



# A fully possible Finland

A vision of a country that played all its cards right

beyond the obvious

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# A productive, growing and sustainable Finland is fully possible

**The Finnish economy is already showing signs of the next upward turn. The time has come to play all our trump cards right. By investing in Finland's technological strengths, we can grow into a globally significant developer of sustainable solutions with a competitive economy.**



Good news: an exceptionally productive, growing and sustainable Finland is fully possible. At best, this could be reality within a decade. The Finnish economy is already showing signs of picking up in our areas of exponential hope with focus on developing new technologies. We are already holding all the trump cards needed for generating growth, renewal and prosperity.

So, let's ditch diminished trust in the future and replace it with an inspiring vision of Finland with all the trump cards we need in our hands. We could become one of the world's most competitive economies. That is what we are aiming at with this debate opener.

We are not naive. We know that major positive turns do not happen by themselves. But they are totally possible and, therefore, worth striving for. Our vision is that in 10 years' time:

## 1. Finland is a country with upstream industries and one of the highest productivity rates in the Nordics.

We Finns are a highly educated people with world-class technological competence. So, it is not profitable for us to export raw materials and let others turn them into valuable products. RDI investments and favourable regulation allow us to develop and commercialise unique technological solutions and scale them up to global markets. If we succeed in generating more innovations, nothing will prevent us from catching up with our Nordic neighbours in productivity.

## 2. We produce the best technological solutions to the biggest challenges of our time: climate catastrophe, digitalisation, resilience, and safety and security.

We develop innovations the world most desperately needs. Over the next few decades, societies around the world will face the challenges of sustainability crisis, demographic change and geopolitics. Finland has competence to solve these challenges in various technology sectors, including biomaterials, clean energy and quantum technology.

Finland will become a “pilot environment for sustainable living”, cranking out best technological solutions one after another. We will create sustainable innovations at a world-leading rate and scale up our solutions to generate business and jobs in Finland.

## 3. The rate at which Finland generates globally scalable technology startups is unparalleled in the world.

Startups developing sustainable technology innovations are at the core of our renewal. We are off to a good start: between 2010 and 2021, the revenues of the Finnish deep tech sector grew from EUR 14 million to more than 723 million. According to Invest Europe statistics, in 2023 Finnish growth companies received proportionally more capital investments than other companies in Europe. As regards companies in the scaling phase, Finland was number one in the amount of financing received.

In future Finland, we will help our startups to grow to the world class at an increasingly fast pace. This requires not only innovations but also talents and capital. We need investments in training and education and work-based immigration. We also need larger growth funds to support scaling.

## 4. Finnish business life makes bold investments in sustainable renewal.

Alongside startups, the capacity of our conventional industries and the SME sector to generate new sustainable business will also rise among the best in Europe.

This requires a change of attitude. If based on robust competence and problem-solving skills, hope is the best motivator. Tomorrow's Finnish trade and industry will have the courage to invest in sustainable renewal.

**For us at VTT**, the vision of Finland described above is fully feasible. We already have the necessary technologies and competences to make it come true. In this paper, we present some of these technologies together with the companies developing them. We have bold new starts in the fields of **semiconductors** (page 8), **biomaterials** (page 9), **wireless networks** (page 10) and **energy transition** (page 11).

We also give the floor to experts in macroeconomics, the finance sector and business. We ask them: Where do you see the best opportunities for growth? What would be your own recipe for turning the economy toward growth?

We consider it worthwhile to share these views, so that we can start building a fully feasible Finland together.

**“It is fully feasible that future Finland has become one of the world’s most competitive economies and a major actor in building international prosperity.”**

– Antti Vasara  
CEO, VTT



Doctor of Social Sciences **Heikki Pursiainen** is an economist and Director of Urban Research and Statistics at the City of Helsinki.



**Pia Santavirta**, CEO at Tesi (Finnish Industry Investment Ltd), operates on various fields in the finance sector.



**Ville Voipio** is Chair of the Board of Directors at the technology company Vaisala and “evangelist of sustainable business”.

# Nothing warrants the endlessly gloomy economic debate

Finland has many strengths on its side. Experts say that we can return to a path of fast economic and productivity growth if we invest in education, training and the growth opportunities of forerunner companies.

## What do you think about the future of Finland?

**Pursiainen:** Nothing warrants the endlessly gloomy outlook that has dominated the recent economic debate.

Finland has many fundamental strengths on its side. We have a well-functioning education system, highly educated and smart workforce and a stable operating environment for businesses. Many universities and cities are also surrounded by large clusters of excellence, where innovations can emerge.

**Santavirta:** Renewal will not happen without investments. Investments in R&D are an excellent start. They are the only way through which something new can happen in Finland. However, we should also figure out how to ensure funding to cover the entire growth path of enterprises, including commercialisation of research and international growth.

**Voipio:** Finland has everything it takes to become a forerunner in sustainability transitions. In the future, we will earn our money from innovations that enable major transitions, such as renewal of the energy and food systems. We are a country that smoothly pilots new solutions from which the bigger ones can learn. This is possible because we have the necessary infrastructure and competences.

## What is the possible future for Finland?

**Pursiainen:** It is totally possible for Finland to get back on track towards a fast, stable growth driven by increased productivity.

We must forget about waiting for a new Nokia. Instead, we could have a large number of strong medium-sized high-tech companies and ecosystems built upon broad-based expertise. These can generate success in various sectors. In the best-case scenario, we could have world-class Finnish companies linked to the cutting edge of international technology, surrounded by a flourishing service sector.

**Voipio:** Future Finland will be a forerunner in energy transition. It has combined different renewable energy and fuel solutions into a well-functioning system. We are not hydrogen producers, but we have businesses focusing on upstream products, such as renewable materials. We also sell sustainable technologies to others. We are not a great power in developing artificial intelligence but one of the fastest countries to apply it.

**Santavirta:** Internationally, Finland is admired as an example of a small country that lacks major capitals but still succeeds in solving the financing conundrum to produce top-class enterprises. Even though we have smaller government grant packages than others, we can attract international capital and compete at a global level.

**Voipio:** The Finnish education system will soon recover from its deep decline. Education and training will be promoted across a wide portfolio, beginning from primary school. We have also gotten over our growing pains with immigration. Finland has become an attractive country for global talents and company investments.

**Pursiainen:** Work-related immigration would also alleviate our demographic dilemma, i.e., the ratio of the working-age population to other population. It would help solve the core problem of Finland’s prosperity.



# The recipe for growth is renewal

R&D requires investments. They must also be targeted right to ensure that the best companies have the opportunity to grow and succeed globally.

## What is the recipe for growth?

**Pursiainen:** Research literature indicates that the key is to take care of the basics: access to a skilled and educated workforce; sufficiently large city districts enabling centres of excellence to emerge; and competitive regulation that promotes the creation of new companies instead of preventing it.

The icing on the cake is the government grant system for research and innovation. The decision to increase RDI funding to four per cent of the GNI alone does not yet solve anything. What's important is to spend the money wisely: only on R&D projects that would not be implemented without aid and that have the best potential to generate new growth. In my opinion, funding must be technology-neutral. It should be directed towards the best projects instead of the state trying to guess which companies or technologies will win.



**Santavirta:** We must ensure that the home market's financing capacity is sufficient for growth companies to access funding from the start-up phase all the way to international growth. This will help companies grow through uncertain times.

It is also essential to take care of the startup ecosystem, to ensure that new companies willing to seize opportunities and aim for international success from the very start keep on emerging.

If the funding system functions from the early stages all the way to international growth, Finnish companies have every chance of success on the international market.

**Voipio:** We need a transformation both technically and mentally.

On the mental side, instead of ideologies, we need social discussion about different scenarios based on facts. We should also honestly admit that major social transitions are not fully equal. The pain caused by social changes must be made visible. We must also discuss how to engage people in the change processes.


Investments in RDI must also be increased. Generally speaking, Finnish companies invest an alarmingly small amount of money in RDI. It is particularly important to invest in innovative long-term development, not just make improvements in the existing products.

Not just companies, but also the state must remain alert. Together, taxation and subsidies must encourage the existing companies to develop and ensure that there is enough capital for new business activities.



**“We need more investments in RDI, particularly in innovative long-term development, not just in improving the existing products.”**

**– Ville Voipio**  
*Chair of the Board of Directors at Vaisala*



**Pursiainen:** Enabling growth also largely depends on whether we can create and maintain places that bring together sufficiently large numbers of very smart people to generate ideas and develop them into successful companies.

# World-class growth will be generated by technology sectors

Finland has many companies and sectors with potential to grow into global winners. To enable renewal, we must clear the obstacles to growth, including bottlenecks in financing, turning in on ourselves and partial optimisation.

## Where can we see early signs of growth?

**Santavirta:** Our startup companies' ambitions lie at the international level, and they have opportunities to grow to a significant size in a short time.

Our deep tech field is developing rapidly. A good example of this is IceEye, which develops satellite technology. We have also contributed to accelerating its growth. We enable a similar growth curve possible in many other sectors as well.

Industrial-scale projects related to the clean transition are another great opportunity for Finland. Their number is still limited, but we must help the best of them succeed.

**Pursiainen:** In Finland, the most promising growth is found in the engineering sector, i.e., in technological development. For example, in Otaniemi area in Espoo, there are many great emerging companies with potential to become global winners in fields such as satellites, quantum technology or new food solutions. Personally, I have followed the stories of IceEye, IQM and Solar Foods, among others, with boyish enthusiasm.



**Voipio:** In energy transition, we have many major elements in place: renewable energy and bioenergy; wind power and hydropower, with additional resources available from our partners; and expertise in biomasses and synthetic fuels.

It gives me hope that, in Finland, climate change and energy transition are taken seriously. When I talk with international clients, they see Finland and the Nordic countries as forerunners – we have a shared will to bring about change.

## How can we mess it up?

**Santavirta:** Currently, the main bottleneck is in financing for international growth. It is important that the public financing system does not try to contribute a little bit to everyone in equal proportion. Instead, we should invest together with private investors in companies that have the highest potential for growth, internationalisation and societal impact. Public financing should also always be available for leveraging substantial amounts of private capital into the market. When we have set up a secured financing path, Finnish companies have every chance of achieving world-class success.

**Voipio:** The biggest threats are partial optimisation and the lack of a common vision. For example, in energy transition, it does not help if each actor creates a model based on their own solution. Instead, we need a common overall vision of the Finnish energy system in 2040 or 2050. However, I believe that, when push comes to shove, we will be able to make rational decisions. We have all the elements in place. It is just a question of whether we have the patience and courage to prosper.

**Excellent new starts emerge all the time from the startup scene with opportunities to grow to a significant size in a short time.**

– Pia Santavirta  
CEO of Tesi

**Pursiainen:** The easiest way to spoil our opportunities is to turn in on ourselves and close the doors. For the economy of a small export-driven country like Finland, a closed and protectionist world would be a disaster. We would not get the goods we need from elsewhere, and we would not be able to sell our own products to the world.

In public debate, we should not turn in on ourselves or focus on fighting over short-term issues. If we do this, we forget what the ultimate goal is. A good society does not only fight to preserve the old but dares to build the new. Finland has excellent starting points to succeed and go forward. We should take full advantage of them.



**OPPORTUNITY:** Semiconductors

## Efficient semiconductors are a billion-dollar business

Power semiconductors may be the next success story for Finland, says Jussi Rautee, CEO of Picosun.

“Our present lifestyle is largely enabled by semiconductors – cell phones, electric cars or wind power plants would not function without them. In Finland, a unique research cluster, involving VTT, universities and companies, has emerged particularly around semiconductors. In the 1970s, Tuomo Suntola invented the Atomic Layer Deposition (ALD) method, which has become the best thin film coating method available among semiconductor technologies. Its application for different kinds of chips is growing exponentially.

The semiconductor market is expected to double to one thousand billion dollars by 2030 since all current change trends – the green transition, artificial intelligence and IoT – require semiconductors. Semiconductors could be the next success story for Finland. Chips are needed in massive amounts, so major product development efforts must be made in the energy efficiency of individual chips. The energy consumption of data centres is also forecast to double by 2026.

Now, we would need joint national efforts. Chip production plants have been set up in other parts of Europe. So, what prevents Finland from attracting industrial investments focusing on power semiconductors, for instance? The Chip Zero project ecosystem already includes 44 companies operating in Finland. To enable the development of future technologies, a piloting and development facility Kvanttinoiva is currently being built in Otaniemi, Espoo. It can be used to attract more world-class companies to Finland, to generate new startups and to collaborate with European research centres.

**Finland has special expertise in semiconductors. Their market is expected to double to one thousand billion dollars by 2030.**

At Picosun, we design and manufacture ALD reactors and develop ultra-thin films with thickness down to a few millionths for them. Without thin films, we would not have the kind of smartphones we have today. The global semiconductor manufacturer Applied Materials acquired Picosun in 2022. Globally, the group’s manufacturing tools for the semiconductor industry hold a 25 per cent market share. Applied Materials annually spends about three billion dollars on product development. In Finland, the focus is strongly on equipment, material and application development.

When Applied Materials acquired us, it gave us an enormous amount of additional resources and capabilities to operate with major clients. In this case, investment came to competence. The same can happen again as long as Finland takes care of its competence: young people will see the potential of the semiconductor industry, and Finland can attract top talents from abroad.”



“Now, we would need joint national efforts. Chip production plants have been set up in other parts of Europe. So, what prevents Finland from attracting industrial investments focusing on power semiconductors, for instance?”

– Jussi Rautee  
VP & GM at Applied Materials and Chairman of Board & Managing Director at Picosun





**OPPORTUNITY: Biomaterials**

## Fibre innovations – an opportunity for global business

By the end of 2020s, downstream biomaterials may be in commercial production, says Katariina Kemppainen from Metsä Group.

“In this day and age, Finland is lucky to have wood instead of oil. Bio-based products are sorely needed to replace fossil materials. In the forestry sector, the growth opportunities lie in raising the added value of products without increasing wood consumption. The product innovations we are currently developing have their origins

in the jointly funded projects launched up to 15 years ago. Metsä Group has invested tens of millions in the demonstration plants for Kuura textile fibre and Muoto fibre products and the forthcoming demo plant for lignin products. They are major investments in renewal. By the end of this decade, we may have many new bio-based

products in commercial production. Demand for sustainably produced materials is massive in, for example, the clothing industry.

In 2018, we set up the Metsä Spring innovation company, and the work has borne fruit. In the field of research, Finland and Sweden are global hot spots within the industry. For example, the startups Metsä Spring has in its portfolio are from Finland, even though we have also been looking elsewhere. People come from Canada and the United States to learn from us since we are ahead of them in innovativeness and research.

**In the field of research, Finland and Sweden are global hot spots within the industry.**

Common guidelines for the industry, such as the biodiversity roadmap and sustainability commitments, are important for accelerating development. In value chains, networks and partnerships must also be built across old sectoral boundaries. Common sustainability targets provide further impetus for actions. The EU may introduce practices that provide us competitive advantage based on sustainability. When the forestry sector succeeds, we can reduce emissions and environmental impacts in Finland and enable Finland to increase its export revenues and environmental handprint with bio-based products.

Growth targets cannot be reached without major investments in R&D. When the targets have been set, we need smart development, efficient ecosystems and RDI funding to drive cooperation. When shifting from demonstration plants to commercial production, we need investment subsidies. Luckily, Finland is not currently cutting back on RDI investments. Therefore, it is possible to generate future growth from northern wood.”



“In the forestry sector, the growth opportunities lie in raising the added value of products without increasing wood consumption. Demonstration plants for biomaterials are major investments in renewal.”

– Katariina Kemppainen  
SVP, Group R&D, Metsä Group



**OPPORTUNITY:** **Wireless networks**

## Wireless network access for billions of devices

The rapid growth of the IoT market opens huge opportunities for wireless network developers, says Jari Hämäläinen, VP, Product Management, at Wirepas.

“**Wirepas’ wireless network solution** springs from Finnish research and Nokia’s tradition of excellence. From the very start, it was designed to operate at the core of IoT, as an enabler of industrial networks comprising up to millions of devices. We are involved when India intends to digitise half a billion electricity meters.

The benefits our innovation offers are its almost limitless scalability, cost-efficiency and energy-efficiency. These are needed, for example, in smart buildings and logistics solutions.

Wirepas has more than 200 patents in wireless communications technology. Our technology is the world’s first

approved non-cellular 5G connectivity network where the devices communicate directly with each other without a base station. Meeting the 5G standard enhances the acceptability of our technology, which is the key to our success. People believe in our technology. Last autumn, we secured new funding amounting to EUR 20 million. The natural home base of our product development is in Finland, but we operate, sell our products and grow globally. At a linear growth rate, within the next 10 years, the global IoT market will grow to approximately 120 billion devices. Within the same period, Wirepas aims to reach an annual turnover of at least one billion euros.

**Within 10 years, the global IoT market will grow to approximately 120 billion devices.**

Currently, IoT is strongly advancing use case by use case. In our ecosystem, customer solutions are being developed by about 200 Finnish and foreign companies, from well-known names to startups. We are coming up with new ideas for purposes of use all the time. Business Finland has supported our growth. In innovation and development, we partner with universities and VTT, for example. Cutting-edge expertise will be needed in the future as well, so the high level of Finnish software and communications education and training is important for us.

The benefits generated by IoT are indisputable, and the digitalisation of electricity meters in India serves as an excellent example of this. In the future, electricity meters will be a part of the sustainability of energy systems. They will function as hubs that steer the power consumption of buildings and local power production. The increasing need for digitalisation opens huge opportunities not only for us but also for companies that licence our technology for different needs.”



**“Our wireless network solution enables industrial networks comprising up to millions of devices. We are involved when India intends to digitise half a billion electricity meters.”**

– **Jari Hämäläinen**  
VP, Product Management, Wirepas



OPPORTUNITY: Energy

## A forerunner packages small nuclear reactors for export

Small modular nuclear reactors that produce clean heat will become a significant export product for Finland, says Tommi Nyman, CEO of Steady Energy.

**“Taking a developmental leap is not a question of courage**, as the need for clean heat production solutions is urgent. Finland has the opportunity to make this alternative come true.

In Europe, half of the overall energy consumption, including in industry, is used for heating. Most of the heat is produced with fossil fuels. Small modular reactors (SMRs) enable reaching almost 100 per cent efficiency in heat production without any greenhouse gas emissions. At the same time, the electricity currently used for heat genera-

tion is released for other purposes. Europe has identified the need for up to 500 district heating reactors. Finland is the best platform for setting up this kind of business and entering the export market from a pioneering position.

Within the next 10 years, Steady Energy will have established its position as a significant technology company. Its track record includes deliveries of several SMRs in Finland and the first international projects underway. In addition to heat generation, the simple and reliable plant concept is applied for process steam production in

industry. The new business model also makes it possible for smaller energy companies to run SMRs.

This energy innovation is made possible by the competent Finland with the world’s best nuclear power expertise. Our innovation is to make things simple. Finland has been accumulating know-how in generating power from nuclear energy for over 50 years. Now we are harnessing the same expertise for generating heat. This know-how has been kept partly under wraps, but our concept packages it into an export product. Exports will enhance the Finnish economy and make it possible for many Finnish component and equipment manufacturers to expand to the nuclear power sector.

**Europe has identified the need for up to 500 district heating reactors. Finland is the best platform for setting up this kind of business and entering the export market from a pioneering position.**

We will invest an estimated EUR 70 million on the development phase but hope the public sector would also contribute to the project. VTT has acted as our development partner, with 60 people contributing to the project, and a shareholder in the company. In 2025, we will start building a pilot plant to model an actual modular nuclear reactor.

Finland should accelerate the productisation process in every way possible. Currently, the development of our technology is advancing at the same pace as the reform of the licensing procedures for nuclear energy production. Technology neutrality should be a key guiding principle applied in public decision-making. Additionally, nuclear energy should be classified as part of the green transition and an alternative for clean energy production.”



**“Taking a developmental leap is not a question of courage as the need for clean heat production solutions is urgent. Finland has the opportunity make this alternative come true.”**

– **Tommi Nyman**  
CEO, Steady Energy

# Finland 2035 is a global success story of prosperity and competitiveness

We make the fully feasible Finland reality by identifying the opportunities – our strongest areas of technological competence – and investing in them courageously and in the long term.

There are undeniable challenges in the Finnish economy. At the same time, Finland is full of opportunities. We have unique inventions and world-class competence that could spur our economy and productivity into new sustainable growth.

If we play our cards right, the strongest companies and competencies we have will be global winners by 2035, building prosperity around them, both in Finland and on a global scale. It is now up to us to make growth and sustainable wellbeing a reality.

A turn for the better is underway, but it needs to be backed up by concrete reforms – and science. We at VTT feel that at least the following steps would drive us towards a fully feasible Finland:

## 1. Clear choices on which technologies are considered strategically important

Finland should select which technologies it considers strategically important. Finland should choose strategically important technologies in which it invests significantly and thus encourage companies to multiply their investments in employment and actions in Finland.

We are a small country, and we will not succeed in every sector. However, in certain areas of exponential hope – such as energy, biomaterials and food innovations, semiconductors, wireless networks and dual use products – we have deep long-term know-how and realistic opportunities to become world leaders.

We should make bold long-term investments in the chosen priority areas of technological development.

## 2. Growth funds for international scaling of operations

As Pia Santavirta highlights, the growth of Finnish companies often stops when they reach the phase of international scaling. This is especially true when talking about innovations that would require industrial investments and building of factories. Such projects require many times more capital than digital startups. That is why we need new, bigger growth funds to invest in international scaling.

How could significant new funds be generated? In addition to Tesi (Finnish Industry Investment Ltd), pension insurance companies could take a role in supporting growth and increase their investments in Finland. Foundations could also play a bigger role than before. This should be supported by tax incentives.

Furthermore, we should attract more investments from major corporations – in Finland, they are way below the European average.

We cannot compete with bigger countries in the amount of overall capital. But if we invest our money courageously and smartly, we have every chance of generating world-class success.

## 3. Adopting new attitude to support courageous growth

We need to change the general attitude and public debate in Finland. We keep on brooding over our economic problems and the stagnating productivity rate. News about lay-offs and bankruptcies receive more coverage than positive signals about recruitments and investments

New growth is not built by holding on to our weaknesses or getting stuck on problems. We must focus on our opportunities and invest in ensuring that the best initiatives gain momentum and find the funding and talent needed for growth.

Of course, we can always choose not to invest in anything, to remain where we are and to turn in on ourselves.

However, that is a much scarier choice than courageous renewal. It would definitely mean a drop in the Finnish standard of living and social prosperity.

At VTT, we do our best to ensure that the opportunities for growth turn into reality over the next 10 years – and that we choose to take action for renewal. Collaborating with our clients, we are already involved in researching, developing and commercialising some of the most significant inventions in Finland.

We hope that decision-makers, funding providers and businesses would continue to have courage and far-sightedness to invest in the opportunities of sustainable growth and exponential hope. It is entirely possible to make Finland a global success story of prosperity and competitiveness again. Let's do it together!



**“If we play our cards right, the strongest companies and competencies we have will be global winners by 2035, building prosperity around them, both in Finland and on a global scale.”**

**– Antti Vasara, VTT**

VTT is a visionary research, development and innovation partner for companies and the society. We bring together people, business, science and technology to solve the biggest challenges of our time. We advance the utilisation and commercialisation of research and technology in commerce and society. This is how we create sustainable growth, jobs and wellbeing and bring exponential hope.