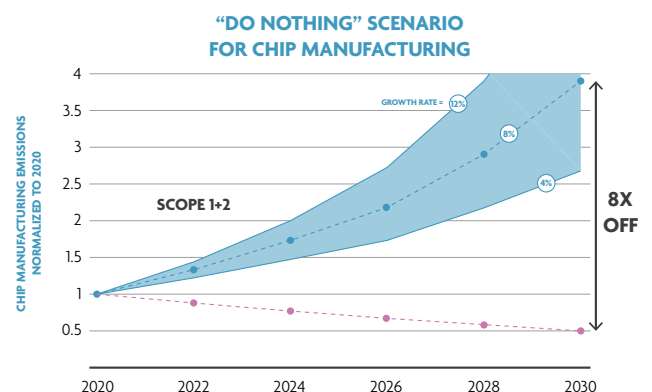
In its dedicated cleanroom, imec and its partners are able to test predetermined hypotheses and solutions before transferring them to industrial production environments. Ultimately, based on the results, the aim is to develop tangible guidelines for relevant semiconductor industry players, establish a roadmap that will help the industry meet its net zero targets, define new standards for measuring and reporting the industry's environmental impact, and share knowledge and data with both the scientific community and the wider public. The biggest challenge, however, seems neither technical nor scientific, but rather the realization that time may well be the most scarce resource for taking on these necessary steps.

Amazon, Apple, Microsoft, ASML, Edwards, KURITA, SCREEN, Tokyo Electron, GlobalFoundries, TSMC, and Samsung – this is just a selection of companies that have joined imec's SSTs program over the past year and a half. While this is impressive to say the least, this list is by no means complete. By recognizing the challenges, this creates support for change across the industry, while also generating the necessary funding to support any subsequent research and development.

In 2023, the imec.netzero platform will be (partially) launched publicly in an effort to share as much knowledge as possible. It will also be further enriched in terms of "logic," "memory," and "3D packaging" technologies.

"Imec finds itself in a unique position to bring the industry together and bridge the gap caused by the explosive growth within the chip industry. Only through transparent reporting on carbon footprints, with a focus on scope 3 emissions and strong ecosystem collaboration, can the climate challenges faced by the industry be overcome."

Sri Samavedam, senior vice president imec



● Model forecast ● Paris agreement



Adopt 50% emissions reduction this decade as a target



Must-do for fabs: renewables, best abatement, materials, equipment,...



Report transparently including scope 3



Share best practices openly

3.1.4 Smart applications that contribute toward a sustainable society (health, logistics, mobility, cities, agrofood)

Advances in nanoelectronics and digital technology (miniaturization of sensors, wireless communications, data processing, low energy consumption, artificial intelligence, robotics, digital twin applications, etc.) are opening up unprecedented opportunities that may sometimes even lead to radically different approaches within those fields. Take healthcare, for example. Imec is fully committed to not only developing technology that runs the gamut of life sciences, but also using technological developments to support the transition toward personalized, accurate, and preventive healthcare.

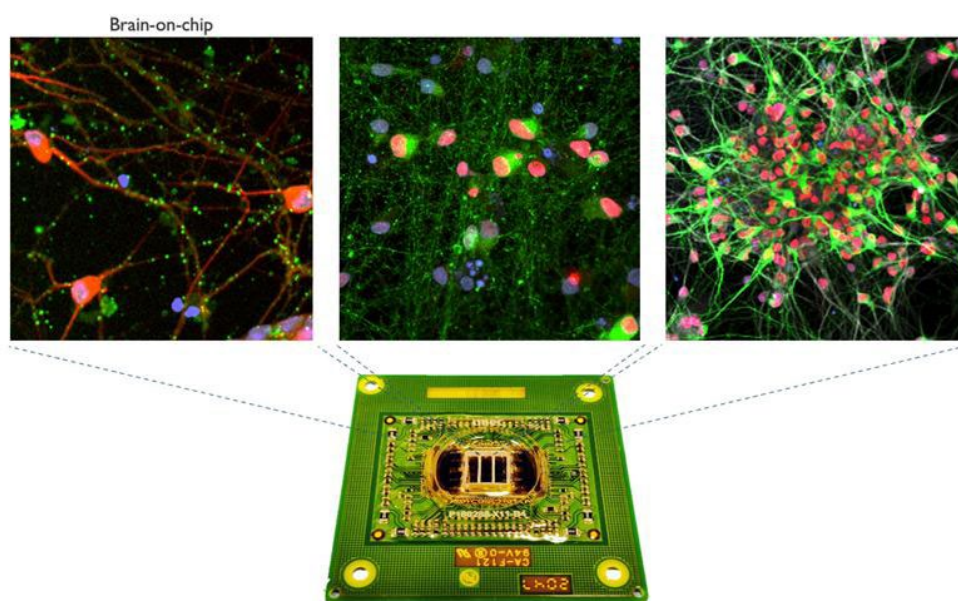
Collaboration and knowledge sharing with those sectors, industry partners, governments, and other research bodies is crucial.

This ambition lies within these three domains:



Some examples:

- Genomics and proteomics. Even smaller, more precise, faster, and cheaper: these are the goals intended to make these science fields more accessible to research and clinical practice. DNA sequencing has become indispensable and has helped us to quickly understand the viral genome of COVID-19. In 2022, thanks to partnerships as well as internal investment, imec managed to consolidate its expertise in this field and is working toward the next generation of faster single-molecule solutions for protein sequencing based on nanopores.



- The smart pill for optimum gut health. It is well known that nutrition plays an integral role in overall health, with about 80% of diseases or disorders being nutrition-related. Not everyone reacts the same way to certain nutrients, so it is important to examine these issues on an individual basis. As part of the OnePlanet initiative, imec is working on developing a smart, ingestible pill that can non-invasively and continually take readings or samples inside the gastrointestinal tract. The technology being developed offers both food and pharmaceutical companies, as well as technology providers, an opportunity for targeted intervention around gut health. The OnePlanet Research Center is a partnership between imec, Wageningen University & Research, Radboud University, and Radboudumc.
- Relevant to mention, is that OnePlanet has a governance committee that helps ensure the social impact of its programs. Besides realizing positive impact, imec takes into account possible risks and negative effects within its application research: material use, circular design choices, the energy impact of cloud applications, as well as pitfalls around exclusion or equal and affordable access to solutions, ethical issues, data security, and privacy.



- Mobility and logistics is all about swift, safe, and sustainable traffic and transportation, no matter the distance, and mode or combination of modes of transportation. In Flanders, imec is applying its knowledge and expertise into researching how digital technology can improve our mobility. For example, many strongly believe in the potential of intelligent traffic lights and connected mobility. This is an important research avenue for Mobilidata, a Flemish government program coordinated by imec. Part of this mobility research is the INDIMO project, a European Horizon 2022 project completed in December 2022. The project used research and user participation to determine the needs of people belonging to vulnerable groups in terms of digitalized and personalized mobility, e.g., how intersections with intelligent traffic lights can contribute to safe mobility for the blind and visually impaired.
- During the pandemic, people became increasingly aware that technology can play a more prominent role in education and lifelong learning, but more importantly that it needs to be used in a more thoughtful way to produce greater sustainable impact. Imec is working on advanced digital technologies and hardware sensors and actuators that help personalize the learning experience and address challenges related to flexible learning.
- A growing number of technologies are finding potential for valorization within the agrofood sector, increasingly combining hardware, analytics, and domain expertise. For example, smart sensor-based solutions are taking big steps toward controlled greenhouse farming, thereby moving toward indoor autonomous farming. The innovations being developed by imec under this program are offering farmers and greenhouse farms new opportunities for sustainable food production.

3.2 Through entrepreneurship (venturing) and startup coaching

3.2.1 Creating and supporting startups, spin-offs and ventures having a positive impact on our society

Beyond its R&D offering, imec utilizes its expertise and extensive international industry network to **support innovation in both smaller organizations with limited internal R&D resources as well as larger spin-offs or ventures.**

These activities are the result of our ambitions in three areas:

- Attracting, growing, and anchoring talent in a fast-growing and inclusive ecosystem.
- Creating and coaching startups, spin-offs, and companies to evaluate ESG risks and opportunities for positive ESG impact.
- Creating ventures with a direct positive ESG impact.

To achieve these ambitions, we are integrating sustainable practices into the daily operations of both our venturing and acceleration programs, wherein the teams are developing their own knowledge and passing it on to the entrepreneurs they are mentoring. They conduct an ESG screening of the company concerned, identifying any ESG risks, as well as any negative or positive impacts they are having. In doing so, the companies are also working toward the UN SDGs. Additionally, ventures, startups, and spin-offs can receive customized training to prepare for any relevant changes in regulation.

In 2022, the venturing and acceleration operations were already running at full speed, through both a solid funnel and the great many spin-offs created over recent years, including another three promising companies in 2022, and more importantly through several spin-offs successfully raising capital to further support their development.

Here are some key highlights of what was accomplished in 2022. Several imec deep-tech startups and ventures saw the light of day in 2022, each with a high potential for sustainability:

- SOLiTHOR, an imec spin-off set up at European R&D innovation hub EnergyVille, concluded a successful capital round of EUR 10 million with imec.xpand as lead investor, supported by LRM, Nuhma, and FPIM. SOLiTHOR is developing an innovative, solid-state lithium battery technology with which the company intends to manufacture and commercialize reliable, economical, high-energy, and high-capacity storage solutions. SOLiTHOR is committed to facilitating the further electrification of the transportation industry with solutions aimed at addressing today's challenges around autonomy, performance, longevity, and safety. The company can have a substantial economic impact, whereby a successful growth may result in the establishment of its own manufacturing facility for its unique battery cells.
- Swave Photonics, a spin-off of imec and VUB, successfully concluded a EUR 7 million seed round, led by imec.xpand and supported by Flanders Future Tech Fund (FFTF) and QBIC. Swave is developing a disruptive holographic extended reality (HXR) technology, a highly realistic and immersive 3D HXR gigapixel technology with widespread applications in various emerging areas. Demand for extended reality (XR) technology, which enhances or replaces our view of the world, is booming with the rapid rise of the metaverse, as well as other applications offering highly realistic 3D experiences. Such applications eventually make it possible to significantly reduce transportation-related carbon emissions by requiring people to travel less but still enjoy a nearly equivalent experience.
- DYAMAND, a joint spin-off between imec and Ghent University, officially launched as a venture to commercialize its eSave solution for the Smart Buildings market. eSave showcases itself with its unique middleware for seamlessly controlling smart radiators from a single heating management system with an intelligent dashboard. Thanks to eSave, owners and managers of hotels, office buildings, and student dorms can reduce their heating costs by up to 30%, while also providing greater comfort for their occupants.

Spin-offs and startups supported by imec have also made great strides in their success stories with additional capital and successes in scaling up their operations.

Under imec's imec.istart program, support is offered to companies that have been founded to commercialize innovative products and/or services and that call on imec's expertise, facilities, or support to do so (i.e., without the research center necessarily contributing technology or IPR). Support means delivering training to the initiators, providing a term sheet and the necessary investments, self-funding, follow-up after establishment, support in the growth phase, and helping to set up subsequent capital rounds.

In 2022, EUR 1,999K was invested in 22 new and 13 already established startups. Since its inception in 2011, a total of EUR 12,077K has been invested, with the total number of startups included in the imec.istart Fund's portfolio standing at 128. Ten ventures exceeded EUR 10 million funding in 2022. One of these is Deliverect, imec.istart's first unicorn company, which has already raised a total of EUR 202 million. Another 2022 milestone was the announcement of the EUR 12 million imec.istart.nl seed fund, to support tech startups and spin-offs in the Netherlands.

Likewise in 2022, the early-stage, deep-tech investment fund imec.xpand stepped up a gear. The second fund closed in September and EUR220 million had already been raised by the end of December. Categorized as an Article 8 fund, the independently managed fund works closely with imec, investing in startups that significantly build on imec's knowledge, expertise, network, and/or infrastructure.



4. imec's sustainable approach

4.1 Putting people first

Sustainability within imec equally involves working with due consideration for its employees. The HR strategy with regard to sustainability is grafted on the following main lines:

- A healthy work-life balance by putting well-being and health first.
- Encourage diversity and inclusion.
- Invest in committed and talented employees.
- Invest in a robust health and safety culture.

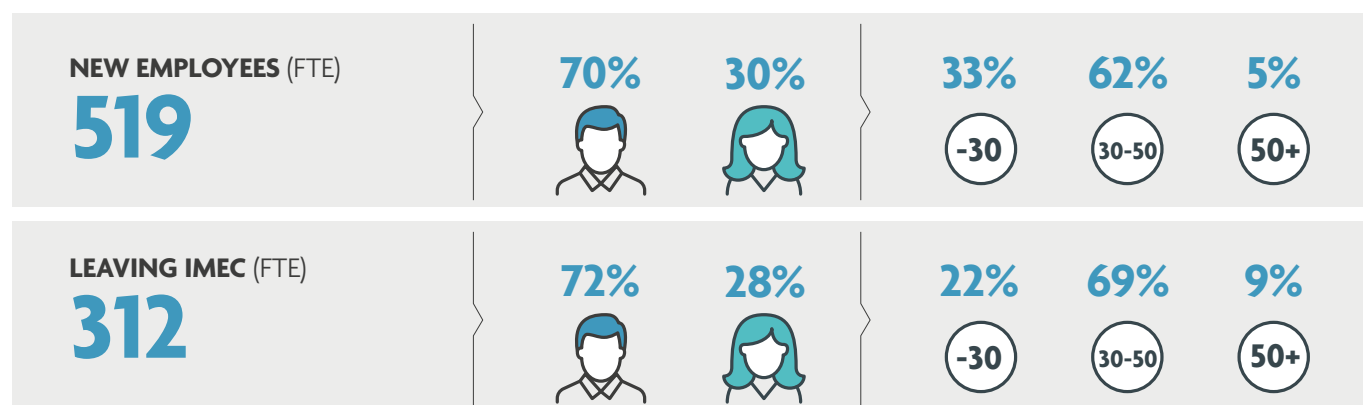
The semiconductor industry has experienced major challenges in recent years, which has also had an impact on how imec manages its own human resources: striving for nothing less than extraordinary people delivering extraordinary results.

This policy is based on the foundations laid over past years. The three strategic pillars comprise **resilient employees, team leadership, and an effective and agile organization**. In 2022, we achieved great results thanks to accelerated adjustments to the organizational and governance structure, as well as the development of set procedures.

In order to achieve the projected growth in R&D activities, imec had 200 to 350 job openings at any one time. In total, imec had 2,544 employees on its payroll in 2022.

This was made possible by focusing heavily on imec's unique employer brand, with four powerful values driving teams in everything they do: "integrity," "passion," "connectedness," and "excellence". Indeed, it is only a combination of these values, coupled with technology, and the pursuit of sustainable solutions to societal problems that differentiates imec from other prospective employers, generating significant appeal among candidates. Equally, it drives existing employees to give their best every single day.

In line with social dialog initiatives, the HR team in Belgium has become a trusted partner for the Works Council (OR) and the Workplace Health and Safety Committee (CPBW), both for employer and employee delegations, while also supporting the ongoing professionalization of the OR and CPBW. In line with already-established local regulations, similar support also exists in the Netherlands.



Evolution of workforce new hires and outflow in 2022, all countries, FTEs on payroll

4.1.1 A healthy work-life balance by putting well-being and health first

Imec is committed to being an engaging and vitalizing work environment, something that is not easy in a post-pandemic world. To this end, imec is constantly working on both improving **individual resilience** and building a **sustainable, stable work environment**. This requires extra vigilance, especially when it comes to workload, rigid procedures or tools, unclear agreements and communication, potential loss of engagement, and staff turnover. That is why it is so important to keep your finger on the pulse via surveys or by creating easier access through various channels, contacts, communications, etc. in situations of stress/discomfort and undesirable behavior.

In a constantly and rapidly changing environment, an organization has to be and remain effective and flexible, maximize its results and stay relevant in the future. The best way to achieve all that is to listen to employee feedback, and then act on it quickly. This is done via our connected.minds surveys, which gauge the overall work experience, including all aspects pertaining to engagement, commitment, vitality, and leadership. The method combines generic, imec-wide surveys with more focused and frequent team surveys. The results can be easily and clearly visualized via a dashboard.

Also in 2022, it was quite a challenge to maintain our vitality score. Imec firmly believes this can be enhanced through cross-team collaboration, creating a pleasant work environment, and setting clear objectives.

THEMES 2020	
Involvement	7.4
Engagement	7.3
Vitality	6.7
THEMES 2022	
Inclusion	7.8
Engagement	7.4
Vitality	6.4

Three main themes of the connected.minds survey, participants' score out of 10

Managers also play an important role in all this. In 2022, we launched two initiatives. First, we introduced the first-time People Manager Track, aimed at helping new managers develop their management skills, and a succession track to specifically anticipate the outflow of senior management. Second, we further rolled out the value-driven leadership model.

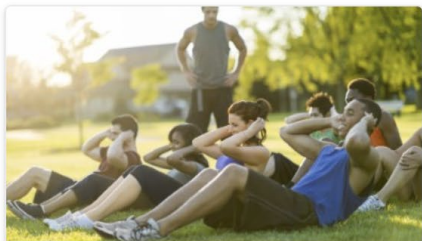
In preparation for the renewal of services (e.g., psychosocial services) and (the network of) confidential advisors, a new external service has been contracted, with this partnership commencing in 2023. When it comes to undesirable behavior, 2022 saw imec take part in a local "Got your back" campaign, serving to motivate and inspire colleagues to provide support and have each other's backs. The campaign launched a shoe tag and accompanying card with referrals to available support, along with further information and links to relevant courses.

In 2023, we intend to continue working on this topic, among other things with a "Safe Space" event run by a number of departments on a specific campus (Antwerp).



Finally, we are committed to sports initiatives, including our regular Move More campaign, as well as other initiatives aimed at promoting both mental and physical health.

Check out the Move More initiatives here!



Bootcamp



Healthy breaks - Kubb, spike ball, petanque, table football, table tennis



Start to run



Start to walk



Yoga classes



Levensloop 2023



4.1.2 Encouraging diversity and inclusion

Diversity and inclusion are becoming increasingly important in every organization, and imec is no exception. Its workforce comprises no fewer than 95 nationalities. On average, a bit more than a quarter of imec staff in its different teams are female, which reflects the underrepresentation of women among STEM researchers worldwide.

In drawing up its related objectives, imec is taking various considerations into account:

- A balanced representation of diverse groups, thereby ensuring that diverse ideas and perspectives permeate the entire organization.
- A “sense of belonging” for all.
- Gender equality (achieving any related objectives as a bare minimum).
- Staying relevant for the younger, more diverse generation.

In January 2021, imec launched its **Inclusive Workplace policy**. This policy sets out imec's vision for diversity and inclusion, as well as a roadmap, including countermeasures against undesirable behavior and KPIs reported at management level. In 2022, focus turned specifically to **gender diversity and inclusion**, through among other things

- A Gender Equality Plan.
- A corporate KPI for growing the percentage of women in leadership roles: 25% by 2025, 30% by 2030.
- Adding questions of inclusivity into the connected.minds surveys.
- The opportunity for international employees to work from abroad for six weeks. Incidentally, this fits in with imec's Inclusive Workplace policy, coupled with hybrid working. For imec, this also enhances its ability to attract talent from a variety of backgrounds.
- Developing a brand new training course entitled “Intercultural Collaboration”, and organizing an “Inclusive Meetings” Connect & Learn session.
- The systematic use of a gender decoder for job listings.

2022 also saw a number of communications campaigns, team initiatives, and training courses on the themes of diversity and inclusion.

“**Top women in Tech**”- job seminar and interviews with women working at imec during open company day



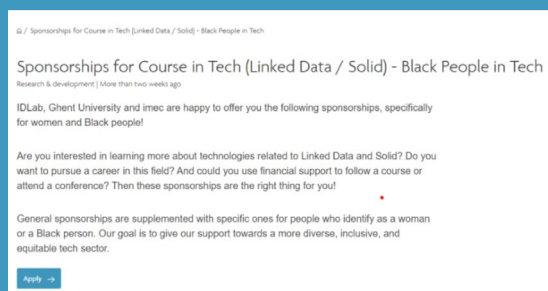
Guidelines for inclusive communication



Connect & Learn book club – the culture map



Women & Black People in Tech - Course & conference sponsorships



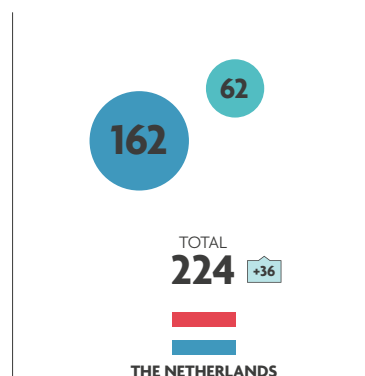
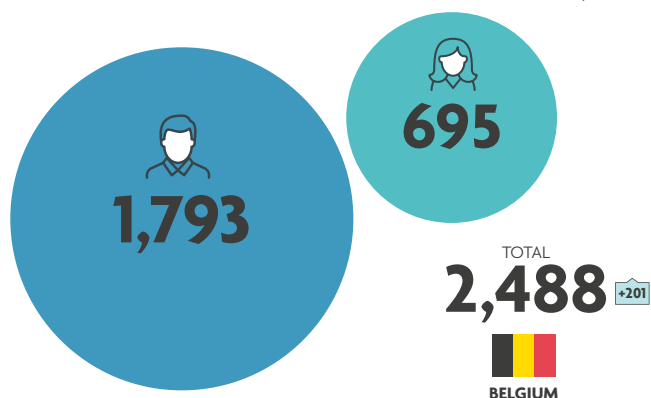
+5,500 IMEC
EMPLOYEES

OF WHICH

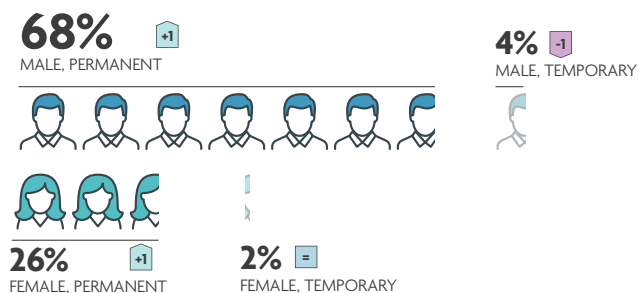
49% ARE
PAYROLL

51% ARE
NON-PAYROLL

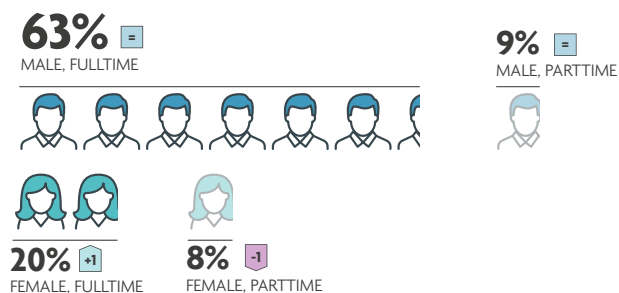
HEADCOUNT IMEC SITES (EXCLUDING NON-PAYROLL)



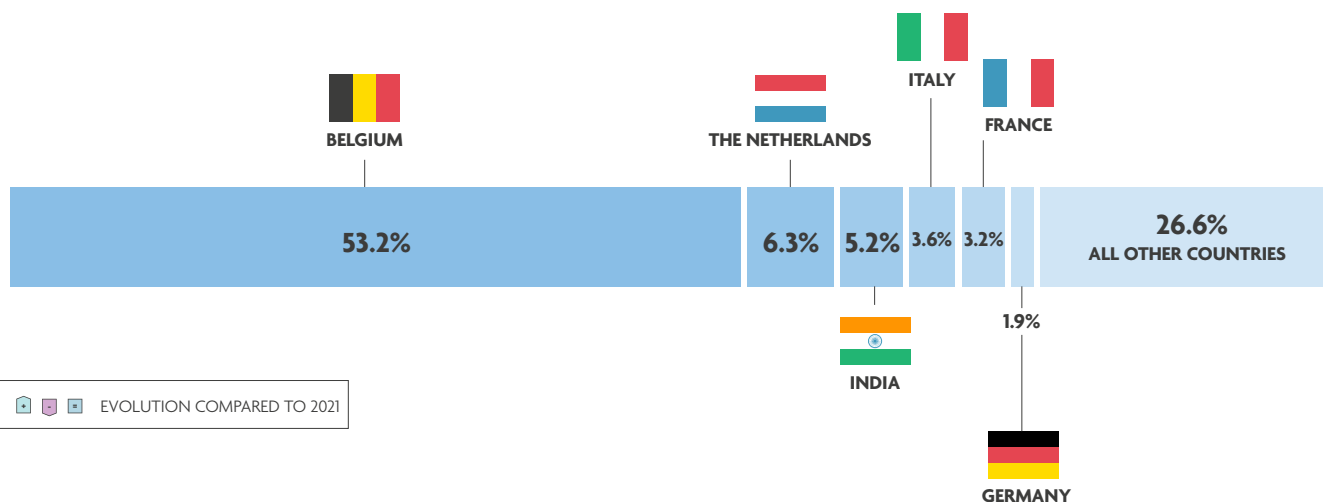
CONTRACT TYPE PER GENDER FOR ALL IMEC EMPLOYEES ON PAYROLL (HEADCOUNT)



EMPLOYMENT TYPE PER GENDER FOR ALL IMEC EMPLOYEES ON PAYROLL (HEADCOUNT)



COUNTRY OF ORIGIN FOR ALL IMEC EMPLOYEES (PAYROLL & NON-PAYROLL)



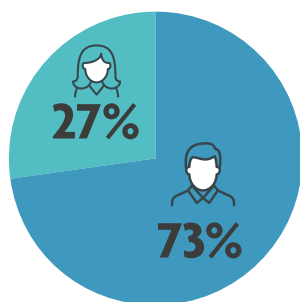
+ - = EVOLUTION COMPARED TO 2021

Imec's workforce totals over 5,500 employees, of whom 49% are contracted, and 51% non-contracted (headcount). The latter group consists mainly of visiting researchers and industrial residents as part of a number of partnership programs, as well as doctoral students, temporary staff, and consultants. Imec's workforce has become steadily more internationally diverse over the past decade. This is apparent at all levels, including right at the top. Imec continues to attract researchers from all over the world. After Belgium and the Netherlands, the top four countries are India, Italy, France and Germany.

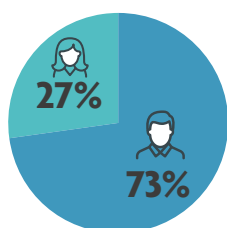
The age distribution of imec's staff is relatively stable, with 18% aged 50 years or older, 12% under 30, and the largest group (70%) aged between 30 and 50. The representation of women at management level has stabilized in recent years, albeit remaining below 25%.

PERCENTAGE OF MEN AND WOMEN FOR ALL IMEC EMPLOYEES ON PAYROLL, % FTE

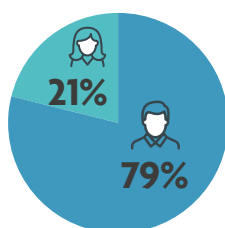
ALL FUNCTIONS & LOCATIONS % FTE



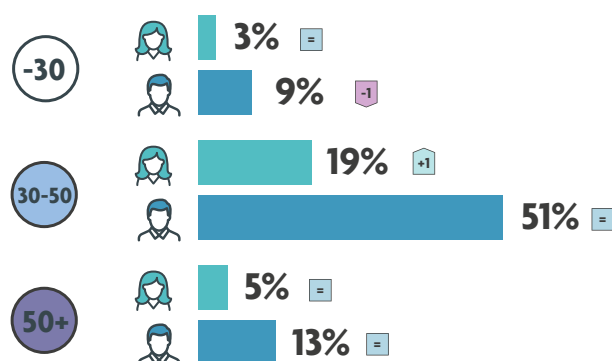
BOARD OF DIRECTORS



MANAGEMENT TEAMS % FTE

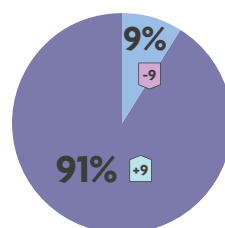


AGE GROUP DIVISION BY GENDER FOR ALL IMEC EMPLOYEES ON PAYROLL, % FTE

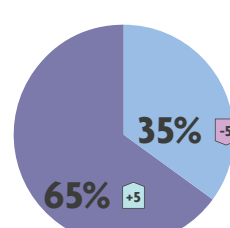


AGE GROUP DIVISION FOR ALL IMEC EMPLOYEES ON PAYROLL, % FTE

BOARD OF DIRECTORS



MANAGEMENT TEAMS % FTE



● 30-50 ● 50+

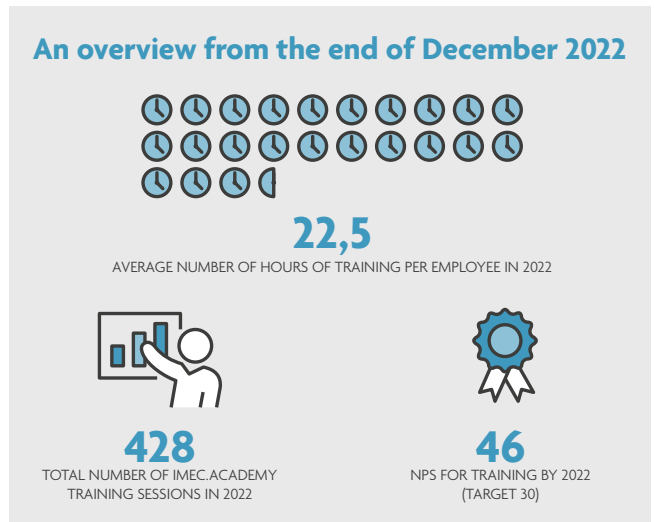
EVOLUTION COMPARED TO 2021

4.1.3 Investing in committed and talented employees

Over the past 10 years, imec has grown by more than 250%. This growth requires an ever-increasing effort to attract talent, while also ensuring that the company continues to be a great place to work. It is also important to remain attentive to training and growth, and to the development of critical technical talent, while staying vigilant in relation to staff turnover.

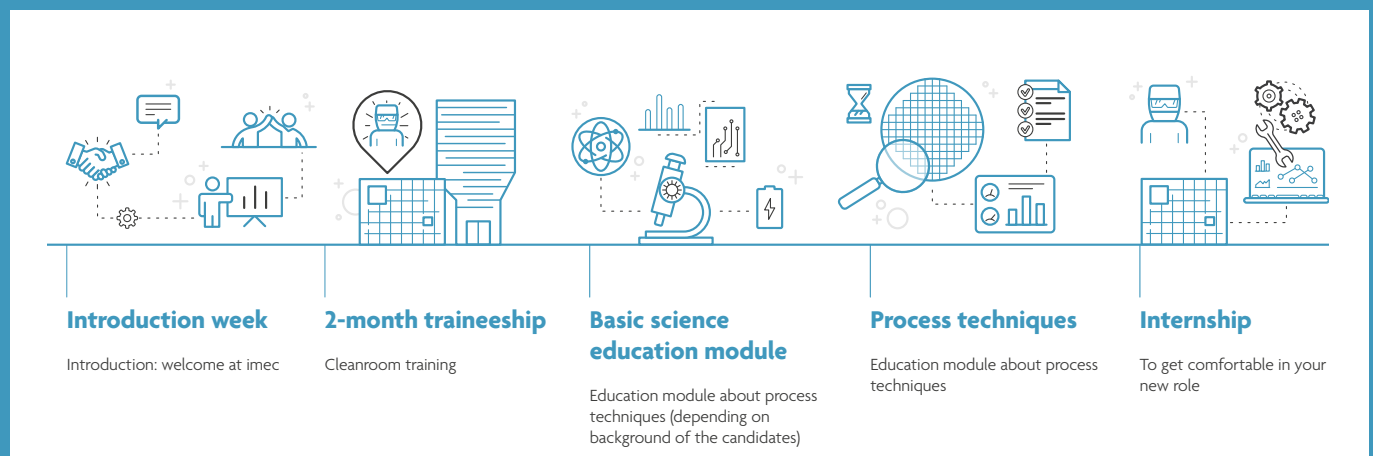
New innovations were implemented in 2021 as part of the new **Performance & Talent Enablement** system, with goals, talent assessment, development reviews, salary reviews, and a new (recognition) bonus. This system was further fine-tuned in 2022, and over 92% of imec employees made use of it.

In addition, imec.academy is an important tool when it comes to realizing imec's ambitions, encouraging each employee to take ownership of their own growth, along with helping and supporting everyone in their professional as well as personal development. 2022 also saw the repositioning of imec.academy, together with a significant increase in its impact. This primarily revolved around technical learning and leadership development.



Imec.school

With education systems not delivering enough skilled talent in an already highly competitive jobs market, imec is taking several proactive steps toward providing talent with the necessary specialized skills itself. As such, for the third time in 2023, imec will host its imec.school initiative. Candidates lacking a technical background with the right motivation and technical affinity will be put through an intensive dual apprenticeship program. After being immersed in chip development processes for six months, they will be ready to work in our cleanroom as a first-line support worker.



Imec is also acting as a driving force behind European projects aimed at addressing the shortage of semiconductor as well as digital skills within the sector. Through the METIS and Europractice consortiums, imec is providing technical training for both Erasmus and domestic students, among others.

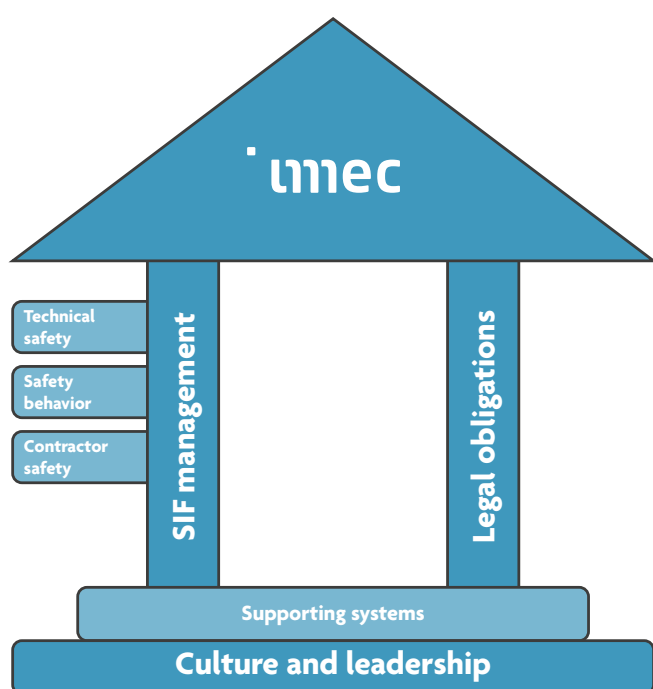
An event for many newcomers who had started during the lockdown periods, and were therefore forced to miss physical onboarding, brought together more than 1,800 participants from the various departments and sites, with newcomers encouraged to connect with each other, while also familiarizing themselves with imec's activities and overall strategy.

4.1.4 Investing in a robust health and safety culture

Health and safety are particularly important issues for imec, its employees, its customers, and the neighbouring communities. Imec is experiencing rapid growth. As such, it is important to keep any risk of workplace incidents under control.

In 2022, the existing safety policy underwent a thorough overhaul, with a new vision being formulated around the following four focus areas:

- Serious Injuries or Fatalities (SIF) management,
- Compliance with regulations,
- Lean and robust systems,
- A safety culture driven by leadership.



In 2022, the EHS service was strengthened by the addition of 2 extra team members. Over 2,530 queries were addressed and closed by the EHS Employee Center. Satisfaction ratings for the EHS Employee Center, both in terms of speed and quality, scored an average of close to 9/10. The team can look back on a strong commitment to properly respond to the ongoing challenges presented by the pandemic, with the team following up over 1,700 cases arising from reported cases of Covid.

By focusing on **SIF**, imec is avoiding latent but potentially significant risks going unnoticed. Here, the emphasis is on safety procedures, safety behaviors in high-risk activities, and attention to risks associated with contracted (construction-related) work. As a result, 2022 saw further work on a methodology for safety procedures, as well as the expansion of the risk analysis matrix.

In a bid to embed this policy deep within the organization, campaigns will be deployed in 2023 to positively influence safety behaviors: what SIF is, and what behaviors everyone should adopt, with a focus on certain risk areas, such as working with chemicals.

A number of major construction works are also due to take place at our sites in 2023 (e.g., FAB3). Contractor safety is therefore, once again, absolutely crucial.



Imec continuously monitors the safety of and the health risks posed to its employees. In 2022, imec reported an accident rate of 0.27 (per million hours worked) for both contractual and non-contractual employees. The majority of reported injuries incurring medical costs were related to incidents following physical contact with chemicals that required preventive testing, as well as other minor injuries. Accidents leading to temporary disability are primarily caused by working with chemicals, falls, or trips.

As a light Seveso company (a company with an activity related to the treatment, production, use, or storage of hazardous substances), imec has a duty to apply the Seveso laws and regulations, while any potential new regulations or amendments to existing guidelines are also closely monitored. Imec's Enterprise Risk team helps review any resulting risks or impacts and, if necessary, including these within the risk register and monitoring them closely. When it comes to obtaining environmental permits, imec's Environment, Health, and Safety team also offer its support.

An EHS policy starts from sound and robust systems and processes. Information about this is made available to colleagues via the imec intranet. Questions related to health and safety topics can also be asked there. Each new employee is assigned a supervisor, informing them of all procedures necessary to go about their work safely from their first day on the job. Any failure to comply will result in access passes being blocked. In 2022, initial preparations were made for an Access Management Improvement Plan (AMIP), linking laboratory access authorization to a training program so that, in the future, only trained and certified employees would have access. Also in 2022, a new “Lab Operations Lead” was added to the EHS team to help spearhead the standardization of operations and procedures within the labs.

2022 saw a great deal of training provided, including sessions on biosafety, bioethics, as well as general health and safety.

A self-inspection and audit management system provides vigilance over the security and quality of hazardous facilities. This is an ongoing process.

A safety culture driven by leadership

A robust safety culture has to be supported and driven by management. It is therefore crucial to involve management in rolling out any security campaign across all imec sites, allowing them to discuss these campaigns with their teams, as well as provide feedback to the EHS team and EHS Steering Committee (with a goal of 90% participation by management).

“By 2023, the EHS team is committed to instilling a culture that emphasizes SIF prevention and compliance.”

Roel Scheys, EHS-director, imec



4.2 With care for the environment

Sustainability is an important driver for imec – not only in our research projects, but also in our operational departments. Imec is aware that its own activities have a considerable carbon footprint. For this reason, it has a clear ambition to reduce its carbon footprint and water usage.

Imec has a three-pronged strategy (reduce, replace, offset) with specific ambitions for its carbon footprint, water usage, and mobility. In 2022, imec took further steps in these three strategic pillars. With new insights, knowledge, and result-oriented short- to medium-term measures, this transformation is gradually taking shape.

REDUCING THE CARBON FOOTPRINT

- Define carbon footprint (scopes 1, 2 and 3)
- Reduce energy consumption
- Reduce process emissions
- Make mobility greener

REDUCING AND RECYCLING WASTE STREAMS

- Waste management

RESPONSIBLE WATER MANAGEMENT

- Reducing water dependency
- Maximizing recycling

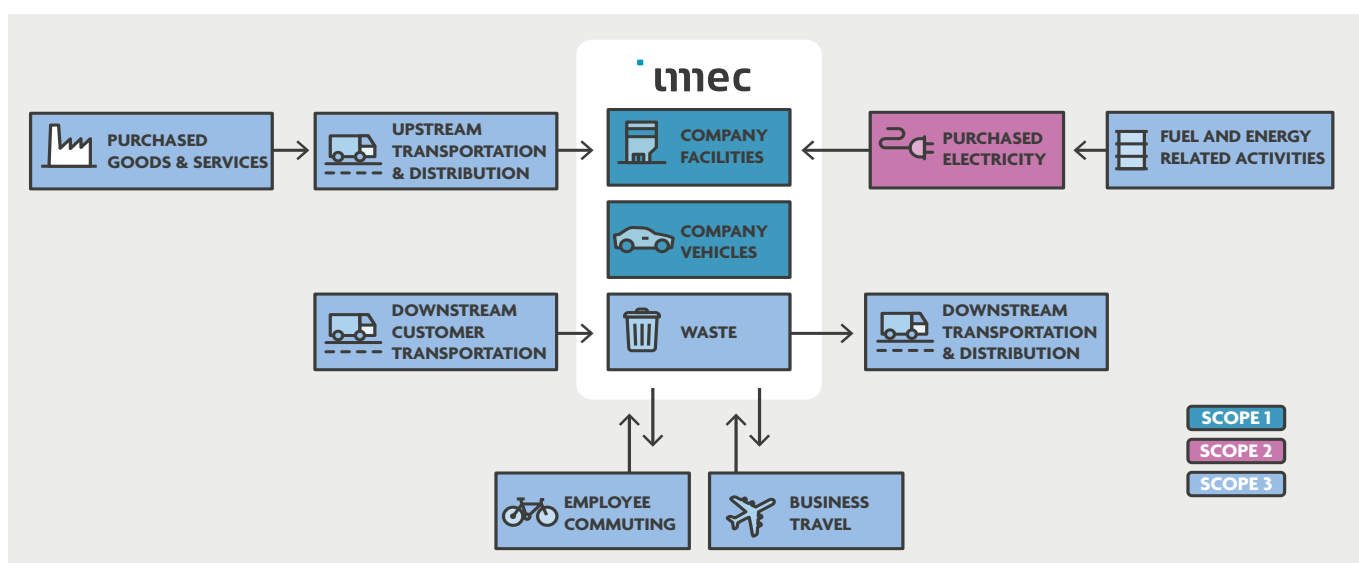


4.2.1 Reducing the carbon footprint of our own operations, mobility, and infrastructure, with responsible and circular use of materials as a guiding principle.

Define carbon footprint

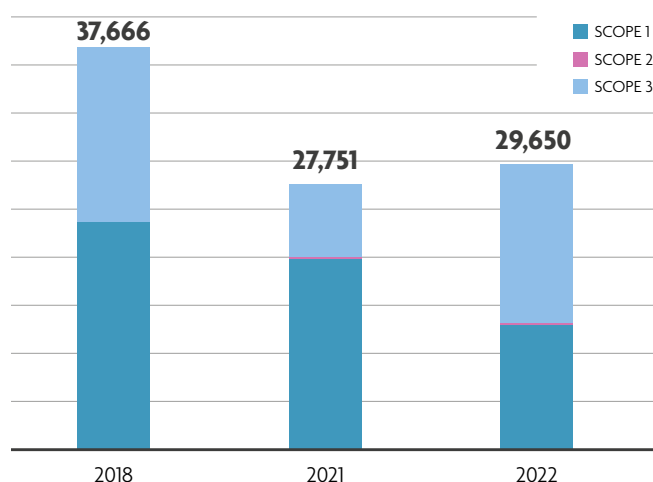
In 2015, imec Leuven calculated its carbon footprint for scopes 1 and 2 (reference year 2014) for the first time. In 2019, scope 3 was also added to the equation (reference year 2018). In 2021, the parameters for the calculation of process emissions for scopes 1, 2, and 3 were updated. These were upheld in 2022.

As part of imec's new sustainability policy, carbon footprint targets were also reviewed. Imec is working toward maximum emissions of 10 tons of CO₂ equivalent for scopes 1 and 2 by 2030, and CO₂ neutrality for these scopes by 2050. Many initiatives are also underway with regard to scope 3 (mobility, responsible use of materials, circularity) and, in 2023, based on thorough analysis, we will make the action plan more explicit.

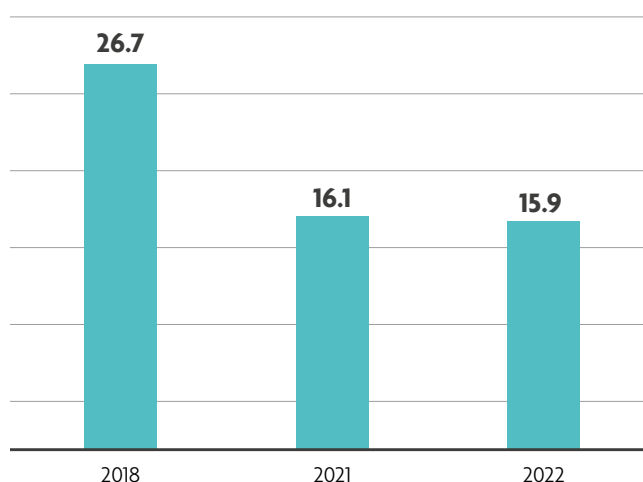


Overview of topics included in imec's carbon footprint, scopes 1, 2 and 3.

EVOLUTION CO₂ EMISSION (TON CO₂E)



EVOLUTION CO₂ EMISSION (TON CO₂E) PER FTE*



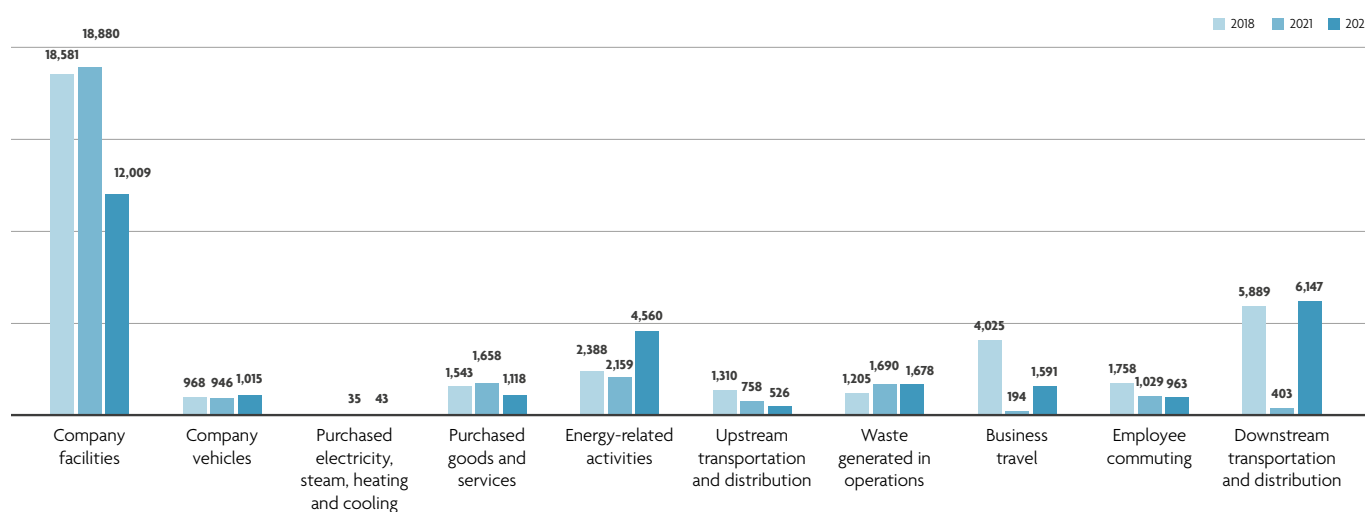
Evolution ton CO₂e 2018 - 2022 (imec Leuven and Genk 2021 and 2022, imec Leuven 2018). The carbon footprint of the Genk site is less than 1% of total CO₂e emissions

*based on the number of payroll employees in the corresponding year

In 2022, imec's emissions across the three scopes hovered around 16 tons of CO₂ equivalents. While we did manage to halve process emissions, this improvement was offset by the rising number of business trips and emissions produced by inbound visitors.

The carbon footprint was determined by Futureproofed on behalf of imec Leuven. It was calculated using the Greenhouse Gas Protocol based on figures provided by imec for scopes 1, 2 and 3 (partly). Scope 1: direct CO₂ emissions - Scope 2: indirect CO₂ emissions from energy production - Scope 3: other indirect CO₂ emissions.

EVOLUTION EMISSION CATEGORIES (TON CO₂E)



Evolution of main emission categories (scope: imec Leuven 2018; imec Leuven and Genk in 2021 and 2022)

Reduce energy consumption

Each year, imec invests in initiatives that reduce energy consumption, in line with the energy policy agreement in place in Flanders. The measures stem from an energy audit once every four years, and are also determined by an internal 'green energy' task force. Thanks to its efforts to reduce natural gas and fuel oil consumption, imec achieved a CO₂e emission reduction of about 15% in 2022 compared to 2021.

			2021		2022	
		Unit	Consumption	Tons CO ₂ e	Consumption	Tons CO ₂ e
TOTAL ENERGY CONSUMPTION (owned and leased facilities)	SOURCES					
	Renewable sources	kWh	117,828,409		119,912,182	
		Gjp	1,060,456		1,079,210	
	Non-renewable sources			6,683		5,009
	CONSUMPTION					
	i. Heat consumption – gas	kWh	31,618,000	6,482	25,221,211	4,666
		Gjp	113,825		90,796	
	ii. Cooling consumption (R1234a en R407c)	Kg	146	193	237	342
	iii. Fuel oil	l	2,650	8	200	0.56
		kWh	28,199		2,128	
		Gjp	102		7.66	
	Total energy consumption	Gjp	1,174,382	6,683	1,170,014	5,009
	Norms, methods, hypotheses, and/or calculation tools used		Internal calculations by imec based on data provided by suppliers			

Imec has developed an energy plan to support the targets regarding the reduction of scope 1 and scope 2 emissions:

- Replacing natural gas to achieve climate neutral heating and cooling and for heat pump and heat recovery systems:
 - The first installation, a heat pump for FAB1, became operational in 2019. This was used throughout 2022, which resulted in an estimated saving of 1,402 tons of CO₂e.
 - A second installation was a heat pump in FAB2's Central Utility Building (CUB): completed in 2021, operational from May 2022.

In order to meet emission reduction targets related to natural gas-fired plants, we are committed to deploy renewable technologies. For example, a heat pump is planned for the expansion of FAB3, allowing us to make this expansion natural gas-neutral. This heat pump, used in the expansion of FAB3, will be operational from October 2023. In this way imec is able to expand its infrastructure without impacting its carbon footprint. For new projects, such as the planned new office building at the Leuven campus (imec 6 project), climate neutrality is our guiding principle. In the first instance, the focus is on comprehensive insulation to reduce overall heating demands.

In 2022, the blueprint for a master plan regarding the construction of a cold-heat network on the imec site was also developed, which will become more concrete in 2023.

Reduce process emissions

Process emissions (part of scope 1) for calendar year 2022 amount to 7,000 tons of CO₂e. Compared to the year 2021, imec notes a decrease in the use of these gases (less demand), resulting in a 42% decrease in process emissions. Since the consumption of these gases can increase back with the demand, imec is also looking at structural solutions independent of consumption.

In 2018-2019, process emissions of greenhouse gases proved to be the largest contributor to imec's carbon footprint. Therefore, imec wants to investigate what is possible to better map these process emissions and reduce them structurally.

After mapping the effective consumption, a plan was developed to further reduce the impact through appropriate gas after-treatment of the process gases. A pilot project has been defined for SF₆, two new gas treatment systems have been ordered whose impact will be evaluated in the fall of 2023.

The main greenhouse gases used by imec are NF₃ and SF₆ and to a lesser extent CF₄ and C₄F₈.

For the conversion to CO₂e values imec follows IPCC 2019 (in use since reporting year 2020). The conversion factors to CO₂e are based on certificates from the gas handlers (DRE – destruction or removal efficiency) and the theoretical values of the IPCC2019. In addition, measurements were made to determine the conversion factors for both process (EF - efficiency factor) as a gas handler (DRE).

In 2022, the EF and DRE for individual process rooms was assessed. Based on these findings, further recommendations were made in order to further reduce emissions.



Towards a greener mobility

One impactful effect of the coronavirus pandemic is a changed view of mobility. Given mobility's large share in today's carbon emissions, any improvement and shift toward green mobility solutions would be a real step forward. As a research center that contributes to knowledge and innovation in the field of mobility, it goes without saying that we ourselves are working on new perspectives in this area. With the insights gained over this recent period, imec's existing mobility approach could be further explored with new campaigns and initiatives.



REDUCING: Reducing commuting in itself

Here, the connection to 'hybrid working' is obvious, which explains why imec wants to help facilitate this by providing tools and financial incentives. Even before the pandemic, around 10% of employees worked from home an average of one day or more per week. The "Hybrid Work Policy" provides guidelines and tips related to team agreements and team management, along with healthy practices and technical support for those working from home.

CHANGING MINDSET: More sustainable modes of transport for commuting for a reduced reliance on cars

Leaving the car behind and opting for a sustainable alternative, be it public transport or cycling, contributes to reducing our overall carbon emissions. The current successful bicycle leasing policy inspires employees to choose this sustainable option. Employees are also reimbursed for each bicycle ride to and from work.

In 2022, imec launched a cycling app that makes cycling information far more accessible, which has yielded some great results:

- On 31/12/2022 there were 404 bike leasing contracts, compared to 247 in 2020 and 366 in 2021
- In 2022, 202 leasing bikes were ordered
- Approximately 1,475 employees registered a route on the bike app.
- 1,335 (90%) of them actually cycled to work in 2022.
- On average, they cycled to work 11.2 times a month
- 41% of all employees cycled to work at least once a month on average

MAKING THINGS CLEANER: Reducing emissions from vehicle commuting

In 2020, imec launched a new car policy that provides an additional budget for employees opting for a more environmentally friendly car. Imec has also invested in charging point infrastructure for electric cars in recent years. At the end of 2022, imec had 555 cars in its fleet, of which 45.5% were green vehicles (hybrid, plug-in hybrid, and electric), up from 17% in 2020. The average emissions of imec's fleet were 87 g CO₂ per km.

The evolution in terms of the greening of the imec vehicle fleet is as follows:

- Average fleet CO₂ emissions (g/km) – status 2021: 96g, status 2022: 87 g
- % green cars in overall fleet – status 2021: 33%, status 2022: 35,5%

In 2022, imec planned a number of initiatives to further promote the switch to greener cars. For example, it rolled out a pilot project on the provision of vacation rentals as a temporary replacement for fully electric cars, and further efforts are being made to raise awareness and provide information on the range of cars available according to both budget and charging options.

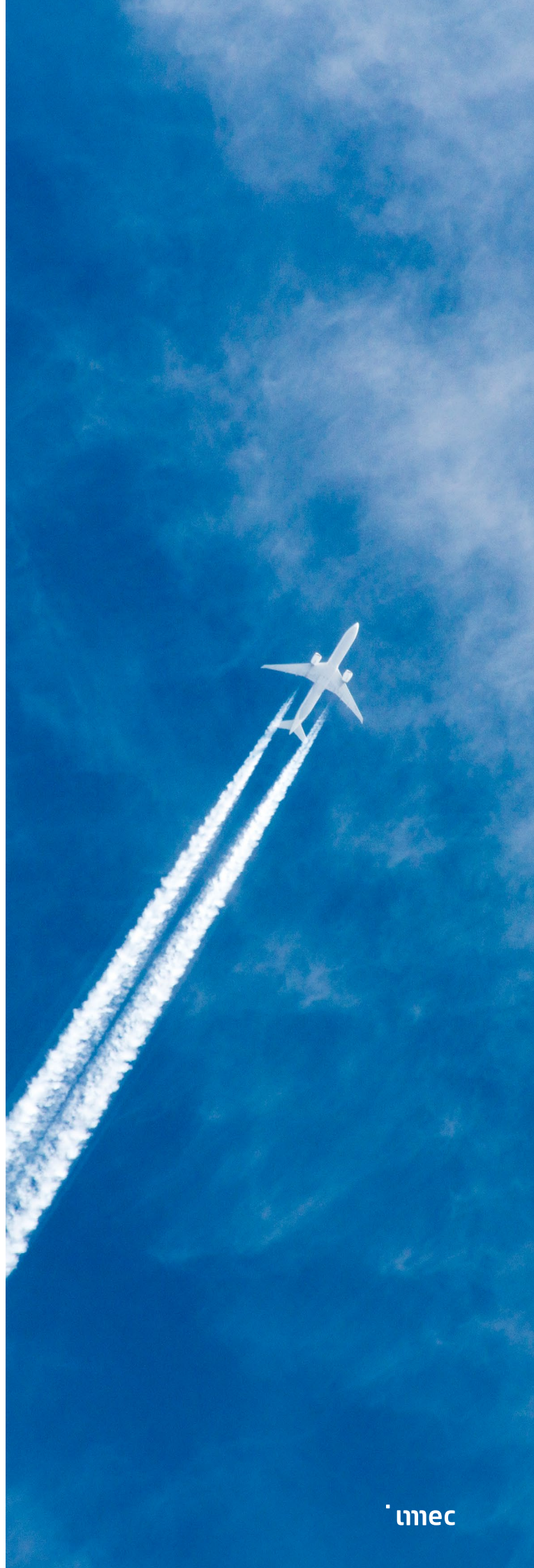
CARS IN OPERATION						
	2020		2021		2022	
Diesel	250	55%	205	43%	158	28.5%
Gasoline	127	28%	116	24%	150	27%
Gas	1	<1%	1	<1%	1	<1%
(Plug-in) hybrid	70	15%	134	28%	197	35.5%
Electric	5	1%	22	5%	49	9%
TOTAL	453		478		555	
CO ₂ average (g/km)	111		96		87	

As imec is an outward-looking international organization, its employees were very frequent travelers before the pandemic. In light of this, the travel policy has been thoroughly reviewed in order to reduce the impact of business travel. The new policy provides firm guidelines for travel within the EU, as well as clear advice for international travel. For destinations accessible from Brussels by train within 5 hours (for employees in Belgian offices), flying is discouraged (with a few exceptions), with alternative transportation options such as train, bus, or carpooling recommended.

A travel request uses four criteria to assess the need for travel: Does the travel plan cover more than one meeting or business activity? Are these external meetings with partners outside of imec? Does it involve activities that cannot be done virtually, by tele- or videoconferencing? Has the required minimum number of employees to participate in the activity been verified? For those cases where flying is the only realistic option, a carbon compensation system has been set up.

The impact of travel to and from imec sites, both by imec employees and visitors alike, increased in 2022, which yielded a negative impact on overall emissions. This caused a more than tenfold increase in emissions in these areas, and is predominantly explained by the relaxation of pandemic measures in 2022.

tCO ₂ e	2021	2022
Business travel	194	1,591
Downstream transport and distribution	403	6,147
Total tCO₂e	597	7,738



4.2.2 Reducing and recycling waste streams

Imec has three fabs on its campus in Leuven: FAB1, FAB2, and FAB3. Previously, most of the liquid waste streams produced by the three fabs were collected and processed externally. In recent years, imec has invested in a local purification plant for FAB2 and FAB3, whereby it has significantly reduced the amount of externally processed liquid waste. To make this as efficient as possible, imec separated the different waste systems (types of chemicals) at source. At FAB2 and FAB3, imec has more than 10 different separated liquid waste streams. FAB1, the oldest fab, does not have a detailed system with separated drainage.



LIQUID WASTE

- waste solvents
- waste oil
- waste acids and caustics
- EKC 265 solvent
- photo lacquers
- lab waste
- residues of CMP slurry
- sludge electrocoagulation
- expired products
- grease from grease trap
- sulfuric acid solution
- nitrate-containing waste water
- lime milk solution WFW installation
- plastic cans with residues of chemicals
- cleaning water
- TMAH (developer)
- water / grease / sludge



HAZARDOUS SOLID WASTE

- batteries
- electrical scrap
- glass beads
- quartz glass
- empty tarnished glass packaging
- empty tarnished metal packaging
- empty tarnished plastic packaging
- disposal waste
- hazardous medical waste
- silicon wafers
- fluorescent lamps
- contaminated material
- filter cake DKD installation



NON-HAZARDOUS SOLID WASTE

- glass kitchen
- wood
- kitchen waste
- class II waste
- paper and cardboard
- PMD waste
- residual kitchen waste
- toners ink cartridges
- metals

Overview of imec's waste groups in 2022 at its Leuven location



		2020 (tons)	2021 (tons)	2022 (tons)
WEIGHT GENERATED WASTE (excl. liquid waste)	Hazardous waste	254.9	226.8	213.4
	Non-hazardous waste	434.6	451.6	397.0
	Total weight generated waste	689.5	678.4	610.4
WEIGHT SORTED WASTE (excl. liquid waste)	Hazardous waste – prepared for reuse	0.0	0.0	0.0
	Hazardous waste – recycled*	0.0	0.0	0.0
	Hazardous waste – other forms of recovery	144.9	135.3	114.7
	Non-hazardous waste – prepared for reuse	0.0	0.0	0.0
	Non-hazardous waste – recycled*	0.0	0.0	0.0
	Non-hazardous waste – other forms of recovery	246.3	270.2	202.4
	Total weight sorted waste	391.2	405.5	317.2
WEIGHT LANDFILL OR INCINERATED WASTE	Incinerated hazardous waste (with energy recovery)	0.0	0.0	0.0
	Incinerated hazardous waste (without energy recovery)	7.5	7.1	7.1
	Hazardous landfill waste	52.9	40.3	46.4
	Hazardous waste disposed of by other means	49.5	44.1	45.4
	Total weight of disposed hazardous waste	109.9	91.5	98.9
	Incinerated non-hazardous waste (with energy recovery)	187.9	181.4	194.5
	Incinerated non-hazardous waste (without energy recovery)	0.0	0.0	0.0
	Non-hazardous landfill waste	0.0	0.0	0.0
	Non-hazardous waste disposed of by other means	0.0	0.0	0.0
	Total weight of disposed non-hazardous waste	187.9	181.4	194.5
	Total weight of disposed waste	297.9	272.9	293.5

This covers all waste from the main waste generating sites (Leuven and Genk) in 2020, 2021, and 2022, excluding effluents. Calculations are based on formal data, collected and reported according to Belgian regulations.

Details of treatment (recycling or other method) according to waste group:



GROUPS OF HAZARDOUS WASTE FOR RECYCLING OR OTHER WASTE TREATMENT (EXCLUDING LIQUID WASTE)

	2020	2021	2022
Glass recycling	3.2%	4.7%	5.0%
Conversion of sulfuric acid into ammonium sulfate	11.4%	13.3%	12.2%
Waste oil and photo lacquers (reused as fuel)	54.0%	50.5%	44.1%
Water waste (silicon recovery)	3.1%	2.7%	4.3%
Used plastic (recovery of plastic)	8.4%	10.5%	12.2%
Sludge from electrocoagulation (reused in the cement industry)	7.9%	5.8%	6.4%
Electronic waste	2.4%	2.3%	3.5%
Batteries	0.2%	0.1%	0.4%
Other*	9.3%	10.1%	11.8%



NON-HAZARDOUS WASTE AND RECYCLING OR OTHER FORMS OF WASTE TREATMENT (EXCLUDING LIQUID WASTE)

	2020	2021	2022
Metal	30.2%	36.7%	19.4%
Glass and plastic	1.5%	1.8%	2.3%
Paper and cardboard	27.4%	20.3%	32.2%
Building waste	4.9%	4.8%	0.9%
Wood	33.5%	34.0%	42.3%
Expanded polystyrene (EPS)	0.3%	0.4%	0.6%
Kitchen waste	2.0%	1.9%	2.3%

*The data for recycled waste is included in the total for separated waste – other forms of recovery.

4.2.3 Responsible water management

With more and more parts of the world – including Europe – facing water stress as a result of global warming, responsible water management is now a really hot topic. The cleanrooms at imec consume a large amount of water. In any microchip production process, there are many steps where water is used, such as cleaning. Today's chips require a high density, which means a small size (nm), and therefore need high-purity, also in the water used in their manufacture. A significant fraction of our high-purity water (HPW) is made from tap water.

In 2018, using an investment of EUR 300,000, imec began with the recycling of waste water. First, a pilot installation was built in order to determine the most appropriate use for the recycled waste water. Subsequently, a new filtration unit was commissioned as part of the final implementation.

To reduce our demand for tap water, our recent focus has been on lowering the demand for HPW in cleanrooms (through review and reduction of idle flows), and maximizing the use of recovered wastewater from R&D manufacturing for other water needs. We have since come to the point where this strategy has reached its limits. If we want to further structurally reduce our demand for tap water, we must be able to treat wastewater in such a way that we can also use it as feed water for HPW production.

Significant progress has been made in city water consumption, water recovery, and wastewater reuse, all of which remain important goals for imec.

Long term objective: Starting from a historical usage of 800,000 m³/year, the goal is to reduce this to 600,000 by 2025, while seeking further savings to reach less than 400,000 m³/year by 2030.

		2018	2021	2022	evolution
Total water consumption	Total consumption of external water (tap water)	743,622	746,842	761,893	▲
Water discharge	Total discharge into surface water	605,103	616,587	616,612	
	Total water discharge (sewage)	18,767	14,461	24,419	
	Total water discharge (external treatment, including liquid waste)	1,159	1,533	1,490	
	Total water discharge	625,029	632,581	642,521	▲
Evaporation	Evaporation	118,593	114,261	119,372	▲

Overview of imec's water consumption (m³) and discharge in 2020, 2021, and 2022 at the main discharge sites (Leuven and Genk).

Currently, at its Belgian sites with the highest water consumption, imec consumes approximately 2,100 m³ of water per day for its operations, equivalent to 764,420 m³ of tap water per year.

In 2022, more than 210,735 m³ of wastewater were reused, equivalent to 577 m³ per day. In 2018, imec used approximately 800,000 m³ of tap water, compared to 748,722 m³ in 2021.

Imec therefore investigated the possibilities of further reducing city water consumption. Based on this study, it was estimated that a 50% reduction (compared to current consumption) by 2030 should be feasible. In order to meet this target, the plan was therefore further concretized during 2022, resulting in 3 pilot tests that will be launched in 2023:

1. Waste removal: By reusing water, less wastewater will be discharged, meaning that concentrations of residual substances, including ammoniacal substances, will increase. This pilot project looks at the removal of these substances to ensure concentrations remain within applicable discharge standards.
2. Closed-loop local abatement devices, in order to reduce the water consumption of local abatements.
3. Water recovery plant (WRP): the purpose of this plant is to turn wastewater back into feed water for the HPW plant, thereby replacing the need for tap water.



4.3 Ensuring sustainable internal operations through good governance

4.3.1 Good governance

Imec is a registered trademark for the activities of IMEC International, with headquarters in Leuven (a public utility foundation under Belgian law).

IMEC International serves as a corporate center for the entities belonging to the imec group, including IMEC vzw ("imec"). These entities conform to the business guidelines set out by IMEC International regarding business development, finance, human resources, and operations, while also respecting the autonomy and governance of each entity belonging to the imec group.

Imec's policy on good governance is reflected in its Good Governance Charter. This charter describes the principles of good governance according to imec, and the monitoring thereof, serving to strengthen imec's long-term development and growth. It is a guide to creating a balanced, clear, and transparent division of authority and responsibility, while also outlining processes of accountability and responsibility. For example, imec has its own **Audit, Nomination and Remuneration Committee**, as part of its governance structure. These committees have set, regular meetings, determining which topics should be on the agenda, which are then thoroughly discussed and analyzed. Any potential conflicts of interest are avoided by carefully monitoring the deliberations in the respective management boards. The boards of directors of all imec group entities conscientiously adhere to and monitor compliance with the guidelines and generally accepted principles within this framework.

The make-up of each entity's board of directors is determined on the basis of specific skill sets. In the interest of transparency, as well as anchoring the business in Flanders, it was decided that the directors of IMEC International would be appointed by the imec Board of Directors.

Like any other organization, imec is exposed to various internal and external risks that, if they occur, can mean serious consequences for its stakeholders, operations, environment, society, and financial situation. Managing these risks is therefore extremely important. Since 2019, these have been monitored by an Enterprise Risk Officer, whose job it is to report directly to the Chair of the Audit Committee. In addition, imec has implemented a cohesive **Enterprise Risk Management approach**, which led to the establishment of a risk register in 2019.

In 2022, the focus shifted toward integrating ESG risk management

into existing risk management procedures. This involved checking the pre-existing risk register for completeness, and supplementing it where necessary. The entire list was therefore evaluated as part of the existing process. In 2023, this exercise will be repeated and the speed with which the impact of a risk is realized is also added into the assessment approach.

"By integrating sustainability risk management into overall enterprise risk management procedures, we are ensuring that these risks are assessed and addressed in both a consistent and structured manner."

Jan Borzée, enterprise risk officer imec

4.3.2 Ethics and the UN SDGs as a moral compass for research projects

With its research and related efforts, imec is aiming for the long-term prospect of a better life in a better society. An ethics policy on fraud, corruption, bribery, and conflicts of interest is therefore a requirement. In 2021, imec thoroughly updated its **code of ethics**. This code forms a considerable part of imec's strategic vision, mission, and values framework. This is a code of conduct that formalizes imec's ethical commitments, while also acting as a guide and directive in the day-to-day activities of imec employees. It is a guide to help manage ethical dilemmas and take appropriate steps in problem situations. To ensure compliance, imec set up an Ethics Committee, which was invaluable in providing advice on certain specific cases in 2022.

Besides an internal code of ethics, imec has a **Code of Conduct for imec partners**, which was also updated in 2021. Imec believes that mutual respect for this code of conduct is a guarantee of reliable, fruitful, sustainable, and professional cooperation with partners such as suppliers, research bodies, and clients.

In addition, imec uses specific contractual clauses related to **contract management, privacy and personal data protection, information security, animal welfare and biosafety, export controls**, etc.

Partners and potential partners (employees, customers, and suppliers) are systematically screened for compliance with export regulations, using a global list of restricted persons, embargoed countries, and businesses owned by these prohibited entities. Furthermore, imec uses an external tool for identifying risks of fraud and corruption. Last year, the whistleblowing procedure was fine-tuned.

Scientific integrity forms an integral part of imec's organizational culture. Imec's policy in this regard is focused on encouraging good research practices. As a frame of reference, imec uses the same applicable codes of conduct at the Belgian (www.belspo.be) and European (www.allea.org) levels. Imec's Scientific Integrity Committee (CWI) addresses potential violations, such as plagiarism and data falsification or manipulation. An internal Research Integrity Officer is responsible for monitoring this integrity policy. Imec is also a member of the Flemish Committee for Scientific Integrity (VCWI).

The entire imec group maintains a transparent internal and external communication policy, both from a management perspective and an operational and logistical perspective, with attention given to the timing, equanimity, and objectivity of the communication.

In 2022, through continuation of the values campaigns of 2021, a number of training programs emphasized the concepts of ethical awareness and ethical dialog. New employees are now given the opportunity to think about the impact of such values during their onboarding. This also occurs during the "first-time people management" training, as well as the "value-based (self)-leadership" course for our future managers. How aware are employees that ethics form part of imec's research, or that you always start from a position of bias? Plus, how do you undertake a conversation about ethics?

Other courses, in turn, use online questionnaires about ethical behavior, a tool that lends language to ethics.

4.3.3 Maximum information security and privacy

In its mission statement, imec declares its intention to be a "**trusted partner for startups and academia**." Its security and privacy teams support the organization in maintaining trust with its partners by ensuring the availability, confidentiality, and integrity of data and personal information.

For imec, R&D data and data more generally are considered crucial assets. They are extremely valuable and therefore need to be well protected against an ever increasing number of risks. For example, imec factors in the risks of an information security breach or correctly applying applicable legislation, while also accounting for risks related to espionage. This sort of risk management is of great importance to imec's various stakeholders. By conducting a thorough risk analysis, validated at the highest level of management, imec has developed its own **information security policy**.

Imec uses a structured and documented Information Security Management Framework (ISMF), based on industry best practices, such as ISO standards 27001 and 27002, as well as NIST SP 800-53. In addition to governance, risk management, and policies, there is a major focus on training and awareness. For example, there is mandatory training for all employees, which has to be repeated every three years. There are also regular awareness activities aimed at identifying and reporting phishing activities. For these training and awareness activities, KPIs have been established.

Other key areas focus on proper record management, embedding agreements into business processes, identity, and access management. To this end, new steps were taken in 2022, partly through the use of new technological solutions and traditional activities related to network and data protection, together with all related analysis and management activities.

In 2023, the "Information Security" team is focusing on developing a new strategy. As part of this adapted strategy, imec will take into account the growing expectations of imec stakeholders, as well as EU Directive NIS 2 which, since its adoption at the European level, also applies to R&D organizations such as imec. In addition, the impact of strategic developments within imec's collaboration model are driving the need to include new elements in information security policies, such as obtaining additional certifications.

Finally, there is a lot of movement at the sector level within the microchip industry. As part of these networks, imec contributes by drawing up broad-based policy principles at a sectoral level.

“Cyber threats are constantly evolving, and at a rapid pace. By working together and exchanging knowledge in the area of information security with other stakeholders within the imec ecosystem, and the wider semiconductor industry, our chances of efficiently fending off these threats are increased significantly.”

Tom Palmaers, information security officer imec

In addition to information and data security, **privacy protection** is an important pillar. To that end, imec complies with all applicable privacy laws, including the General Data Protection Regulation (GDPR).

Imec has appointed a Data Protection Officer (DPO) who, along with the privacy office, monitors the proper application of the law, including at the international level, while also establishing policies that cover potential risks and enabling knowledge building and supporting processes.

Privacy is held in high regard. For example, all new projects and programs as part of a multi-year plan are implemented in accordance with the GDPR from the very start. When it comes to imec's own organization, this means maintaining the trust of imec's partners in relation to privacy issues. At the same time, imec also possesses a substantial amount of personal data, all of which must be handled very carefully to avoid any unlawful processing thereof. Lastly, the international scope of the imec organization also provides for monitoring the impact of international partnerships. In this regard, a project or program may be covered by several laws or directives, with action needing to be taken accordingly.

This approach to privacy is an iterative one, based on a risk management process that involves assessing privacy at both an individual and organizational level. The internal processes involving personal data processing operations by HR, ICT, and communications services are also included within this monitoring framework. These policies, underlying processes, and controls are monitored, with results reported to imec at a management level.

In 2022, the team also turned their focus to the topic of behavioral change. Privacy is everyone's business. The more all imec employees incorporate privacy concerns into their daily operations, the better personal information will be handled. Imec can look back on the proper handling of questions and comments relating to the GDPR. In 2023, imec will continue to focus on training and awareness initiatives. For example, targeted roadshow training sessions, such as themed days around health research, have already been scheduled.

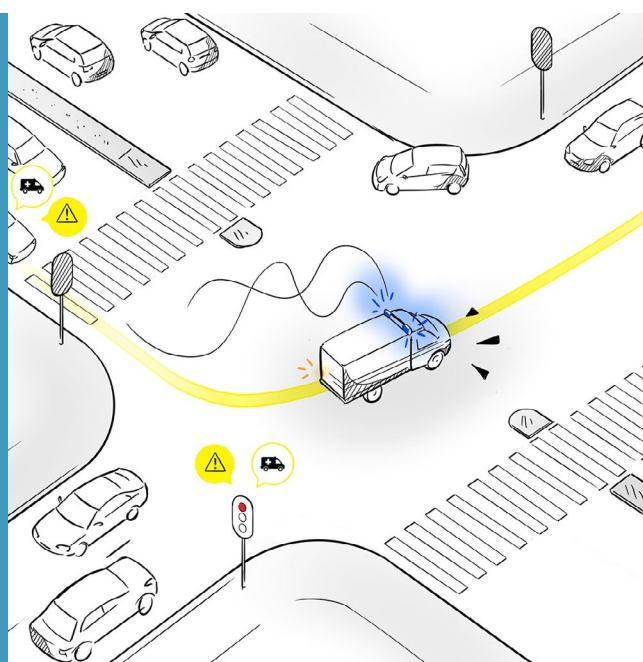
“Privacy is everyone's business. If everyone uses their common sense, it's not so difficult to deal with appropriately.”

Klaas Ghesquiere, data protection & healthcare compliance manager imec

Mobilidata

Imec also contributes toward larger programs through its expertise related to topics around privacy. For example, this expertise was widely deployed throughout the Mobilidata project, where imec made a substantial contribution in sharing its risk management knowledge and related advice.

Mobilidata is the first government program to achieve innovations and digital transformations within the mobility and traffic management sectors in Flanders. This is a multi-party collaboration investigating a reference architecture for ITS services in Europe, as well as connecting active road users with intelligent road infrastructure, including personal and location data processing. As part of this, a comprehensive data protection assessment was carried out by all partners involved, including imec, leading to several measures and recommendations for the future.



4.3.4 A responsible procurement policy and Due Diligence in the supply chain

Imec's Procurement Department also places importance on the principles of good governance and sustainability. From this principle of good governance, the procurement team manages the risks that may accompany any procurement process. With high-quality and high levels of screening, it is possible to mitigate such risks. This starts as early as the signing of the Code of Conduct for imec partners when concluding a contract.

New suppliers are comprehensively screened using a four-pillar system that evaluates them based on quality, approach, cost, and sustainability. Depending on which category they belong to, they have to complete a "risk-based" questionnaire that gauges, among other things, their ESG sustainability performance. Do they have their own environmental management system in place? Do they have a policy on respect for human rights within the supply chain? Are they transparent with regards to their subcontractors? When it comes to capex, for example, a level of circularity is always requested. The assessment of these and other questions is considered in the process of choosing a final supplier. The team review sustainability labels, while supplier sustainability claims are also screened. And after a contract is signed, suppliers are re-evaluated on an annual basis. Existing suppliers are also integrated into this process.

The Procurement Department sets a minimum goal of making more than 40% of purchases from within the local ecosystem. In 2022, imec exceeded this objective, achieving a local order rate of 57% purchases within a 250 km radius of the Leuven site (from where the vast majority of purchases are made). The idea behind this target is for imec to contribute toward the sustainable economic growth of the communities in which it is active.

In 2023, the procurement team will continue to focus on the due diligence element of the procurement process. Through value chain mapping, the transparency of the procurement chain is increased, with a matrix used to categorize suppliers based on risk and impact. An entire chain is then mapped out and evaluated for the major procurement groups presenting the greatest risks.

Beyond that, in 2023, the team will commit to centralized data management, which will allow it to gain a greater insight into spending patterns and continue building on synergies and process optimization. The team will also receive additional training for this purpose.

Over the past year, most of our procurers have attended a training course on sustainable procurement, giving them a chance to get inspired and come up with new ideas. This has helped to instill a culture of innovation, shifting toward a more sustainable, yet more consolidated, procurement approach. The Procurement Department wants to be an ambassador for sustainability, engaging both internal stakeholders and suppliers in creating a positive story.

"Within imec Procurement, we believe we can make a broad contribution to establishing truly sustainable ecosystems. We use our in-house leveraging to help drive the right decisions as a company, in order to contribute to our shared goal."

Wouter Machiels, procurement director imec

4.3.5 Through our citizenship

Guided by the SDGs' slogan "Leaving no one behind", imec believes it is important to focus on engagement and solidarity, both in local communities and globally. Over the years, as well as being prompted by current events, examples of this can be observed in imec's structural collaborations.

- In collaboration with Brightlab, efforts were made to provide opportunities for young individuals and inspire them to pursue STEM pathways through new educational packages linked to the UN SDGs. In addition, EDUboxes on the pandemic and the circular economy were put together, while pilot STEM projects were launched to help motivate girls to choose STEM pathways, such as "Yes, We Make it" in schools and SPARK at youth clubs. For more info, visit www.brightlab.be
- In 2022, imec challenged its employees to exercise more before, during, and after work hours, with a more active lifestyle encouraged by offering onsite yoga and fitness classes, as well as promoting exercise during lunch hour. Increased exercise was linked to financial support for cancer research via donations to Levensloop, for which imec employees participated with a team again this year.
- Imec employees provide structural support for various projects, including the 'Empowering Girls Through Education' project in Kenya, Knitting for Alzheimer's, and an annual donation via the Sinterklaas Fund to organizations where imec employees work as volunteers.
- By promoting imec's online card shop sending New Year's wishes to imec partners, donations were secured for the Warmest Week.
- Imec organized a major solidarity campaign for war victims in Ukraine, as well as for flood victims in Pakistan.

5. About this report

Imec is a registered trademark for the activities of IMEC International with headquarters in Leuven (a public utility foundation under Belgian law), imec Belgium (IMEC vzw, supported by the Flemish government), imec Netherlands (Stichting IMEC Nederland, a division of the Holst Centre and the OnePlanet Research Center, supported by the Dutch government), imec Taiwan (IMEC Taiwan Co.), imec China (IMEC Microelectronics (Shanghai) Co. Ltd.), imec India (Imec India Private Limited), and imec Florida (IMEC USA Nanoelectronics Design Center). The organization has operations in Belgium, the Netherlands, China, India, Japan, and the United States.

Reporting period

Publication date: August 25, 2023

Reporting period: Saturday, January 1, 2022 - Saturday, December 31, 2022, also corresponding to the fiscal year for all entities in the imec group. The sustainability report can also be accessed online at <https://www.imec-int.com/en/sustainability>

This sustainability report is published annually to provide information in a transparent and public manner about the ambitions and progress toward achieving imec's objectives..

Reporting standard and approach

Imec reports in accordance with GRI guidelines. Imec International has reported in accordance with the GRI Standards for the period 01/01/2022-31/12/2022. The GRI content index can be found on pages 54-57. The scope of the KPIs and deviations are explained in the relevant chapter. Here, the choice was made to use the 2021 GRI standards, with the new standards applied as widely as possible. The structure and content of the report are based on imec's sustainability policy and material themes. The management approach is included in the headings for each material theme.

Contact details

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Disclaimer

The information and materials contained in this report are provided "as is" without any express or implied guarantee of any kind. Imec shall not be liable for any damages whatsoever due to the use of or inability to use the information or materials contained in this report.

External safeguarding

This sustainability report has not obtained external assurance. However, internal verification and recommendations were performed and applied with internal experts and management.

This sustainability report provides an accurate insight into imec's social, environmental, and ethical performance, relevant to both imec's stakeholders and imec itself.

Production

Storyline and copy: imec en Studio D

Management approach and data collection: imec

Design: imec

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6. GRI-index

STATEMENT OF USE		Imec International has reported in accordance with the GRI Standards for the period 01/01/2022-31/12/2022.			
GRI 1 USED		GRI 1: Foundation 2021			
APPLICABLE GRI SECTOR STANDARD(S)		Not applicable			
GRI STANDARD/ OTHER SOURCE	DISCLOSURE	LOCATION	OMISSION		
			REQUIREMENT(S) OMITTED	REASON	EXPLANATION
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	2-9 Governance structure and composition	p. 49			
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	2-16 Communication of critical concerns	Not included in the report but publicly available at link			
	2-17 Collective knowledge of the highest governance body	p. 11; p. 16			
	2-18 Evaluation of the performance of the highest governance body	Not included in the report but publicly available at link			
	2-19 Remuneration policies	Not included in the report but publicly available at link			
	2-20 Process to determine remuneration	Not included in the report but publicly available at link			
	2-21 Annual total compensation ratio	Not included	Annual total compensation ratio	Confidentiality constraints	Information is not publicly available
	2-22 Statement on sustainable development strategy	p. 3			
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	2-27 Compliance with laws and regulations	Not included	Compliance with laws and regulations	Confidentiality constraints	Information is not publicly available
	2-28 Membership associations	p. 13			
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	3-2 List of material topics	p. 15-16			
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