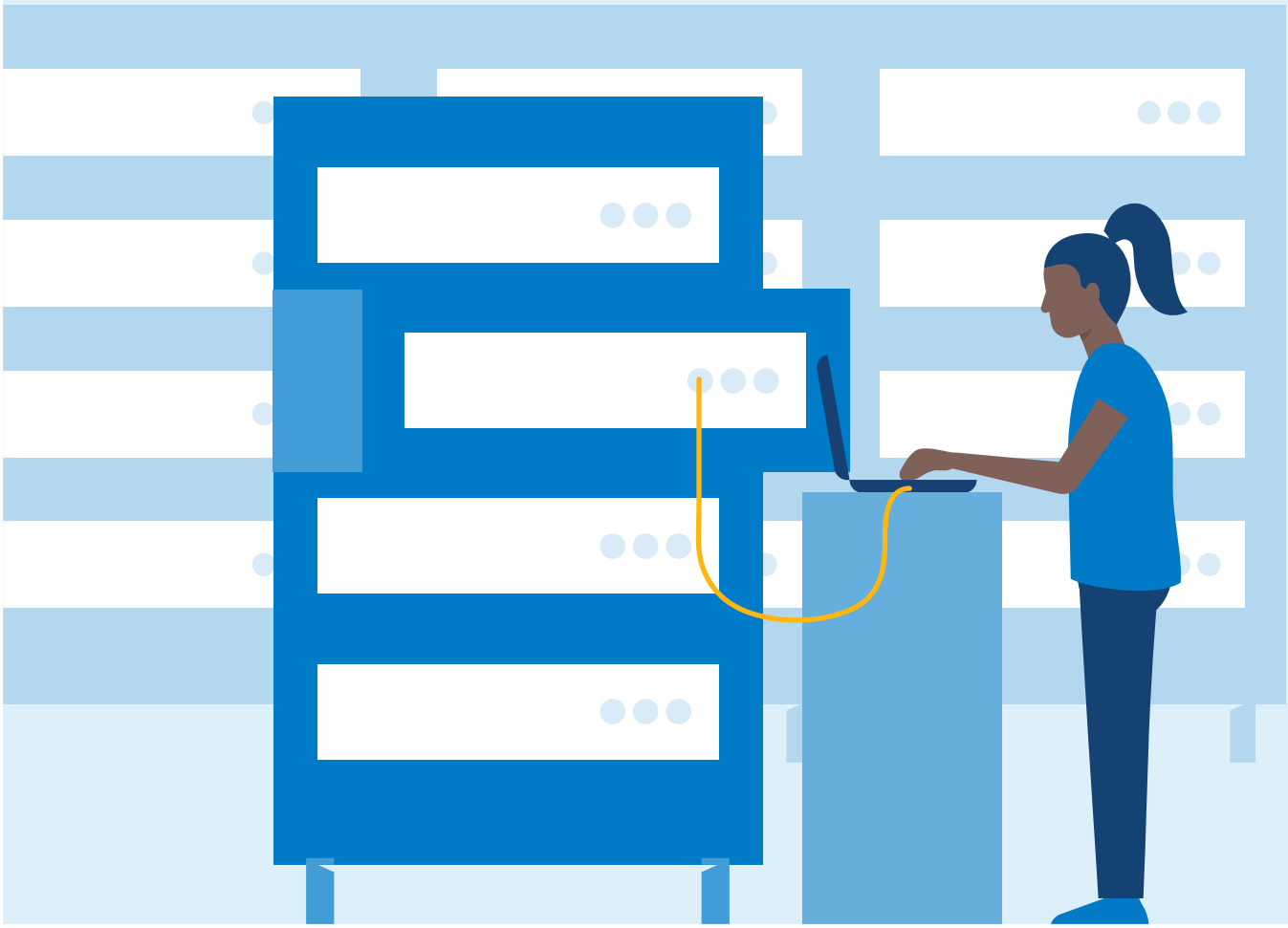
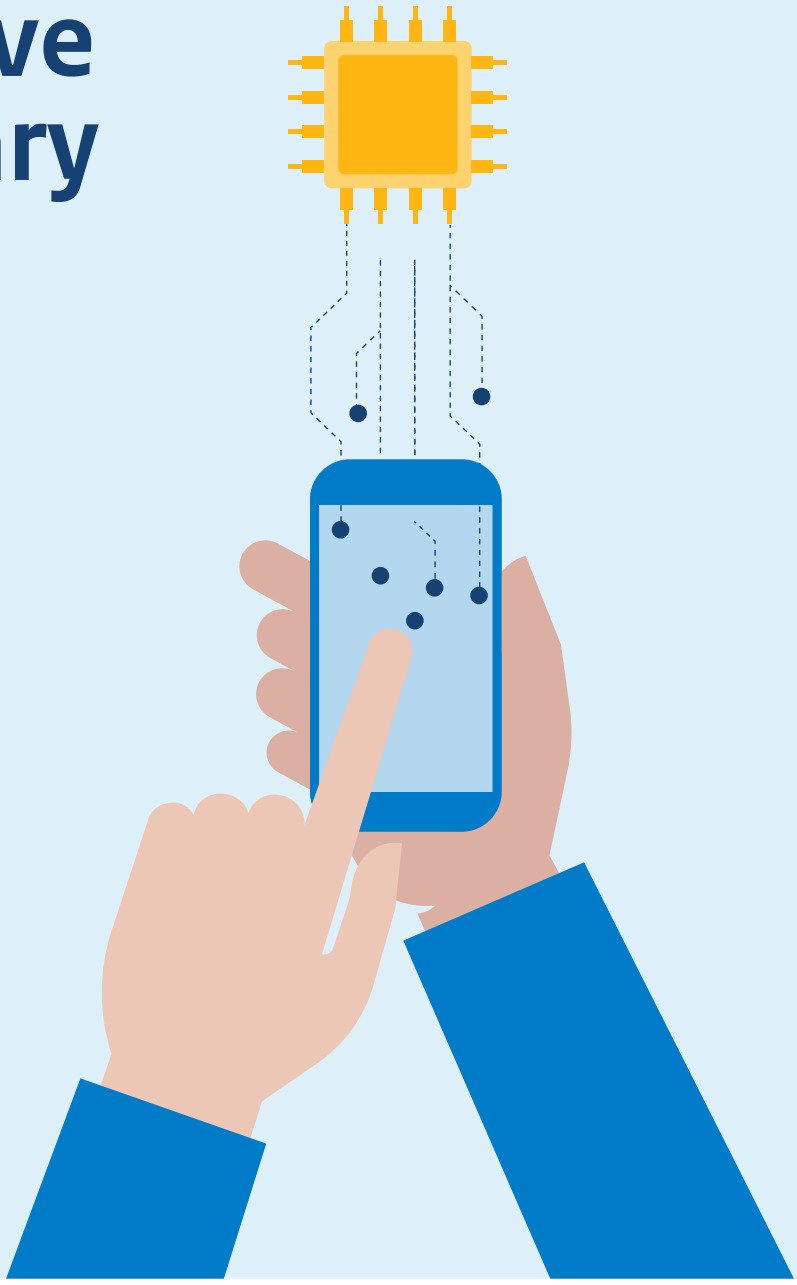
Ministry of Economic Affairs

National Semiconductor Vision 2035

Ambitions for the Dutch semiconductor industry



Executive Summary



Why a National Semiconductor Vision for 2035

The semiconductor industry is indispensable to our society, our economy and our geopolitical resilience. The Netherlands plays a key role in this sector and has a world-leading ecosystem: from global technology frontrunners to a thriving landscape of startups, scale-ups and knowledge institutions.

However, this position cannot be taken for granted. Rapid technological developments, global competition and geopolitical shifts mean that business as usual is no longer an option. What we need instead is targeted, coordinated action by the government and the business community, in consultation with our closest allies. The Netherlands will have to make a joint public-private effort to remain at the forefront of technology and strengthen our position in the value chain. This will make our economy and society more robust. The Netherlands' strong position offers great opportunities to shape the future of the sector, provided we take the right steps now and in the future.

At the request of the Semicon Board NL, a broad group of public and private parties has worked over the past year on a joint vision for the future of the Dutch semiconductor industry. The result is this sector vision, which outlines the course we intend to pursue between now and 2035, with clear strategic choices and corresponding investment windows.

Six strategic priorities for the Dutch semiconductor industry

This sector vision sets out six strategic priorities that need to be addressed in concert in order to maintain and expand our leading position.

1. **Focus on effective international collaboration**
   a. Take a leading role in the European Union
   b. Work together with strong semiconductor countries outside the EU

2. **Invest more in innovation, development and manufacturing, and do so in a more targeted manner**
   Opt for specific strategic core positions in the chip value chain, focusing on high-mix manufacturing. This will require a structural annual investment of at least **€500 million**, €250 million of which should be public and at least the same amount private.
   a. Strengthen what the Netherlands is already good at
      i. Materials & equipment
      ii. Chip design
      iii. Advanced packaging
      iv. Manufacturing (high-mix)
      v. Integrated photonics
   b. Focus on a number of promising new growth markets
      i. Design AI-accelerating chips
      ii. Manufacture and design 6G/communication chips
      iii. Manufacture and design heterogeneous chips (heterogeneous integration)
      iv. Manufacture and design chips for quantum computers and communication
      v. Manufacture and design chips for automotive applications and robotics
   c. Focus on effectively embedding semiconductors in EU innovation programmes
   d. Focus on strategic international innovation partnerships

3. **Ensure that the Dutch semiconductor industry has better access to capital in order to grow**
   From now to the end of 2035, scaling up technology and businesses requires a public investment window of **€7 billion** in revolving funds, which can be used to leverage private investment and mobilise up to **€25 billion**.
   a. Increase the availability of capital
      i. Strengthen Invest-NL
      ii. Focus on blended finance
      iii. Make capital available for manufacturing photonic chips in the Netherlands
   b. Create the right venture-development infrastructure
      i. Create shared service facilities to test new innovations
      ii. Establish a quantum industry cluster
      iii. Actively scout promising initiatives
   c. Enhance strategic competitiveness

4. **Protect the chip industry to strengthen our economic and national security**
   a. Prevent unwanted transfer of knowledge and technology
   b. Raise awareness of and insight into security risks
   c. Fight unfair competition on the European market
   d. Counteract disruptions to international value chains
   e. Maintain the dialogue on export control
   f. Strengthen and diversify international value chains
   g. Increase demand for chips in the EU

5. **Ensure sufficient talent**
   a. Build on the momentum from the Microchip Talent Development Plan that aims to educate an additional 25,000 technical professionals by 2030. To this end, **€450 million** has been pledged by central government for the period 2025 to 2030, plus **€310 million** from regions and the business community.
   b. Focus on structural solutions for the period from 2031 onwards. For the 2030-2035 period, the regions expect to educate approximately 15,000 additional technology students. From 2031 onwards, **€80 million** per year has been structurally reserved for this purpose.
   c. Prevent cuts in higher education and ensure stable government policy that continues to focus on and invest in education and knowledge development.
   d. Focus on maintaining schemes aimed at attracting top international talent.

6. **Ensure that the right preconditions are in place**
   a. Ensure stable and predictable government policy.
   b. Prioritise the semiconductor industry when bottlenecks arise (such as housing, accessibility, a sufficient power supply and scope within environmental limits for activities that cause nitrogen pollution).
   c. Continue to focus on an internationally competitive investment and business climate.

Concrete measures

The National Semiconductor Vision 2035 provides the necessary building blocks for a public-private implementation programme for the semiconductor industry. Further agreements need to be made on implementation. Public and private financial commitment is also required. This can only be achieved through cooperation between the business community, national and regional government bodies, knowledge institutions and other parties. The Semicon Board NL plays an essential role in monitoring progress on these ambitions and addressing bottlenecks.

With this vision for the future, the Netherlands can ensure that our semiconductor sector maintains and expands its leading position, so that we remain an indispensable leading global player in 2035.

The Hague, January 2026

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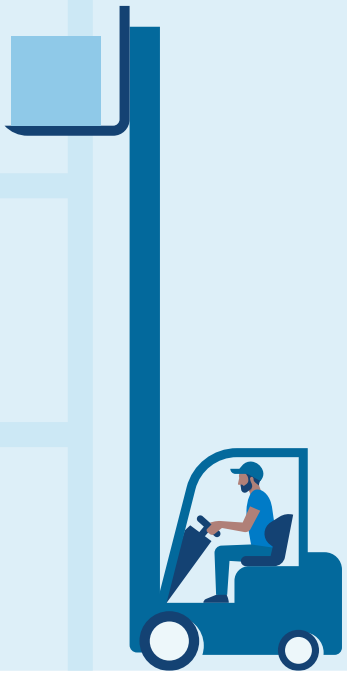


Introduction

1. The special importance of semiconductors

a. Challenges in society

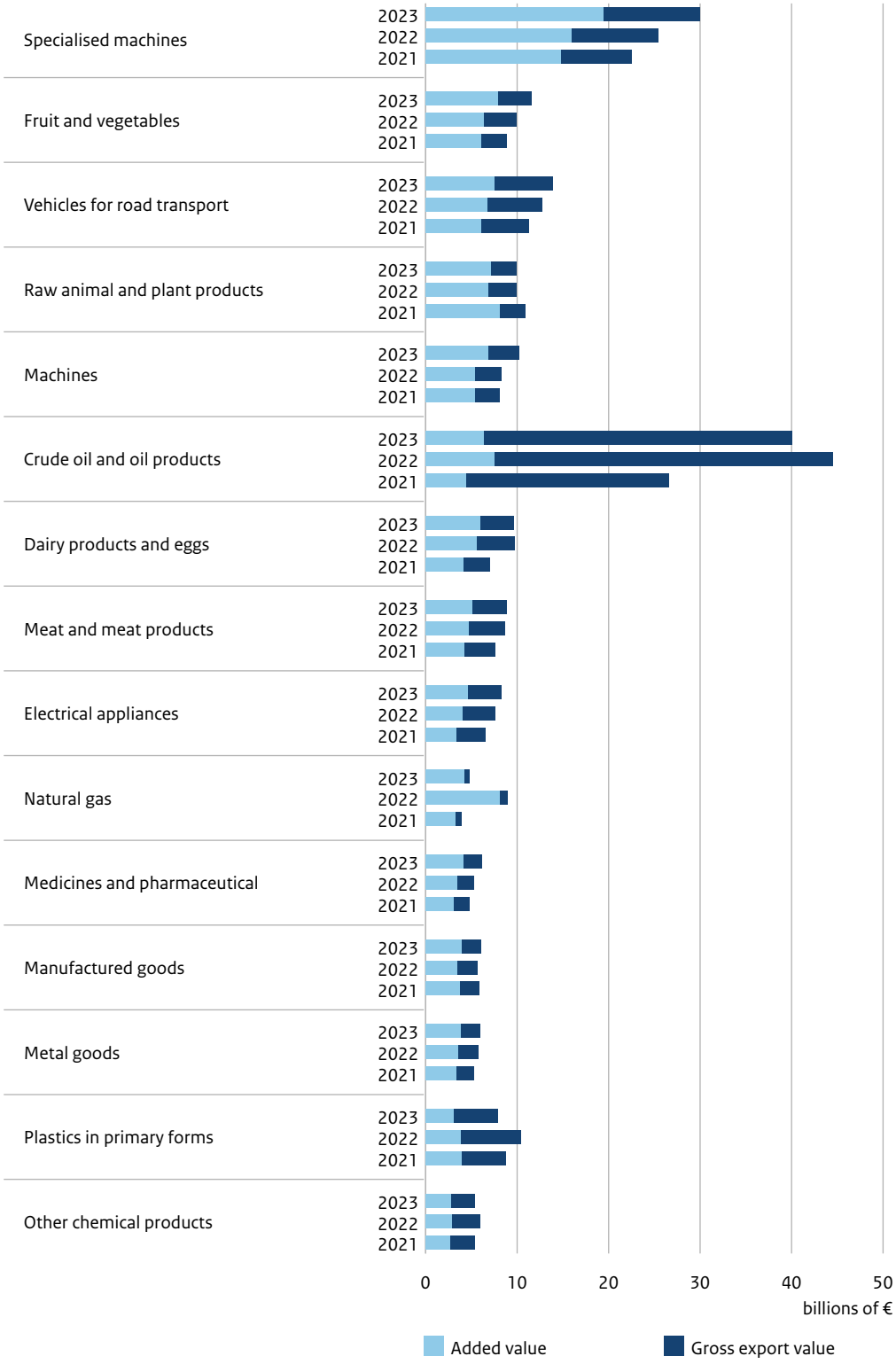
Semiconductors form the basis of virtually every electronic device and are therefore indispensable to our society. Wherever we encounter bottlenecks, semiconductors often provide the solution. This includes smarter transport and mobility, cleaner energy, secure communications, and better and more affordable healthcare. Advances in semiconductors are making our society and economy more productive and ensuring that we will remain globally competitive in the future.

b. Future earning capacity

The semiconductor industry is already one of the most important sectors in the Netherlands. The global semiconductor market is growing rapidly, with revenue expected to reach around €1 trillion by 2030, doubling again by 2040.[1] In order to maximise our future earning capacity, it is essential that we are part of this growth. Without investment, we risk falling out of step with global developments. We will miss out on direct economic growth, as well as the opportunity to build a robust ecosystem in which other key technologies such as artificial intelligence, imaging, robotics, integrated photonics, quantum computing, optical systems and sustainable energy can grow. These key technologies will give us access to the markets of the future.

1 See, for example, PwC Global semiconductor industry outlook 2026 https://www.pwc.com/gx/en/industries/technology/semiconductor-and-beyond.html Deloitte 2025 global semiconductor industry outlook https://www.deloitte.com/us/en/insights/industry/technology/technology-media-telecom-outlooks/semiconductor-industry-outlook.html.

Specialised machines, including those used for semiconductors, have a higher added export value than products from other Dutch sectors



Source: Statistics Netherlands (CBS)

c. Geopolitics, resilience and security

The world order is becoming increasingly fragmented, and countries are making intensive use of the technological domain to exercise power, as concluded by the Scientific Council for Government Policy (WRR).[2] Our position in the semiconductor value chain enables us to participate in this geopolitical arena and maintain a degree of strategic autonomy. We must not lose our technological edge, as this would render us strategically dependent on others.

Semiconductors are also crucial for our resilience and economic security. They are, for example, essential for the functioning of our critical infrastructure and processes, such as policing and defence, energy supply and telecommunications. The availability of semiconductors is therefore a prerequisite for the proper functioning of our society and economy.

Our approach to semiconductors is not business as usual. A joint public-private effort is crucial if we are to remain at the forefront of technology, and our position in the value chain will need to be strengthened in order to become more robust as a society and economy. We are fully aware that the Netherlands is an open economy with a strong international orientation, and that cooperation with our closest allies is essential. To this end, the Netherlands must join forces with its European Union partners and operate as a united bloc based on shared interests.

2. Outline of the global value chain and the Netherlands' position

a. The global value chain

The international semiconductor value chain is spread across various industries worldwide. Broadly speaking, the value chain can be divided into the following categories: materials and equipment, chip design, front-end manufacturing and back-end manufacturing. In terms of percentage of revenue, it can be seen that Europe still plays an important role in materials, equipment and design.

Distribution of chip design and front-end manufacturing in the global semiconductor industry

	EU	USA	China	Taiwan	Japan	South Korea	India	RoW
Number of Chip designers [1] (2021)	4%	32%	28%	5%	2%	4%	19%	6%

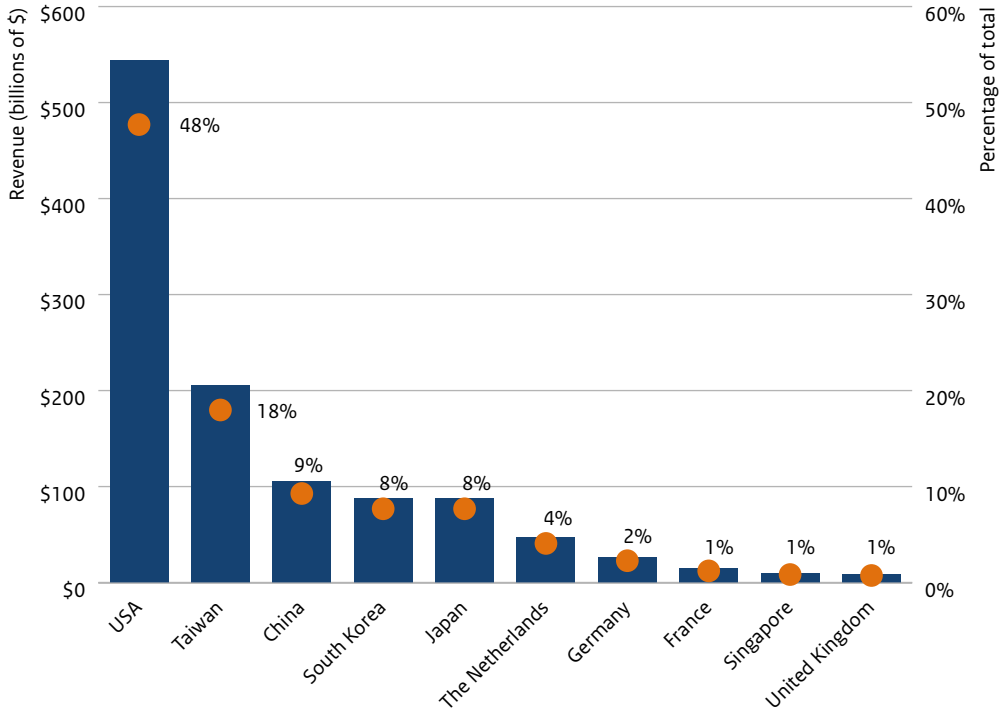
	EU	USA	China	Taiwan	Japan	South Korea	RoW+ India
Front-end manufacturing capacity [2] (2024)	4%	8%	32%	17%	15%	16%	8%

Source: BCG, OECD, via Netherlands Enterprise Agency (RVO)

Europe's position on the global stage is relatively modest: the principal design and manufacturing centres, as well as the end markets (where chips are integrated into equipment), are located outside Europe. This distance between Europe and the end markets for chips also underscores the urgent need to strengthen our semiconductor sector.

2 Scientific Council for Government Policy (WRR) (report 109): *Nederland in een fragmenterende wereldorde* (The Netherlands in a Fragmenting World Order) (2024).

Top 10 semiconductor industries in terms of revenue and percentage of global revenue



Source: S&P Global via Netherlands Enterprise Agency (RVO)

b. Netherlands' position

The Netherlands occupies a unique position in both the global and European value chains. This is the result of a combination of strengths, including technological leadership in several niche areas, a diverse and innovative ecosystem, and a robust supply chain. Our country is home to global players in the chip machine industry. The 'R&D Top 50' for 2025 shows that semiconductor companies account for a significant proportion of Dutch R&D investment.[3] The Netherlands excels in chip design, manufactures chips and is fertile ground for emerging technologies such as integrated photonics and quantum computing. A unique strength of the Netherlands is our network of specialised Dutch suppliers to our original equipment manufacturers (OEMs), which provide high-quality and critical components and knowledge. Another distinguishing feature of the Dutch ecosystem is its culture of collaboration and open innovation. Companies work together closely with each other, as well as with universities, research institutes, and national and regional government bodies. This continuous exchange of knowledge and ideas accelerates innovation and reinforces the Netherlands' position as a technological leader.

3 'R&D Top-50', *Technisch Weekblad*, Confederation of Netherlands Industry and Employers (VNO-NCW) and TNO https://www.tno.nl/nl/newsroom/2025/12/top-50-meest-intensieve-bedrijven/

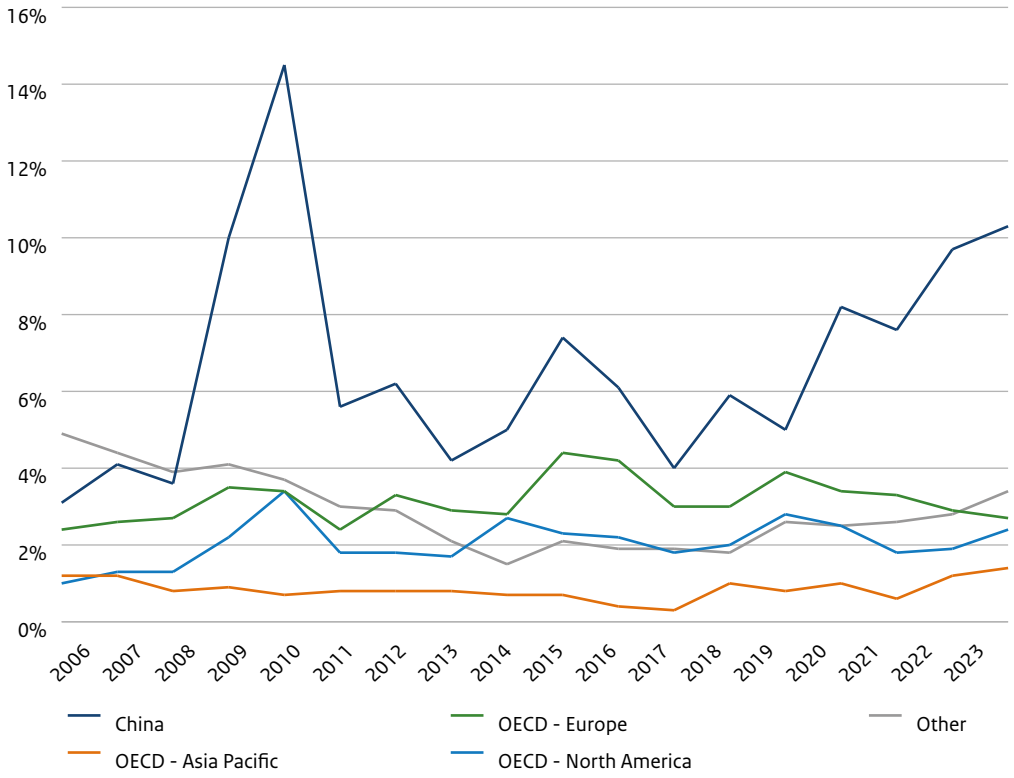
3. The benefits of joint public-private action

a. Uneven playing field

The international competition between countries and regions around the world to grow their own semiconductor industries requires stronger public-private action. Countries around the world are spending billions on subsidies, tax incentives and other support measures to boost manufacturing capacity and attract and develop talent. Public funds are also being invested in research and development. However, the wide variation in these amounts creates an uneven playing field for companies. Notably, for decades, China has been far ahead of other regions in public contributions to semiconductors, as shown in the OECD graph below.

In addition to offering incentives, countries are increasingly resorting to restrictive measures such as export restrictions, trade tariffs and additional requirements. These measures increase strategic dependencies. The multilateral world order from which the Netherlands has benefited so greatly has been under pressure for some time. For the semiconductor sector in particular, this trend towards de-globalisation calls for stronger public-private action.

Semiconductor subsidies, % of firm revenue



Source: OECD (2025), 'Recent trends in semiconductor subsidies', OECD Policy Briefs, No. 17, OECD Publishing, Paris, https://doi.org/10.1787/5e91af33-en

b. Preconditions for growth

The availability of space, infrastructure, energy and talent is essential in ensuring that the Netherlands is an attractive location for companies to set up shop and do business.

In recent years, the Netherlands has sought to strengthen its semiconductor sector. For instance, as part of 'Project Beethoven', central government and the regional authorities have agreed on a comprehensive package of measures to improve the

conditions necessary for the semiconductor industry in the Brainport region. In order to keep pace with international developments, ensure the Netherlands remains attractive, and secure the continued growth of the sector, we need to take an even bigger step.

While other countries and regions are investing, the growth opportunities for Dutch companies are being hindered by shortages of space and energy supply for businesses, and a lack of sufficient talent. This not only slows down the growth of companies that have already established themselves in the Netherlands, but also makes us less attractive to foreign firms considering setting up business here. These companies are crucial to strengthening our ecosystem and making the value chain more robust.

4. How can we respond to the challenges facing the sector?

a. Setting ambitions for the semiconductor sector in the period up to 2035

Realising the importance of the semiconductor sector to our society, economy and resilience, and in light of the international situation that demands more from us than business as usual, the Semicon Board NL has asked for a comprehensive public-private vision for the semiconductor industry to be drawn up. This vision was developed through a joint analysis by the sector, knowledge institutions, financial specialists and the government.

Experts from various working groups analysed the main problems and challenges facing the Dutch sector and translated them into substantive ambitions. The advice is to achieve these ambitions in an integrated manner.

b. Making joint investment choices

In the global semiconductor value chain, it is not possible for the Netherlands to have a leading position in every area. For example, the Netherlands excels at high-quality, highly complex work, but not at low-cost mass production. We must therefore invest in maintaining our technological lead on the one hand, and in the technological world leaders of the future on the other.

The Netherlands has the best chance of leading the way in the following growth markets:

Existing strengths:

i. **Materials & equipment**
ii. **Chip design**
iii. **Advanced packaging**
iv. **Manufacturing (high-mix)**
v. **Integrated photonics**

New growth markets:

i. **Design AI-accelerating chips**
ii. **Manufacture and design 6G/communication chips**
iii. **Produce and design heterogeneous chips (heterogeneous integration)**
iv. **Manufacture and design chips for quantum computers and communication**
v. **Manufacture and design chips for automotive applications and robotics**

c. Set goals for the following lines of action:

i. Focus on effective international collaboration

Continue to focus on maintaining strong international cooperation in the future, both within the EU and with the most important and emerging semiconductor countries outside the EU.

Dependence on international supply chains and geopolitical tensions both underscore the need for a stronger European semiconductor sector, focused on resilience and technological leadership. The sector needs predictable policy, open market access and an international playing field that is as level as possible.
We cannot do everything ourselves in the Netherlands, or even in Europe.
By working together with allies we can intelligently share manufacturing capacity, as well as innovation and human capital. To safeguard our geopolitical resilience, we should make agreements on market access.

ii. Invest more and in a more targeted manner in innovation

The Dutch semiconductor industry is challenged by the need for continuous innovation in a global market driven by rapid technological developments and increasing competition. In order to maintain our lead, specific investment is required in research, open innovation ecosystems and strategic collaboration between knowledge institutions and the business community. Sustainability and applications in new markets also require targeted investment. Use the National Technology Strategy (NTS) as a basis for this.

iii. Improve the Dutch semiconductor industry's access to capital in order to grow

Improve access to adequate risk-bearing capital and stimulate scale-ups in the semiconductor industry. Startups and growth companies still face too many bottlenecks. What they really need is patient capital, specialised investors and a favourable climate for venture development in order to accelerate the transition from innovation to market introduction.

iv. Increase the resilience of the ecosystem

Given the uncertain geopolitical playing field in which this sector operates, we must ensure that it remains resilient. Make sure that Dutch knowledge stays in the country, that there is no unfair competition in the market, and that value chains are reinforced to better absorb shocks.

v. Ensure sufficient talent

The sector is facing a growing shortage of technical talent at all levels, ranging from engineers to specialists in advanced manufacturing. Attracting, retaining and retraining talent requires a comprehensive approach, including education in state-of-the-art technology, lifelong development, an attractive working environment and international talent recruitment.

vi. Ensure that the right preconditions are in place

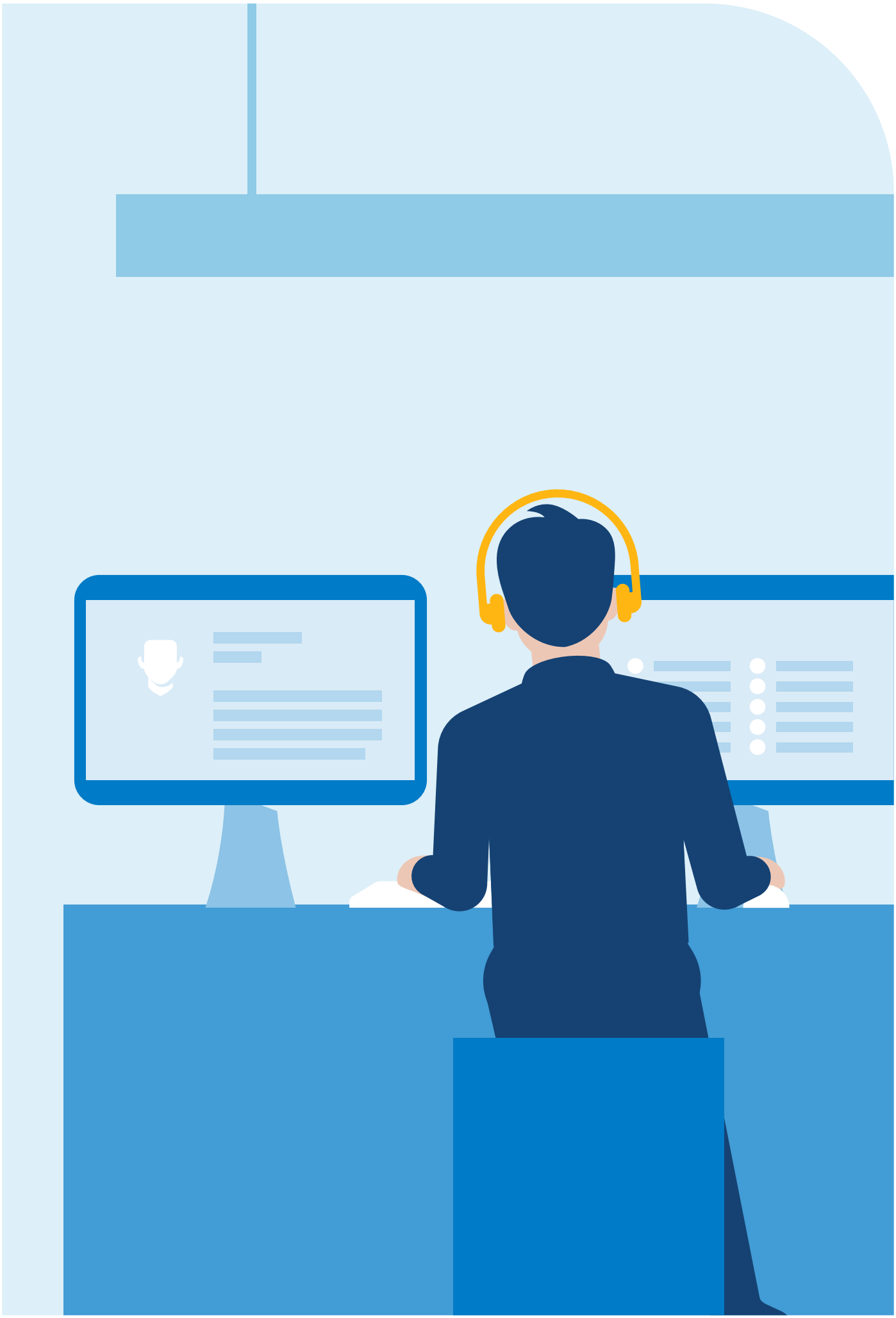
A predictable, reliable and incentivising policy climate is essential to accelerate private and public investment in the semiconductor sector. This includes clear, predictable and stable regulations, attractive investment conditions, rapid licensing and a strong public commitment to infrastructure and knowledge development. These measures will enable the Netherlands to profile itself as a top destination for semiconductor investments by new and existing companies, offering companies the long-term certainty they need to make such investment decisions.

d. Work on an implementation programme:

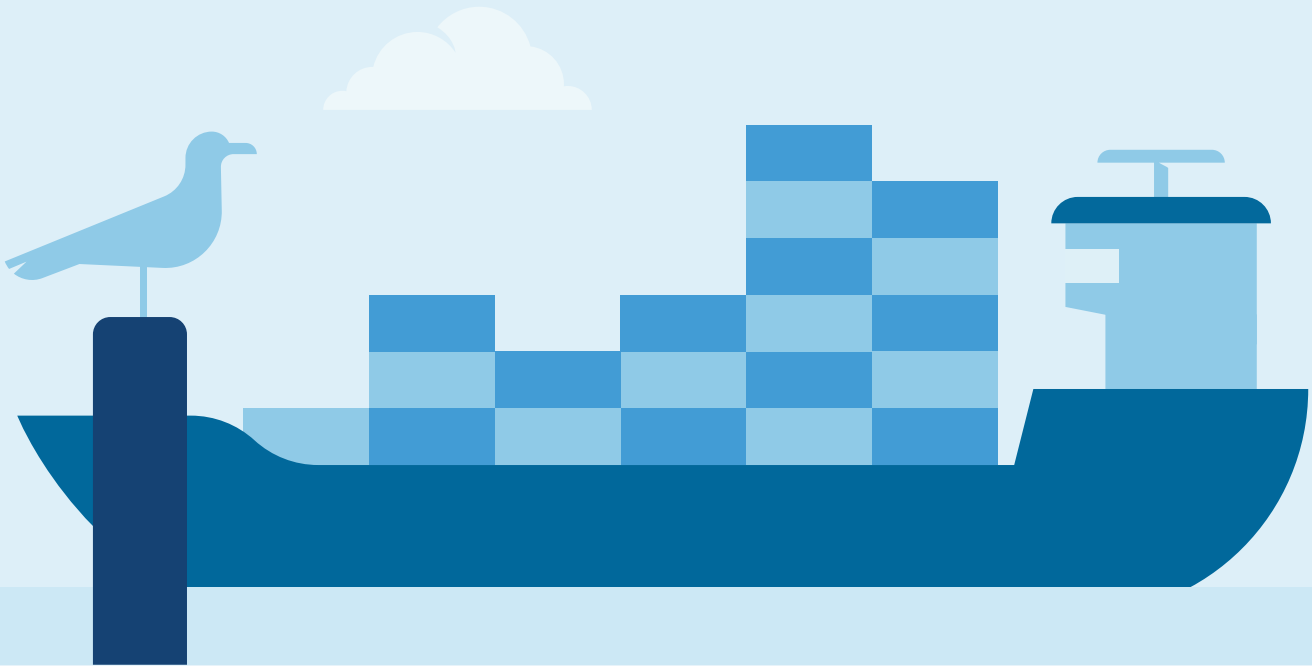
This vision document contains a widely supported **analysis of the ambitions required** for the sector at political and civil service level. The aim is to encourage discussion and make choices. Semiconductors are one of the priority growth markets identified by the Minister of Economic Affairs in the letter to parliament on industrial policy of 17 October 2025. This document outlines the course of action needed in the period up to 2035. Furthermore, the independent **advisory report by Peter Wennink**[4] highlights the same sense of urgency, as well as opportunities and bottlenecks.

Because this document represents a vision for the semiconductor industry, it does not establish any binding agreements. Decision-making remains the responsibility of the individual government authorities, companies and other organisation via their regular procedures.

4 https://www.rapportwennink.nl/downloads/rapport_wennink_12december2025.pdf, published on 12 December 2025



1 International



The Netherlands plays a major role in the global semiconductor value chain as one of the key players in this complex, highly interconnected sector. Around 80% of Dutch revenue in the semiconductor industry is generated outside Europe, primarily in Asia and the United States. This highlights not only the global nature of the industry, but also the need for close cooperation with other countries. Cooperation in the European Union is particularly important, not only in terms of manufacturing, but also for building a solid market within Europe itself.

Call to action

Increasing geopolitical tensions and strategic dependencies in the global value chain pose a risk to the availability of semiconductors and to Dutch companies' access to crucial markets. At the same time, Europe's already limited manufacturing capacity is declining. This, paired with the EU's strategic dependence on suppliers in other countries, is jeopardising the availability of semiconductors for the European market.

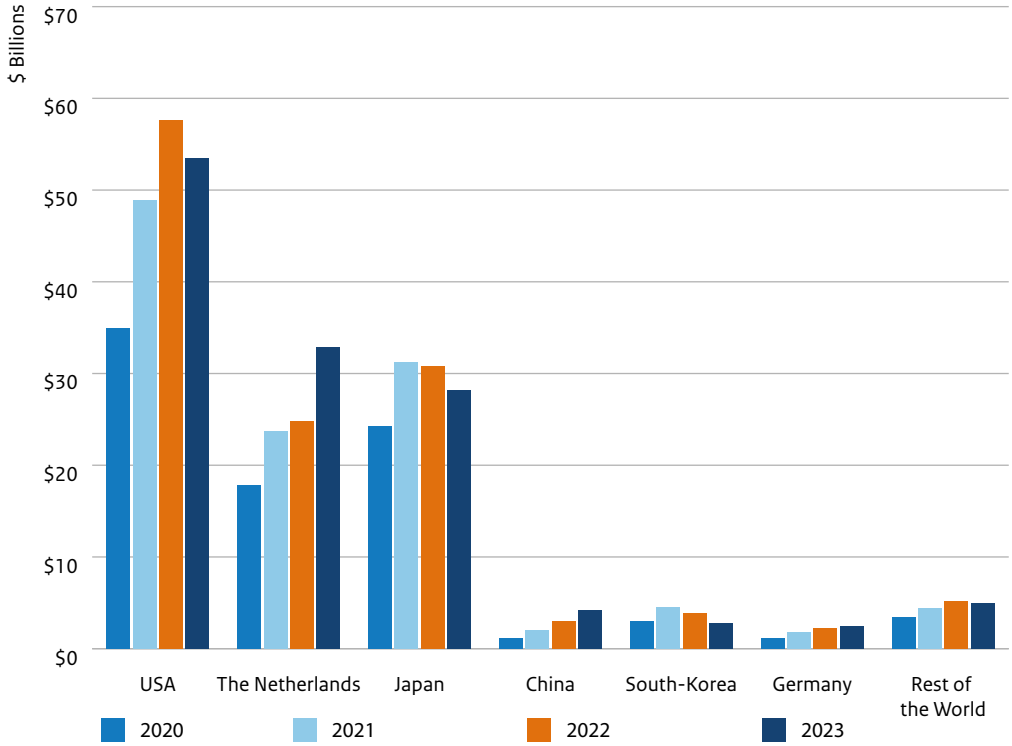
Current situation

The Netherlands is a key player in the European semiconductor landscape, actively driving international cooperation that contributes to a resilient, open and competitive global semiconductor sector.

Within Europe, the European Chips Act is the most important tool for strengthening manufacturing capacity, innovation and strategic autonomy. The Netherlands is actively contributing to this through the Semicon Coalition and by investing in high-value knowledge and public-private partnerships, including through the PIXEurope project.

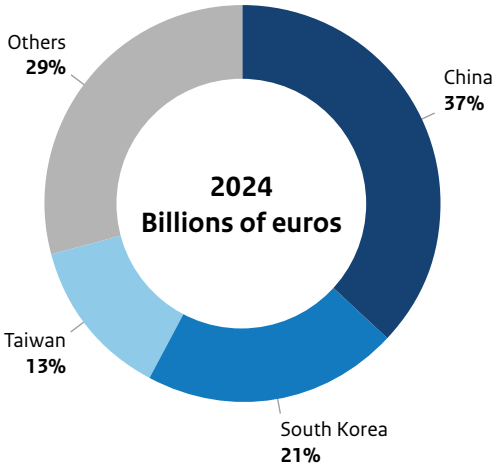
The Netherlands maintains strong relationships with like-minded countries worldwide, focusing on strategic partnerships with countries that play a leading role in technology and innovation. Active efforts are being made to establish new partnerships with emerging markets in the semiconductor industry, focusing on trade, joint innovation, access to new markets and talent acquisition. These partnerships help strengthen the strategic position and resilience of the Dutch and European semiconductor sectors.

The Netherlands ranks among the top three countries worldwide in the field of semiconductor manufacturing equipment



Source: Status of the Wafer Fab Equipment Industry, 2025 report, Yole Group, via the Netherlands Enterprise Agency (RVO)

Final destination for exports of semiconductor manufacturing equipment



Source: Status of the Wafer Fab Equipment Industry, 2025 report, Yole Group, via the Netherlands Enterprise Agency (RVO)

Goals

International cooperation is crucial for virtually all aspects of this industry vision. This is why each of the following five sections – 2) Innovation, 3) Venture development and capital, 4) Economic security, 5) Talent and 6) **Preconditions** – includes the international objectives that apply to that pillar. In addition, the Netherlands has the following overarching ambitions:

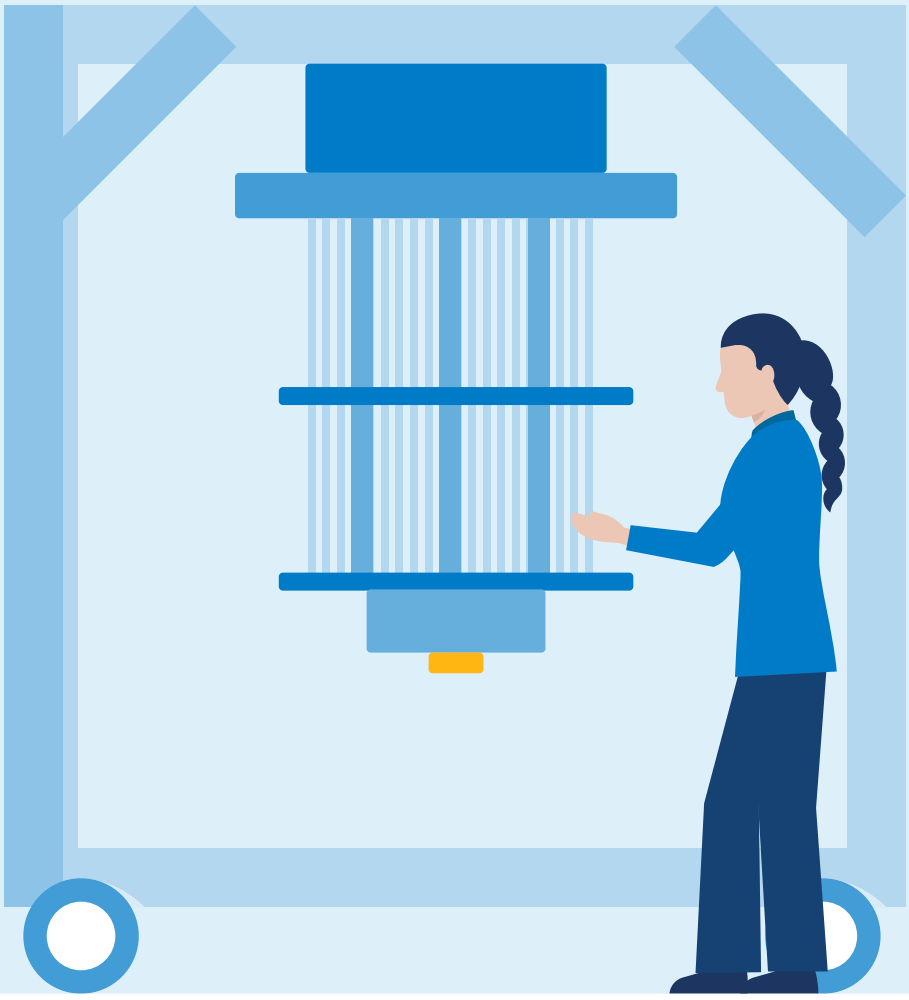
a. **Take a leading role in the European Union**
   The Netherlands played a leading role in establishing the European Semicon Coalition. It must maintain and further strengthen this role when it comes to undertakings such as the revision of the Chips Act and the creation of new Important Projects of Common European Interest (IPCEIs) and future initiatives, including the Quantum Act. The Netherlands must therefore strive for a leading position in the EU at pivotal points in the semiconductor, quantum and integrated photonics value chains.

b. **Collaborate with strong and emerging semiconductor countries outside the EU**
   Alongside the European playing field, the Netherlands aims to foster close ties and partner with like-minded countries outside the European Union. In this respect, preserving and strengthening our capacity and knowledge, including the innovation attachés, at embassies in like-minded countries is essential.

Impact indicators

- **EU subsidies and projects for the semiconductor industry**
  Analysing the number of projects, investment volumes, and co-financing amounts provides insight into the effectiveness with which EU subsidies and projects contribute to the growth, innovation, and strategic autonomy of Europe's semiconductor industry.

2 Innovation



A strong semiconductor industry starts with innovation. Developments in quantum chips, photonic chips and AI chips, for example, are progressing at a rapid pace. This is why continued investment in robust fundamental and applied research, as well as market-oriented valorisation, is crucial. The semiconductor sector is highly innovative and is therefore well placed to make an above-average contribution to the target of investing at least 3% of gross domestic product (GDP) in R&D by 2030.[5]

Call to action

Innovation is crucial for technological leadership and, consequently, economic resilience. Countries such as the United States, China, South Korea and Japan are therefore investing in innovation on an unprecedented scale. If the Netherlands is to maintain its technological leadership, we cannot afford to fall behind. Focusing strongly on research and innovation is essential to maintaining and further expanding our strong position.

Current situation

The Netherlands plays a prominent role globally in the semiconductor industry. We are technological leaders in the field of semiconductor equipment and metrology and possess unique expertise in chip design. We are also among the best in the world when it comes to high-performance and mixed-signal circuit manufacturing, integrated photonic chips, quantum components and chips, and advanced packaging.

Universities such as Delft University of Technology, Eindhoven University of Technology and the University of Twente conduct leading fundamental research, while organisations like TNO and imec bridge the gap to applied research. Large companies including ASM, ASML, Besi, NXP and Thermo Fisher Scientific invest heavily in R&D. Additionally, we have a dynamic ecosystem of SMEs, startups and scale-ups that translate knowledge from universities and research institutions into market applications.

National Growth Fund programmes such as NXTGEN Hightech, Quantum Delta NL, PhotonDelta, Polaris and 6G Future Network Services are already working on important innovations for future earning capacity. And as part of the National Technology Strategy, under the management of KIA Key Enabling Technologies, action agendas for 10 key technologies will be delivered in early 2026. More than half of these are directly relevant to the semiconductor industry, including optical systems and integrated photonics, quantum technologies, imaging technologies, mechatronics and opto-mechatronics, artificial intelligence and data science, and, of course, semiconductor technologies. The innovation programmes included in these NTS action agendas will therefore also form the basis for the focus on innovation in this sector vision.

The letter to parliament on industrial policy of 17 October 2025 mentions mechanical engineering, AI, 6G, quantum and the semiconductor industry as important markets to focus on.

Thanks to its strong innovation ecosystem, the Netherlands will be able to make optimal use of additional investment in innovation. These are expected to more than pay for themselves.

5 Ministry of Economic Affairs: https://open.overheid.nl/documenten/4ca054dc-2310-4cd6-84b4-635d435c999d/file

Goals

a. Strengthen what the Netherlands is already good at

Build on our strong starting position in sustainable competitive chip design, equipment, high-mix manufacturing, integrated photonics and advanced packaging, so that in five to ten years from now the Netherlands will be the undisputed leader in these growth markets with a resilient, clean and productive semiconductor chain that reinforces strategic autonomy and security.

i. Materials & equipment

The Netherlands has an leading international position in advanced equipment – manufacturing and analytical equipment – which forms the backbone of high-tech industries worldwide.

This position will be further expanded by deepening and broadening it to include new and emerging technologies, such as critical materials, metrology and mid/back-end processes. The focus is on continuous R&D and system innovation to produce equipment with higher precision, productivity and reliability.

An important step in this regard is the establishment of a national research institute for advanced materials and metrology. This institute will function as a national and international innovation hub, in which science and industry will collaborate on the development of the next generation of materials, measurement methods and manufacturing technologies. This will strengthen the interaction between materials development, metrology and equipment design, thereby accelerating the further development of advanced manufacturing and analytical equipment.

Supply chain as an essential foundation

The technological ambitions of the equipment sector are inextricably linked to the performance of the supply chain. To maintain its leading position, this chain must continually innovate to increase productivity, flexibility and quality. By fostering close collaboration between knowledge institutions, technology companies and suppliers, the Netherlands continues to set the standard for the design, development and manufacture of advanced equipment, which is crucial for global technological progress.

ii. Chip design

Strengthening the Netherlands' position in chip design is not only a technological necessity but also a strategic choice aimed at safeguarding our economic strength and autonomy in critical markets such as defence, energy, transport and mobility and healthcare. Advanced chip designs, resulting from a robust ecosystem, ensure more sustainable and resilient systems that bolster our national and European autonomy and security. In line with the NTS action agenda, focus on the Netherlands as a key player in the global chip design ecosystem, paying specific attention to the design of complex chips for high-mix applications.

iii. Advanced packaging

In line with the NTS action agenda for semiconductor technologies, the Netherlands is positioning itself as a European and global hub for developing and applying cutting-edge packaging techniques, such as 3D and heterogeneous integration, which are crucial for performance improvement and miniaturisation in markets that are strategically important to Europe (military, medical, industrial and automotive). Focus on establishing a Dutch manufacturing facility for photonic chips and a facility for quantum chips, incorporating a disruptive, cost-efficient and environmentally friendly packaging process based on an additive advanced-packaging chain.

iv. Manufacturing (high-mix)

The emphasis is on high-quality niche manufacturing of both equipment and advanced photonic and quantum chips that are difficult for other countries to copy, due to, for example, unique technological knowledge, complex system integration or the absence of economies of scale.

This type of manufacturing focuses on strategic applications that set the Netherlands apart and aligns with Europe's need for resilience and autonomy. Therefore, focus specifically on establishing a new Outsourced Semiconductor Assembly and Test (OSAT) facility, aimed at packaging small series of varying complexity and medium-sized series (up to an indicative 10 million units per year) of integrated components.

v. Integrated photonics

The Netherlands is strengthening its position in the emerging European and global value chain for integrated photonics by developing indispensable strengths at critical points in the chain, such as the production of photonic chips on indium phosphide (InP) and silicon nitride (SiN) platforms, including metrology and advanced packaging.[6]

A pilot line is currently being set up for SiN and for InP. The next step is to scale up to fully fledged fabs, including heterogeneous integration between different photonic platforms and with electronic chips.

Targeted investments are needed to strengthen and maintain our position in the global value chain. This is in line with the National Technology Strategy for integrated photonics.

b. Focus on promising new growth markets

The aim is for the Netherlands to become a leading player in the chip design ecosystem within five to ten years, with a specific focus on high-mix manufacturing. Investments in chip design will focus on three areas: 1) making chip design more sustainable, 2) organising chip design, analysis and manufacturing more efficiently, and 3) innovation and business development to create new markets in specific sectors. Dutch design expertise will be strengthened with an emphasis on system design, testing and co-design. Continued investment in high-value niches and technology crossovers is crucial. This includes specific product-market combinations (PMCs), such as AI, 6G, integrated photonics and quantum technology, which require robust design and systems engineering capabilities. It is in these PMCs that the Netherlands can strengthen EU autonomy, even without large-scale CMOS production. These major opportunities for the semiconductor market are also mentioned in the letter to parliament on industrial policy.

i. Design of AI-accelerating chips

Design energy-efficient, high-performance AI-accelerating chips.

ii. Manufacturing and design of 6G/communication chips

Make an active contribution to chip development for next-generation mobile communications.

iii. Manufacturing and design of heterogeneous chips (heterogeneous integration)

Further expand expertise in combining various chip types and technologies on a single module for optimal performance.

iv. Quantum chips for computing and communication

The Netherlands is strengthening its position in the emerging European and global value chain for quantum components by developing indispensable strengths at critical points in the chain, such as various types of quantum chips, such as superconducting chips and photonic chips, including testing, metrology and advanced packaging and integration.[7]

This requires in-depth research, in collaboration with the ecosystem, into the scalability of the entire value chain surrounding the manufacturing of quantum components, in line with the National Technology Strategy for quantum technology. This could establish the Netherlands as a global player in a potential new strategic pillar.

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6 For more information see the 'Venture development and capital' section.

7 For more information see the 'Venture development and capital' section.

v. **Manufacturing and design of chips for automotive applications and robotics**
Further expand Dutch expertise in chip design and manufacturing for the automotive and robotics sectors. This would also improve productivity, flexibility and quality in our supply chain.

International innovation

a. **Focus on effectively embedding semiconductors in EU innovation programmes**
European programmes could make additional resources available for the Dutch innovation ecosystem. They offer opportunities to form strategic partnerships within and outside Europe. One example is the IPCEI in Advanced Semiconductor Technologies (AST), which is financed from national funds and mobilises private funds. The IPCEI AST helps bring highly innovative European technologies to market. In order to participate in new European programmes, public and private funding must be made available. It is important to have structural access to sufficient funds for such programmes.

b. **Focus on strategic innovation partnerships**
Strengthen our position by entering into strategic innovation partnerships with other countries and with companies and knowledge institutions that have complementary expertise from which both parties will benefit. Here too, both public and private investment is needed (co-funding).
Deploy the ChipNL Competence Centre with PhotonDelta and Quantum Delta NL as implementing organisations for EU collaboration on innovation.

Innovation investment window: €500 million on a structural basis

In order to achieve the ambitions outlined above, **€250 million in public innovation funding** is required per year, with at least an equal contribution from the private sector, resulting in a total investment volume of at least **€500 million**.

This estimate is based on the funds needed to: 1) implement the NTS action agendas, 2) secure co-financing for programmes such as the Chips Act, future IPCEIs and Eureka, and 3) realise the necessary investments in R&D infrastructure for the development of new equipment and manufacturing technology.[8]

Securing these resources is crucial for developing Dutch R&D and for making optimal use of European funds. This is particularly important given the new funds that are expected to become available under the Chips Act 2.0, the Quantum Act, the European Competitiveness Fund (ECF) and future IPCEIs, as well as the expected European funds for R&D infrastructure.

These funds are in addition to the generic innovation instruments such as the Research and Development (Incentives) Act (WBSO) and the innovation box (tax relief for innovation) and the funds required for scaling up manufacturing facilities as mentioned in the 'Venture development and capital' section.

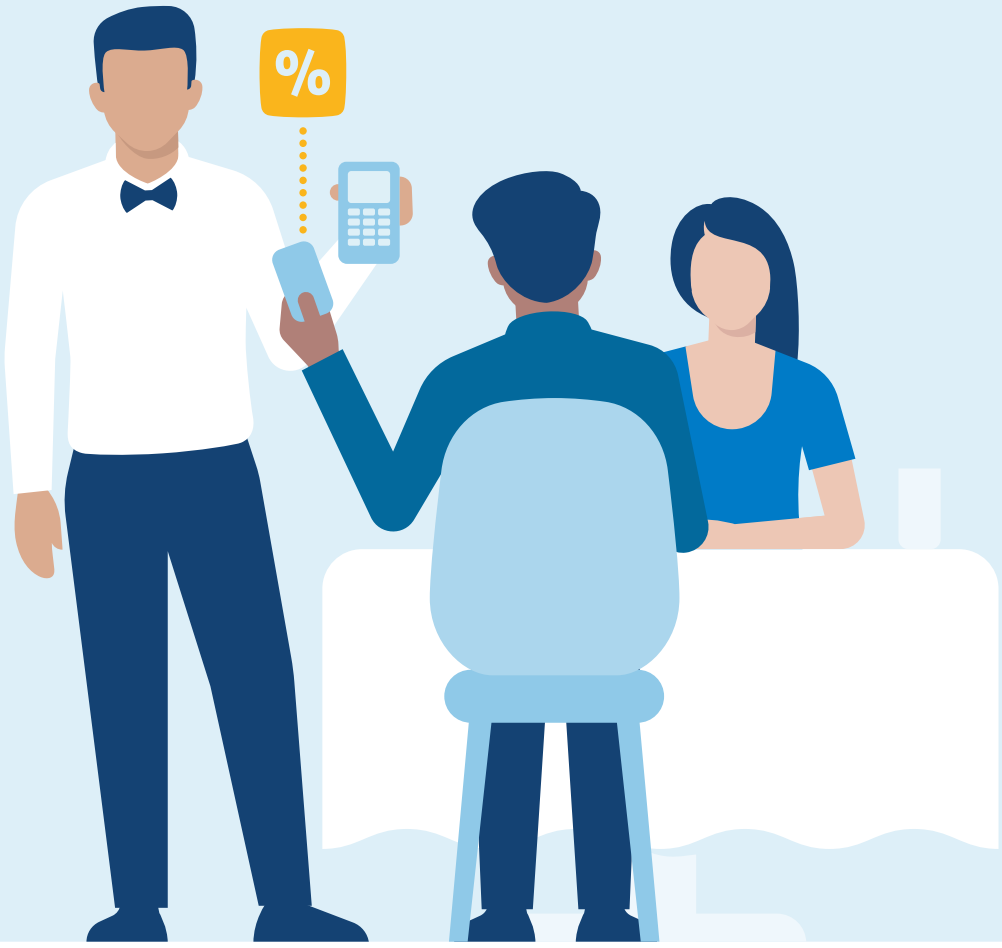
8 Technology infrastructure focused on product development for new equipment and manufacturing processes and technologies; this is not part of the shared service infrastructure for testing and validation as described in section 3 'Venture development and capital'.

Impact indicators

- **R&D intensity**
  R&D intensity, expressed in terms of number of projects and financial scope, is one of the most important impact indicators for innovation strength as it shows how much a company invests in the development of new technologies and products.

- **Productivity growth**
  Productivity growth in the supply chain that grows and develops in tandem with materials and equipment manufacturers, which are growing in a sustained manner in line with the doubling of the market.

3 Venture development and capital



Enhancing venture development and making sufficient capital available is essential for keeping the Dutch semiconductor sector future-proof, competitive and resilient. By investing strategically, strengthening coordination and encouraging public-private partnerships, we can further expand our unique position in deep tech and help boost Europe's technological resilience.

Call to action

Semiconductor and deep tech startups often have long development processes and require major investments, sometimes amounting to tens or even hundreds of millions of euros over a five- to ten-year period, or more. All the while, other countries are investing billions in technology and manufacturing. Recent data shows that the Dutch scale-ups receive far less money than US or Asian companies, 2.6 to 3.7 times less in the case of major investment rounds. We also see that there is a shortage of major tickets of working capital, leading to a lack of resilience. As a result, financiers from outside Europe may attempt to move R&D and/or manufacturing to countries outside Europe. At the very least, the situation calls for a level playing field with regard to other countries and deep enough pockets so that Dutch companies are willing and able to remain in the Netherlands and continue to grow.

The capital working group has conducted a substantive analysis of the investment windows in this section. Together, the financiers in this group represent approximately 90% of the Netherlands' portfolio for upscaling semiconductor companies. This means that they possess the insights needed for this analysis.

Current situation

In order for this sector to grow, it is necessary to continue building on existing structures, such as Invest-NL and the Deep Tech Fund. The latter of these focuses on startups and scale-ups throughout the value chain, from chip design to manufacturing and applications, providing seed and growth capital as well as working capital. Public investments in this area are always coupled with private co-financing.

Regional development agencies (ROMs) and the financing instruments of the Ministry of Economic Affairs play a central role at this early stage. We therefore must ensure that instruments such as early-stage financing, innovation credit, the SEED Capital Scheme, and ROM capital and activities are well aligned and remain well capitalised. This way, we can continue to support new enterprises in every sector.

Goals

Ensure that the Dutch semiconductor industry has better access to capital in order to grow. Aim to increase the availability of capital and the creation of the proper venture development infrastructure.

a. Increase the availability of capital

i. Strengthen Invest-NL

We see Invest-NL as a key player in supporting innovative companies in their growth phase. It is vital for the semiconductor industry to enhance scale-up financing, and thus Invest-NL, as the main generic investment instrument for this sector. This requires additional financial resources and specific expertise, so we can better respond to the needs of capital-intensive deep tech companies with long development processes.

Make it possible to introduce larger and longer-lasting investment rounds, in keeping with the scale and investment speed of the companies concerned. At the same time, develop innovative financial instruments that can also provide working capital, limit risks and attract private investors with substantial tickets.

Ensure that Invest-NL works closely with venture builders, international partners, and the various ROMs, PhotonDelta and Quantum Delta NL, so we can strengthen the entire chain, from the early stages to upscaling. By positioning Invest-NL as a possible principal investor, you send a strong signal to the market: where necessary, public capital will take the lead, thus opening the door to private co-investments.

The strategic role of semiconductors in the defence and security sector also requires closer cooperation between the defence organisation and investors. In terms of knowledge and technology, the defence organisation has five priority areas – smart materials, intelligent systems, sensors, quantum technology and outer space – for which chips and rapid processing power are key elements. By enhancing cooperation between the defence organisation and Invest-NL, we can boost the Netherlands' resilience and seize technological opportunities, so the armed forces continue to have superior technology at their disposal.

Invest-NL already has an excellent instrument for this purpose, the Deep Tech Fund. The fund invests in knowledge-intensive startups and scale-ups in sectors such as photonics, quantum technology, nano technology and high tech in order to strengthen the Netherlands' technological knowledge and international competitiveness. Together with private venture capital funds, the Deep Tech Fonds is a major driving force behind growth and innovation in the Dutch semiconductor sector.

Investment window to strengthen Invest-NL: €4 billion*

An investment window of €4 billion in public capital between now and 2035, focused on semiconductors, AI, photonics and quantum deep tech ventures. Assuming a leverage effect on private investments, this can lead to:

- €16 billion in total investment capital, including private contributions.
- Long-term financing for startups and scale-ups over the next 10 years.
- Growth of scale-ups into unicorns and IPOs.
- A strong position for the Netherlands in the European and global ecosystem.

This demands a coherent governance structure and cooperation with private investors, multinationals and international partners.

** €1.8 billion in venture capital is needed to scale up existing startups, plus €1.2 billion in working capital and €1 billion for national security (including the Economic Security Protection Instrument).*

ii. Focusing on blended finance

Combine public funds with private capital intelligently in order to mobilise as much money as possible. This can be done by improving the way that existing instruments work together and by setting up a new blended finance instrument.

There are already subsidies, guarantees, loans and other resources for innovative semiconductor firms through the EU, RVO, ROMs and Invest-NL. Ensure that these instruments are well aligned, so that companies can receive continuous financing during their growth period.

The merging of Invest-NL and Invest International also contributes to this goal. This makes it possible to achieve better linkages between public funds and helps entrepreneurs find funding more easily.

The new blended finance instrument intelligently employs concessional public capital in order to attract private investments. This mainly applies to funding between €10 million and €100 million, where there is now a shortfall due to market failure.

With the integration of Invest-NL and Invest International, a foundation is being laid for a single national investment institution, thus supporting synergies between various financing instruments focused on setting up and fostering the growth of companies. This helps entrepreneurs efficiently acquire public and private financing for their business or project.

The planned blended finance instrument under Invest-NL of €250 million is a major step forward. Soft funding products are only available in limited quantities for growing innovative companies, but they can play a crucial role in raising additional private investment and successfully upscaling a business or project.

iii. Capital for manufacturing photonic chips in the Netherlands

Invest in advanced integration technologies and encourage cooperation between industry, knowledge institutions and the government. Photonic chips are essential for applications such as super-fast data communication, sensing, medical technology and defence technology. By investing, the Netherlands can position itself as a world leader in photonics, which not only stimulates technological progress, but also promotes economic growth. This is designed to lead to a national manufacturing facility for photonic integrated circuits (PICs) which will go into operation in 2032.

Investment window for a PIC manufacturing facility: €1 billion

The global market for PICs is growing rapidly, driven by applications in data communication, telecommunications, the automotive sector, healthcare and defence. In order to claim a strategic position in this market, the Netherlands needs to invest in its own manufacturing facility and build up its technological autonomy.

The Netherlands is home to a unique ecosystem, which rests on two pillars:

- **Indium phosphide (InP)** is crucial for active components such as lasers and modulators, especially for datacom (data centres), telecommunications (including 6G networks) and radar and detection systems;
- **Silicon nitride (SiN)** is rapidly emerging for use in precision applications such as LiDAR, sensor technology and medical sensing.

Through its partnership with imec, the Netherlands also has access to Silicon Photonics (SiPh), which is the most commonly used platform in photonics. With the help of strategic investments in manufacturing capacity and advanced packaging, such as PIXEurope (the Netherlands), Europe can reduce its dependence on Asia and the US. The Netherlands is ideally suited to take the lead in this regard, thanks to the unique combination of high-value knowledge, existing infrastructure and strong cooperation between companies, knowledge institutions and the government.

A public investment of €1 billion in a national PIC manufacturing facility is necessary for converting this technological lead into economic earning capacity and European strategic resilience.
This public investment forms a one-off foundation for the upscaling; from that point on, the market can pick up the baton and invest on its own in further growth and utilisation of the infrastructure.

b. Create the right venture development infrastructure

i. Shared service facilities to test new innovations

It is mainly SMEs (82% of the sector) that need pre-competitive foundries where they can test new tools in factory-like setting. Work with the ROMs, PhotonDelta and Quantum Delta NL to explore opportunities for:

- Building a national network of shared facilities with high-tech services, accessible to startups and scale-ups.
- Centralising and coordinating these services, thereby reducing red tape and expediting access.
- Encouraging cooperation between research institutions, companies and the government for sustainable operations.

This approach enhances our technological capabilities and accelerates the development of new products and applications. In this way the Netherlands can consolidate its position as a frontrunner in innovation.

Investment window for a shared service infrastructure: €1.15 billion

The chip industry is developing rapidly, with the reshoring of manufacturing, packaging and testing to Europe and the US leading to robust demand for shared service facilities. This creates opportunities for the Dutch semiconductor sector to accelerate groundbreaking technologies, provided there is sufficient infrastructure for packaging activities and cost-efficient validation of the equipment that has been developed.

In the decade ahead, this will require a major expansion of the shared services infrastructure. On the one hand this is needed to develop and optimise equipment and on the other, to develop and manufacture advanced packaging technologies, so we can scale up and maintain our competitive advantage. In order to be prepared for this, there is a need for the following:

- Strategically positioned shared service facilities for equipment validation and testing that serve both SMEs and larger players (€800 million):
  - Nijmegen: silicon facilities
  - Eindhoven: silicon nitride and indium phosphide facilities
  - Enschede: silicon nitride facilities
- Advanced packaging pilot line at TNO's Chip Integration Technology Centre (CITC) in Nijmegen (€150 million): With the increasing complexity of chips and integration of various technologies, advanced packaging is essential for remaining competitive. This pilot line makes new packaging methods accessible to the private sector.
- Exploring the acquisition of the NXP pilot line: Keeping this pilot line in Nijmegen prevents the loss of relevant infrastructure and facilitates the manufacturing of small series, essential for rapid market introductions and flexibility in production.
- A national research institute for advanced materials and metrology (€200 million public and €250 million private).

The necessary public investment for the shared service infrastructure amounts to €1.15 billion. It is expected that a substantial amount of private financing will also be set aside for the facility. The eventual size of this contribution, as well as that of the public investments, will emerge from business cases and a programme of implementation that will have to be drawn up on the basis of this sector vision.

ii. Quantum Industry Cluster

The Quantum Industry Cluster in Delft focuses on the development of quantum computers and a quantum internet, with systems that require millions of integrated qubits. Building a European quantum supply chain, supported by the European Chips Act and the upcoming European Quantum Act, is essential. The Delft ecosystem of quantum hardware and component companies is taking major steps in this direction, which makes the cluster attractive to new companies and partners. Invest in this ecosystem to enable the Netherlands to capture strategic positions in the global quantum value chain.

Investment window for quantum facilities: €500 million

The quantum cluster integrates expertise in the realm of semiconductors, photonics and advanced technologies, which makes the development of scalable, fault-tolerant quantum systems possible. The quantum processor foundry in Delft plays a key role in scaling up chip production and achieving the necessary integration of quantum computing and communication. The ecosystem works with leading national and international partners. The successors to the Dutch quantum pilot lines Spins (Spin-based qubits), Supreme (superconducting qubits), Photonics4Quantum (quantum photonic chips and devices) are also part of this investment window.

The necessary public investment for quantum facilities amounts to a total of €500 million. It is expected that private financing will also be set aside for the facilities. The eventual size of this contribution, as well as that of the public investments, will emerge from the implementation programme that will have to be drawn up on the basis of this vision document.

iii. Actively scouting promising initiatives

The Deeptech Pre-Seed Incubator (DSI) makes it possible to accelerate innovation in semiconductors, photonics, quantum and advanced packaging. When it comes to knowledge, the Netherlands has a strong position, but there is often a gap with the world market. The DSI bridges this gap.

It deploys national technology scouts who will proactively identify opportunities and make connections between the international market, our semiconductor industry and knowledge institutions. Together with students and professors and under the leadership of industry experts they are collaborating in working groups on innovative ideas that will grow into proofs of concept (POCs). Fundamental research plays a key role in this connection because of its explicit focus on breakthrough technologies that form a basis for next-generation innovation.

The DSI assists scale-ups in commercialisation: many innovations arise from technology, but making a commercially viable product is difficult. Technical support can be provided through an advisory hub, staffed by experienced captains of industry and CTOs. If a concept proves to be technically and economically feasible, encourage the creation of startups by using the existing ecosystem or issue licences to the major Dutch industrial players.

These efforts involve close cooperation with public and private financiers and the Ministry of Economic Affairs. In this way we can build a powerful national instrument that stimulates deep-tech innovations from a joint agenda and accelerates revenue in economic and strategic value for the Netherlands.

Investment window for DSI (long-term): €10 million annually

With a targeted focus on chip design, advanced packaging, heterogeneous integration, photonics and quantum, the DSI is positioning the Netherlands as a high-value niche player within the global high-tech value chain. Close cooperation and targeted investment will give rise to a centralised innovation ecosystem that makes the Netherlands' semiconductor industry future-proof and strengthen its position worldwide. This will help expand technological capabilities and accelerate product development.

c. Enhance strategic competitiveness

Support negotiations in Europe on the startup and scale-up strategy, for modifying the definition of businesses in difficulty. Flexible rules can help entrepreneurs access capital sooner. This will help prevent the loss of valuable companies and technologies and strengthen economic stability.

In addition it is important that companies do not pay any tax on the purchase of their own shares because this enables them to restructure their capital more efficiently. By refraining from introducing this tax, the government allows companies to continue making strategic use of their reserve capital in order to promote investments, support growth opportunities and stabilise market capitalisation. This strengthens companies' strategic competitiveness, increases investor trust and contributes to a dynamic and healthy economy.

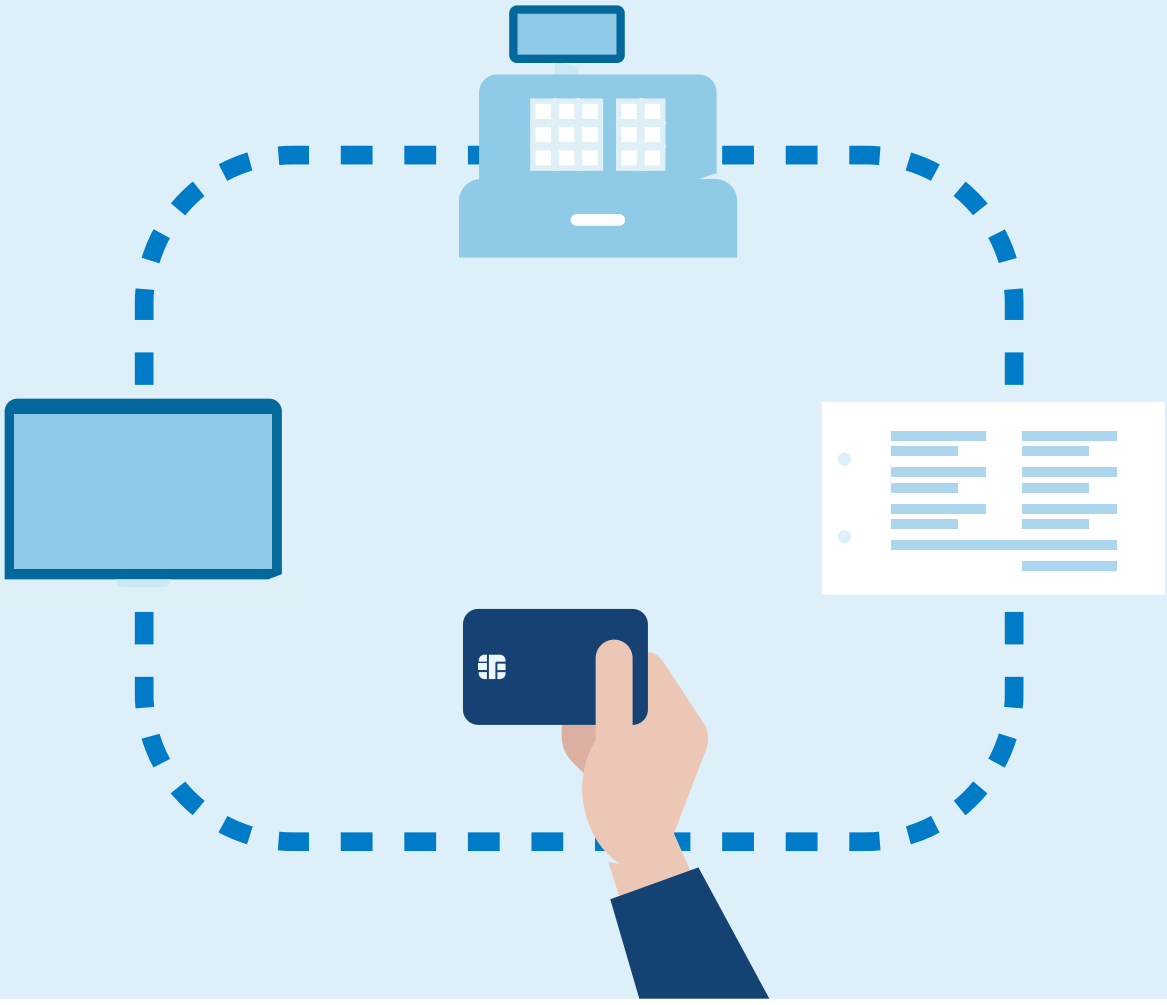
It is also important to maintain a focus on a strong supply chain for SMEs. These SMEs thrive thanks to the success of the bigger players in the sector. Their ability to supply these parties shows their technological skills for precision manufacturing and advanced research and attracts additional commercial activities. Every euro in revenue from the semiconductor industry generates over 2 euros in other sectors, creating an enormous spillover effect. It is not always easy to obtain financing for business succession and upscaling for these SME suppliers. There is consequently a potential pressure on the retention of know-how in the supply chain. The financing of this group of SMEs also requires attention.

Impact indicators

There are three powerful impact indicators that are essential for monitoring and steering these investments:

- **The number of semiconductor scale-ups financed in rounds/tickets of €100 million or more**, in comparison to North America and Asia.
- **Total number of investments and the total invested capital volume** (public and private) and the degree of leverage – to monitor financial strength and market confidence.
- **Technological and societal impact** – such as the number of patents, new manufacturing technologies and the contribution to European technological autonomy and security.

4 Economic resilience



Semiconductors are strategic resources that influence national security and geopolitical power, and they are thus an aspect of our economic resilience. They include key components of military applications. A strong position in the semiconductor ecosystem can therefore be a source of geopolitical leverage.

Call to action

The Netherlands has a leading position in the global semiconductor chain. This position gives the Netherlands access to other crucial goods and services. Knowledge leaks, the deployment of strategic dependencies as a weapon or the disruption of critical processes will have a negative influence on the Netherlands' earning capacity and its economic and national security.

Current situation

The world is increasingly characterised by geopolitical tensions, strategic dependencies and emerging mercantilism. For example, export restrictions and tariffs are increasingly obstructing trade flows and market access; the playing field is less and less level because governments are increasingly intervening in the market (motivated, among other things, by national security considerations); local manufacturing standards are being introduced and we are witnessing more intellectual property theft and the leaking of knowledge and technology.

During the COVID-19 pandemic we were confronted for the first time with a shortage of certain essential goods, which put security of supply at the top of the agenda. As the case surrounding Nexperia makes clear, the Netherlands and Europe lack adequate safeguards to protect the security of supply for microchips. In order to remain resilient, security of supply is essential.

Although there is political and societal urgency for a more active industrial policy in this sector, we see that the combination of international fragmentation, an insufficiently competitive investment climate, the largesse of foreign governments and targeted acquisition by foreign, state-affiliated actors are putting pressure on Dutch and European manufacturing capacity and innovation.

Goals

a. Prevent unwanted transfer of knowledge and technology

We are increasingly confronted with the targeted acquisition of semiconductor companies based in the Netherlands by other states. The Security Assessment (Investments, Mergers and Acquisitions) Act addresses this challenge, in so far as there is a direct risk to national security in the case of investments, mergers and acquisitions. In extreme cases the Economic Security Protection Instrument (BEV) offers the option of immediately acquiring a stake in companies of strategic importance if there is a risk to national security.

However, we also need to be concerned about other illicit ways of acquiring valuable knowledge, technology and intellectual property, such as cyberattacks or industrial espionage.

In order to offset these risks, the Netherlands must ensure that security measures in areas such as cybersecurity, information security and HR policy are a standard part of operational management in the semiconductor sector. After all, a focus on security is a logical consequence of commercial success and a way for companies to protect what makes them strong. The government supports this through certain tools and the provision of information (via, among other things, the Economic Security Desk for Entrepreneurs and the Make Your Business Resilient (maakjebedrijfweerbaar.nl) campaign).

Focus on creating a strong and rapidly deployable strategic fund in order to combat the targeted acquisition of strategic assets in the value chain. The particulars of this instrument are fleshed out in greater detail in the section ‘Venture development and capital’.

b. Raise awareness of and insight into security risks

Resilience starts with an awareness of the possible risks. For that reason, foster a wide-ranging dialogue on the relevant developments and risks in order to raise awareness.

Monitoring risks is also vital. For this reason the Netherlands must dedicate itself to acquiring structural insight into global value chains, for example through the Netherlands Materials Observatory. Where necessary, we should explore the possibility of accumulating strategic stocks of critical raw materials or components, in both a Dutch and European context, in order to cope with disruptions.

c. Fight unfair competition on the European market

A level playing field, both within the European internal market and beyond, is essential for European companies with respect to third countries, in terms of both earning capacity and resilience. Focus on strengthening this level international playing field.

Be alert to dumping practices and the violation of intellectual property law by other countries. The Netherlands and the EU need to take appropriate action against this, for example through the WTO or by deploying defensive trade measures. Companies and other entities with intellectual property rights that suspect that these rights are being violated can ask the Customs Administration to take action by submitting a form to that effect (in the Netherlands or elsewhere in the EU).

In addition, endeavour to achieve the most equal possible approach to FDI screening within the EU in order to ensure a level playing field in the realm of foreign investment as well. This is already the subject of EU negotiations in connection with the FDI Screening Regulation.

d. Counteract disruptions to international value chains and cultivate a favourable business climate

Amid increasing geopolitical unrest, there is also a growing risk of disruptions to international value chains. In order to keep product development opportunities and essential production capacity in the Netherlands and thus safeguard the security of supply for critical knowledge and goods, it is necessary to foster a favourable climate for business and investment. Instruments developed to this end are discussed in greater detail in the other sections. Nevertheless, disruptions can still occur. Seek therefore to develop a set of instruments and measures that can cushion such disruptions.

For example, we will be exploring the options for setting up a public-private roadmap, in order to align the strategy for the five technologies of the Ministry of Defence with the vision for the semiconductor sector. Such a roadmap sheds light on multi-annual technological developments within the five technology domains of the Ministry of Defence, and it also offers the sector more certainty and insights as to where possible opportunities might present themselves.

Press for the introduction of the Defence and Security Industry Resilience Act, to make market regulation and the accumulation of strategic stocks possible, among other things. Maintaining strategic stocks of critical raw materials or important components helps buy time in the event of disruptions to international value chains, creating a buffer before problems start cropping up in manufacturing processes.

In addition it is important that the aforementioned strategic fund for resilience assets can be used to acquire and scale up strategic assets rapidly and flexibly, both proactively and reactively. That way, in the event of a disruption to international value chains, it will be possible to swiftly deal with the absence of any key components.

e. Keep up the dialogue on export control

Export control policy is implemented within the framework of the European Dual-Use Regulation and the partnership established by the Wassenaar Arrangement. National security considerations are paramount in this regard, and the government makes a careful assessment that takes account of both the effectiveness and economic impact of the measures. Export controls can also help maintain technological leadership and prevent unwanted strategic dependencies.

International

a. Strengthen and diversify international value chains

Resilience requires close cooperation with our European partners. The Netherlands is too small to provide all the key components of the semiconductor ecosystem. For this reason we have to work with our partners in Europe, through the European Semicon Board and the Chips Act 2.0. Moreover, 27 EU member states have more effectiveness than the Netherlands alone. Through this partnership we can collectively enhance the ecosystem and undertake joint efforts to attract foreign companies to strengthen the supply chain here. Various European countries have their own specialisations and vulnerabilities within the semiconductor chain. With that in mind, make optimal use of the comparative advantages and thus collectively counterbalance the vulnerabilities.

Look beyond the borders of Europe in order to strengthen and diversify the international value chains. This can be done in a variety of ways, including by expanding the Semicon Coalition initiative (a Semicon Coalition+) in order to maximise efforts to achieve open market access and resilient marketing chains.

In addition to multilateral initiatives, it is also important to engage in bilateral dialogue with like-minded and less like-minded countries, given that the semiconductor value chain is so internationally dispersed that it is practically impossible to work around certain countries. So it remains important to stay in contact with them in an appropriate way in order to address issues that affect resilience.

b. Increase demand for chips in the EU

In order to reduce risky strategic dependencies, a certain proportion of the European demand for semiconductor products will have to be addressed through local production in Europe. The challenge in this regard is, however, that the European market's demand for chips is relatively limited, especially when compared to Asian markets, for example. Because the European market is currently too small, manufacturing within Europe leads to cost increases.

Given that investment in manufacturing capacity for semiconductors follows market demand, Europe must stimulate demand for 'Made in the EU' within strategic end markets such as automotive, AI, edge and cloud, and defence, in order to attract manufacturing capacity. The Dutch government can act as a leading customer or launching partner in this, either on its own or in collaboration with European governments and partners. This creates a stronger business case for manufacturing on the European continent, and makes it possible to attract more manufacturing capacity. There is, for example, a broader industrial base to fall back on when international value chains are disrupted. The EU Chips Act 2.0 can make a contribution to this demand created with regard to the necessary capabilities and capacities. The DARPA model also serves as an example of how demand creation can be stimulated by the government. To this end the Netherlands is currently exploring the possibility of establishing a National Agency for Disruptive Innovation (NADI).

Also work to enhance the effectiveness of Pillar 3 of the EU Chips Act 2.0, with a view to boosting resilience.

In addition it is important for the EU to do its utmost to achieve and maintain equal access to international markets. This is essential in order to ensure a large enough market for Dutch companies. This also means that the Netherlands and the EU will have to keep pace effectively with international developments and adapt accordingly.

Impact indicators

- **Knowledge security**
  The number of cybersecurity/insider incidents gives a sense of the frequency with which knowledge is stolen and the level of our resilience.

- **Intellectual property**
  The changes to the Netherlands' intellectual property portfolio, as expressed in patents held by the Dutch semiconductor sector (possibly with a distinction between direct semiconductor and indirect semiconductor), gives an indication of the extent to which companies are taking their own measures to protect their intellectual property.

- **Acquisition activities**
  The use of the available instruments to combat targeted acquisitions by other states, for example via the annual reports published by the Investment Assessment Office (BTI), gives a sense of the general effectiveness of the Netherlands' instruments.

5 Talent

A sufficient amount of talent – from practical professionals to theoretically trained specialists – is crucial for the growth of the semiconductor sector. This sector is among the most high-tech and knowledge-intensive in the world and therefore requires an ongoing influx of well-trained technical professionals of the highest level.

Call to action

Both the Netherlands and the European Union more broadly are facing a structural shortage of technical professionals. In the next few years alone – between now and 2030 – there is expected to be a need for approximately 38,000 extra technical professionals in the Netherlands, around 26,000 in the Brainport region. The replacement demand within the industry has not been factored into these figures, nor has the greater demand for talent that arises from additional investments in startups, scale-ups and facilities. The growing shortage of technical staff appears to be here to stay, due in part to the demographic ageing of the labour force. By 2030 there is expected to be a shortage of over one million people in the high-tech sector.

Current situation

The Netherlands has leading technical programmes at various academic levels: secondary vocational education (MBO), higher professional education (HBO) and university (WO). Delft University of Technology, Eindhoven University of Technology and the University of Twente, in particular, are world-renowned institutions. The current intake and graduation rates for technical talent within educational institutions, especially at secondary vocational and higher professional level, are not large enough to meet growing demand. It is therefore necessary not only to increase intake and graduation rates but also to attract more international talent. Domestically, an intake-related issue requiring urgent attention is secondary education. The decline in the number of students and the quality of STEM education requires our attention.

Goals

a. Focus on meeting the demand for talent between now and 2035

i. Increase intake figures for technical courses

The national plan for developing microchip talent was created to boost intake in technical fields, including for students looking to retrain or 'upskill'. The activities are taking place in the following regions: the Brainport (also in collaboration with Arnhem-Nijmegen), Twente, South Holland and the North. With respect to incoming students, both Dutch and international, there is an additional focus on under-represented groups (including women). These efforts are intended to lead to approximately 25,000 additional trained technical professionals for the semiconductor industry by 2031.

The talent development plan also aims to attract international talent and increase worker productivity. More specifically, these efforts include modifying and expanding curricula (such as developing specific tracks for semiconductors and joint modules for both institutions of higher professional education and universities (HBO/WO)), the recruitment of both Dutch and international students, the creation of more traineeships, the further development of facilities (modernising sites and raising worker productivity), increasing the rate of graduates who remain in the country, and the retraining and 'upskilling' of jobseekers, untapped talent and highly skilled migrants. Another key issue is ensuring sufficient accommodation for talent, but this is not part of the talent development plan. For more on this, please see section 6 on preconditions.

The plan seeks to attract more international students, particularly at university level (Master's level) and higher professional education level. We are currently concentrating on a number of focus countries, but given the high demand, it will probably be necessary to broaden our perspective to include other countries and thereby attract additional students. In order to meet this need for growth in the short term, highly skilled migrants are essential for the semiconductor industry.

In addition the Techkwadraat programme focuses on stimulating interest in technology among primary and secondary school pupils. Current activities reach around 70% of pupils in primary and secondary education. The ultimate aim is to raise this figure to 100%, introducing all pupils to technological fields.

The demand for talent in the post-2031 period is difficult to predict, but we know that the sector will grow. For the period between 2030 and 2035, the regions expect to train approximately 15,000 additional technology students.

The national talent development plan provides for €450 million in central government funds between now and 2031. A total of €310 million in co-financing is being provided by the four regions. An amount of €145.8 million has been allocated for Techkwadraat, plus a conditional €205.8. With these investments, over €1 billion is being spent on additional training for technical talent, from primary school to university between 2025 and 2031. From 2031 onwards, €80 million per year has been structurally reserved for this purpose.

Working with industry representatives, the government will consider what the specific demand for talent is after 2031. On the basis of this demand for talent and evaluation, it will become clear which additional structural investments are needed in order to build a lasting high-quality training structure for technology.

ii. No cuts to the education budget

The sector demands a stable government policy that is committed to and invests in education and knowledge development.

b. Attract additional exceptional international talent

It is not possible to resolve the talent issue with national talent alone. Between now and 2030 it is anticipated that at least 38,000 additional technical professionals will be needed, whereas the previous target only projected a need for an additional 25,000. Furthermore, it obviously takes time to move through the educational system, and it will thus take several years before the first graduates start entering the job market. It is therefore essential to attract international highly skilled migrants in order to meet the demand for talent in the short term as well.

For that reason, it is necessary to maintain the highly skilled migrant scheme.

It is also important to retain and, where possible, improve, the flat-rate tax allowance for expats in order to remain sufficiently attractive and internationally competitive. These schemes are vital for both large and small companies in the semiconductor industry. In the international battle to attract top talent, it is essential to maintain and not to further tighten the current schemes. Tightening them further would have a counterproductive effect and would only increase the shortage of technical talent.

With respect to international students it is important to make the prospect of moving to and living in the Netherlands as attractive as possible, for example with the help of targeted programmes in the areas of housing, language instruction and career development.

c. Foster talent circulation

Focus on initiatives that aim to circulate talent (secondments from corporates to scale-ups, fast-track programmes for senior international experts) to expedite the transfer of knowledge and maximise the direct impact.

International

a. Ensure that the amended Chip Act devotes enough attention to the subject of talent

The countries of Europe need to work together to ensure a strong semiconductor industry, not only for the European economy, but also for European security. The subject of talent must therefore be addressed in the Chips Act 2.0. We do, however, need to prevent a battle for talent from arising within Europe. The Netherlands needs to show what it has to offer when it comes to the semiconductor industry. An attractive business and investment climate also plays a role in the choice of international talent to come to the Netherlands and settle here.

Impact indicators

- **Demand for talent in the semiconductor sector**
  This will be monitored by the ChipNL Competence Centre. This demand will grow in time but it will also fluctuate, due to economic and geopolitical factors, for example.
- **Enrolment rates for relevant technical courses**
  At secondary vocational schools (MBO), higher professional education institutions (HBO) and universities.
- **Number of participants in life-long learning**
  Divided by retraining and upskilling.
- **Outflow to the semiconductor sector**
  In number of people who end up going to work for the semiconductor industry.
- **Number of highly skilled migrants**
  Number of highly skilled migrants working in the semiconductor sector

6 Prerequisites

Investment decisions in the semiconductor industry are determined not only by technological or market-related factors; they are also strongly influenced by the overall climate in which businesses operate. This includes tax regulations, energy costs, swift access to the necessary infrastructure, and predictable and stable government policy. Given the enormous capital investments, long payback period and lack of a level global playing field, creating optimal conditions for the Netherlands is not a luxury but a strategic necessity.

Call to action

In an internationalised sector like the semiconductor industry, with companies that operate on a global scale, it is particularly important for the Netherlands to maintain good investment conditions, along with a solid foundation for innovation. Project Beethoven has made a start on this, but more will be needed over the long term. Central government, regional authorities, the private sector and other relevant stakeholders will have to join forces in order to ensure stable policy, on the one hand, and create the necessary preconditions, on the other, (and where necessary, deliver customised solutions) so as to make new investments possible. After all, the right preconditions are essential for facilitating the continued growth of the sector.

Current situation

Although the Netherlands has had a long-standing reputation as a country with an excellent business and investment climate, there has been growing criticism in recent years. The business community often perceives political decisions as harmful and arbitrary, and companies are not asked for their input, or if they are, the request comes too late. This creates uncertainty for business, which leads to the postponement or cancellation of new investments.

Moreover, the Netherlands is dealing with various types of economic scarcity. In addition to the aforementioned workforce shortages, there are also restrictions to and pressure on our power-grid capacity, the scope allowed for activities that cause nitrogen pollution and other environmental standards, housing and infrastructure networks. More and more often, these restrictions mean that companies have to wait longer before they can make investments, or indeed that they have to refrain from them entirely.

Finally the Netherlands must be aware of the international competition. Countries around the world compete with one another in an attempt to attract the semiconductor industry. In doing so, the Netherlands cannot fall too far behind the international competition.

Goals

a. Ensure stable and predictable government policy

The semiconductor industry is characterised by long-term, capital-intensive investments in R&D and manufacturing capacity. This is why investment certainty is crucial. A predictable and consistent government policy increases trust and enables companies to commit themselves to the further enlargement of the Dutch ecosystem. The aim is for policy changes to be prompt, transparent and in line with European agreements, so that companies know what to expect over the long term. The structural dialogue in the Semicon Board NL also contributes to the timely coordination between the sector and the government.

b. Prioritise the semiconductor industry when bottlenecks arise (in areas such as housing, accessibility, the power supply and scope within environmental limits for activities that cause nitrogen pollution)

The Netherlands is struggling with bottlenecks in the areas of housing, accessibility, the power grid and restrictions on activities that cause nitrogen pollution. These are complex challenges that currently demand a great deal of time to resolve. It is crucial to prevent these obstacles from impeding the growth of businesses, undermining our resilience or stifling our economic growth. However, the further growth of the semiconductor industry is of such strategic importance for the Netherlands' resilience, earning capacity and prosperity that these bottlenecks must not be allowed to form an obstacle.

Rapid licensing is crucial for this sector. It is therefore important that the government is capable of acting quickly and flexibly, with an emphasis on weighing the interests involved in licensing procedures and investments when a national strategic interest is at play, as is the case for the semiconductor industry. In order to address these preconditions, the Semicon Board NL must play a steering role in relation to the administrative consultative bodies, such as the BOL (for the physical environment), BO-MIRT (for infrastructure, transport and the environment) and (p)MIEK (for infrastructure, energy and climate).

c. Continue working to maintain an internationally competitive investment and business climate

In the global competition surrounding semiconductor investments, financial prerequisites play a key role. In order to retain businesses and attract new ones, countries use substantial packages comprising grants, tax incentives, investment deductions and targeted energy and capital rebates. Although investment decisions depend on more conditions than just financial ones, the cost element does play a key role and the Netherlands needs to offer a competitive alternative.

The Netherlands already has a number of successful tax schemes, such as the Research and Development (Incentives) Act (WBSO), the innovation box (tax relief for innovation) and the flat-rate tax allowance for expats, which are all regarded as effective and efficient. The business community also appreciates schemes such as the purchasing facility that allows company to buy back their own shares. Build on this set of instruments and offer new tools in the future, such as tax schemes, that encourage companies to invest. These instruments are meant to appeal to a wide variety of parties: major companies, multinationals, startups and scale-ups and SMEs. This requires a customised approach for divergent cost structures and capital needs. For example, the threshold for investments in R&D, manufacturing capacity and upscaling is being lowered and the Netherlands can position itself over the long term as an attractive country to establish a business in.

Impact indicators

- **Private sector confidence in the Netherlands' business and investment climate**

  Confidence in the business and investment climate is crucial for the private sector because of the influence it has on investments, innovation, market development, policy stability, competitive advantage, reputation and long-term planning. A stable and favourable business and investment climate offers companies the certainty they need to grow, innovate and operate successfully.

Publication details

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ASML
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SMART Photonics
Nearfield Instruments
Axelera AI
Holland High Tech
High Tech NL

Working group for Innovation

Ministry of Economic Affairs
TKI HTSM
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Quantum Delta NL
Demcon
Thermo Fisher
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Working group for Venture Development and Capital

Ministry of Economic Affairs
Ministry of Defence
Invest-NL
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Innovation Industries
PhotonVentures
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