



# Climate and Environmental Strategy for the ICT Sector

Publications of the Ministry of Transport and  
Communications 2021:6

**LVIA** MINISTRY OF TRANSPORT  
AND COMMUNICATIONS

**#ICTCLIMATE**

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# Climate and Environmental Strategy for the ICT Sector

Ministry of Transport and Communications Helsinki 2021

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## Climate and Environmental Strategy for the ICT Sector

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**Abstract** The Ministry of Transport and Communications appointed a working group in November 2019 to draw up a climate and environmental strategy for the information and communication technology sector (ICT sector). The task of the working group was to establish a common view on the climate and environmental impacts of the ICT sector in Finland and to recommend means to manage the impacts. The working group published an interim report that gave a broad and comprehensive picture of the situation in terms of the climate and environmental impacts of the ICT sector in June 2020 and the final report including recommendations for measures in November 2020. To ensure a broad-based view, the final report was circulated for comments before the strategy was finalised.

The purpose of the national Climate and Environmental Strategy for the ICT Sector is to promote ecologically sustainable digitalisation and support the achievement of climate and environmental objectives. The Strategy presents recommendations for measures related to a climate- and environment-friendly ICT infrastructure and data economy, sustainable material flows and a circular economy, expanding the knowledge base and developing the measurement framework, enhancing consumer awareness and expertise, and utilising emerging technologies and responding to challenges.

**Keywords** climate strategy, climate impacts, information and communication technology sector, environmental issues, environmental impacts, data centres, information technology, communication networks

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## ICT-alan ilmasto- ja ympäristöstrategia

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### Liikenne- ja viestintäministeriön julkaisuja 2021:6

**Julkaisija** Liikenne- ja viestintäministeriö

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**Toimittaja/t** Tuuli Ojala, Pinja Oksanen

**Kieli** englanti **Sivumäärä** 30

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**Tiivistelmä** Liikenne- ja viestintäministeriössä asetettiin marraskuussa 2019 työryhmä tieto- ja viestintäteknologia-alan (ICT-ala) ilmasto- ja ympäristöstrategian laatimiseksi. Työryhmän tehtävänä oli muodostaa yhteinen näkemys ICT-alan ilmasto- ja ympäristövaikutuksista Suomessa sekä suositella keinoja vaikutusten hallitsemiseksi. Työryhmä julkaisi ICT-alan ilmasto- ja ympäristövaikutuksista laajan tilannekuvan antavan väliraportin kesäkuussa 2020 ja toimenpidesuosituksia sisältävän loppuraportin marraskuussa 2020. Laajan näkemyksen varmistamiseksi loppuraportti asetettiin lausuntokierrokselle ennen strategian viimeistelyä.

Kansallisen ICT-alan ilmasto- ja ympäristöstrategian tarkoituksena on edistää ekologisesti kestävää digitalisaatiota ja tukea ilmasto- ja ympäristötavoitteiden saavuttamista. Strategiassa esitetään toimenpide-ehdotuksia ICT-infrastruktuurin ja datatalouden ilmasto- ja ympäristöystävällisyyteen, kestäviin materiaalivirtoihin ja kiertotalouteen, tietopohjan laajentamiseen ja mittaamisen kehittämiseen, kuluttajien tietoisuuden ja osaamisen lisäämiseen sekä nousevien teknologioiden hyödyntämiseen ja haasteisiin vastaamiseen liittyen.

**Asiasanat** ilmastostrategia, ilmastovaikutukset, tieto- ja viestintäteknikka-ala, ympäristökysymykset, ympäristövaikutukset, palvelinkeskukset, tietotekniikka, viestintäverkot

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## Klimat- och miljöstrategi för IKT-branschen

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**Referat** Kommunikationsministeriet tillsatte i november 2019 en arbetsgrupp med uppgift att utarbeta en klimat- och miljöstrategi för sektorn för informations- och kommunikationsteknik (IKT). Arbetsgruppen hade till uppgift att skapa en gemensam syn på IKT-sektorns klimat- och miljöpåverkan i Finland och att rekommendera metoder för att hantera konsekvenserna. Arbetsgruppen publicerade i juni 2020 en mellanrapport som ger en omfattande lägesbild om IKT-sektorns klimat- och miljökonsekvenser. En slutrapport med åtgärdsrekommendationer publicerades i november 2020. För att säkerställa en vidsträckt syn skickades slutrapporten ut på remiss innan den slutliga beredningen av strategin.

Syftet med den nationella klimat- och miljöstrategin för IKT-sektorn är att främja ekologiskt hållbar digitalisering och att stödja uppnåendet av klimat- och miljömålen. I strategin presenteras åtgärdsförslag som gäller miljövänligheten hos IKT-infrastruktur och dataekonomi, hållbara materialflöden och cirkulär ekonomi, utvidgning av kunskapsunderlaget och utvecklande av mätningen, ökad medvetenhet och kompetens hos konsumenterna samt användning av ny teknik och svar på utmaningar i fråga om den.

**Nyckelord** klimatstrategi, klimatpåverkan, IKT-sektorn, miljöfrågor, miljökonsekvenser, serverhallar, informationsteknik, kommunikationsnät

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# 1 Introduction

The objective of Prime Minister Sanna Marin’s Government of a carbon-neutral Finland by 2035 will require emissions to be reduced in all sectors. While the information and communications technology (ICT) sector delivers solutions that promote emission reductions, attention must also be paid to the sector’s own carbon footprint and its other impacts on the environment, including biodiversity impacts. These issues have recently drawn growing international attention.

The Ministry of Transport and Communications appointed a working group on 1 November 2019 to prepare a climate and environmental strategy for the ICT sector. The broad-based working group consisting of representatives of government, CSOs, higher education institutions and businesses issued its interim report, *The ICT sector, climate and the environment*, on 15 June 2020 and its final report, *Ecologically sustainable digitalisation contributes to climate targets*, on 30 November 2020.

The final report of the working group summarises the main environmental impacts of the ICT sector, widely covered in the interim report, and presents a vision and recommendations for measures in Finland. In order to ensure a broad-based view, the final report was made available for public consultation after publication. This current strategy was finalised by the Ministry of Transport and Communications on the basis of the final report and the consultation round. Finland is leading the way in the drafting of a national climate and environmental strategy for the ICT sector.

The measures proposed in the strategy will promote action to better understand and respond to the challenges relating to the energy consumption of data transmission and processing as well as the materials consumption of ICT devices. The strategy also puts forward measures to strengthen the central role played by digitalisation in the change that will enable economic wellbeing in a manner that is environmentally sustainable and reduces the greenhouse gas emissions that cause climate change. Finnish ICT expertise, research, development and practical ventures may play a key role in furthering the green transition.

**Figure 1.** The ICT sector consumes energy and materials, but its role and potential in response to climate and environmental challenges are also significant.

<b>POSITIVE IMPACTS HANDPRINT</b>	<ul style="list-style-type: none"> <li>Greenhouse gas emission reductions in other sectors</li> </ul>	<ul style="list-style-type: none"> <li>Digital solutions supporting environmental protection and nature conservation</li> </ul>	<ul style="list-style-type: none"> <li>Solutions facilitating climate change adaptation</li> </ul>
<b>NEGATIVE IMPACTS FOOTPRINT</b>	<ul style="list-style-type: none"> <li>Energy consumption and its greenhouse gas emissions</li> </ul>	<ul style="list-style-type: none"> <li>Raw materials usage in infrastructure and devices</li> </ul>	<ul style="list-style-type: none"> <li>Emissions into air, water and soil</li> </ul>

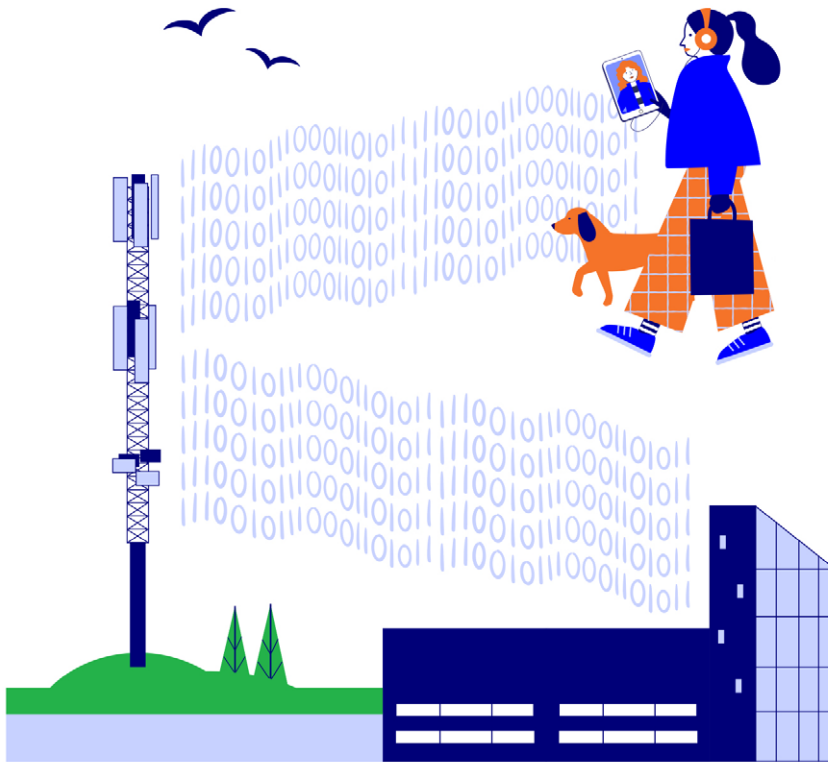


## 2 Vision to 2035

Finland is a leader in the use and development of ecologically sustainable ICT solutions. With its products and services, the ICT sector is a major provider of solutions to climate and environmental issues. The climate and environmental impacts of ICT are widely known in society and there is reliable data on these that is used in development in the sector. Finland promotes climate and environmentally friendly digitalisation internationally and provides solutions also for beyond our national borders.

## 3 Objectives and measures

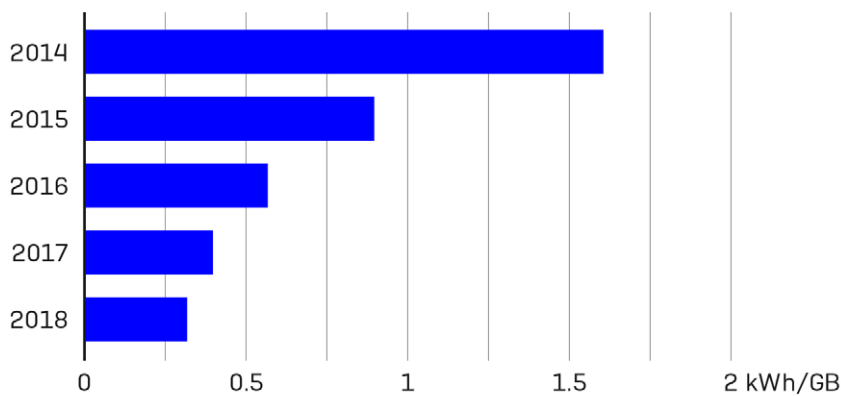
### 3.1 Climate and environmental friendliness of ICT infrastructure



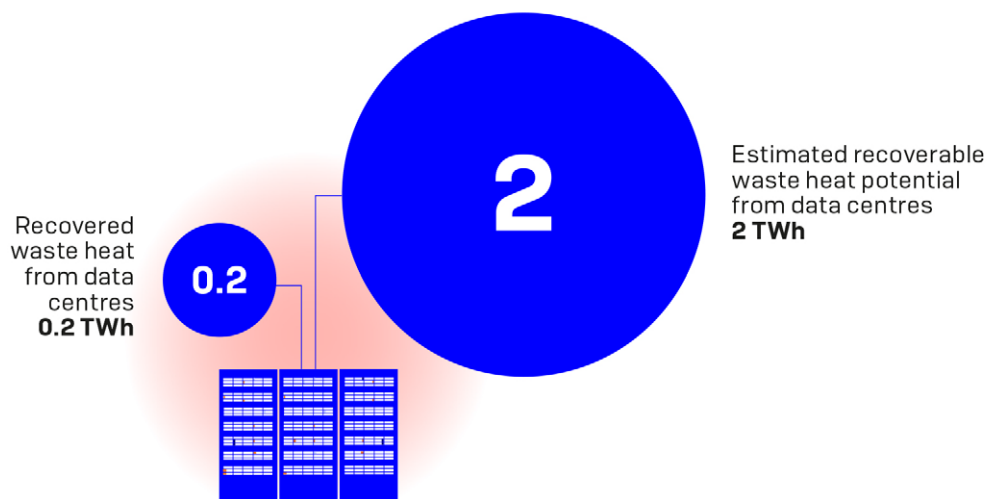
Digital services require ICT infrastructure, the construction and use of which in turn require energy and materials, thus burdening climate and the environment.

Various sources estimate that the ICT sector accounts for around 4–10% of global electrical energy consumption and around 3–5% of global greenhouse gas emissions. The amount of emissions depends on the production sources of the electricity used.

**Figure 2.** Mobile networks have been developed for greater energy efficiency, i.e. the amount of electricity consumed per data bit transmitted has decreased. The further development of mobile communication technologies and their new generations towards even greater energy efficiency is important in terms of curbing the rise in electricity consumption. Finland has technology-neutral broadband objectives – both wireless and fixed connections are needed and promoted. Finland is a global leader in the development and use of mobile communication networks. As a rule, data transmission over a mobile network consumes more energy than over a fixed network. Figure source: Finnish Federation for Communications and Teleinformatics FiCom.



**Figure 3.** The heat generated as a by-product of data centre operation can be utilised in heating buildings, thus reducing the need for heat generation from other sources. In a report prepared for the Ministry of Economic Affairs and Employment, AFRY estimated the potential of Finnish data centres most amenable to waste heat recovery to be around 2 TWh of heat generation.



## Measures to promote the climate and environmental friendliness of ICT infrastructure:

- 1) Promote the development and use of energy-efficient solutions**
  - Strive for energy efficiency in the design, construction and operation of networks, including the replacement of network devices with more energy-efficient ones, the enabling of energy savings functions in components not in use, optimisation using artificial intelligence  
*Main actor: telecommunications operators*
  - Take part in the development of ecological sustainability assessment criteria at the EU level and internationally  
*Main actor: Finland's representatives, such as the Finnish Transport and Communications Agency Traficom, in EU and international working groups*
  - Utilise best practices and recommendations to increase energy efficiency when designing and building new data centres and when maintaining, upgrading and operating existing ones. Develop new methods by making use of modelling and pilot projects as well as the potential of innovation funding.  
*Main actor: data centre sector, ICT sector, technology industry enterprises, higher education institutions, research institutes*
  - Develop energy-efficient cooling solutions for data centres and network base stations by utilising pilot projects  
*Main actor: operators, equipment suppliers, higher education institutions, research institutes*
  - Conclude energy efficiency agreements that include yearly reporting. Make use also of other instruments such as energy audits and energy management systems to make operations more efficient.  
*Main actor: telecommunications operators, data centre sector*
  
- 2) Promote the use of zero-carbon electricity sources**
  - Purchase zero-emission electricity and review the potential to increase renewable energy production through long-term power purchase agreements (PPA).  
*Main actor: ICT sector enterprises*
  - Develop solutions for the sector that leverage zero-carbon electricity sources, for example renewable energy at network base stations.  
*Main actor: telecommunications operators, equipment suppliers, higher education institutions, research institutes*
  - Look into the possibilities of data centres and other telecommunications facilities of sufficiently high volume to take part in the electricity market  
*Main actor: ICT sector and energy enterprises, providers of virtual power plant solutions*

**3) Improve the conditions for waste heat recovery**

- Encourage waste heat recovery at data centres of all sizes by means of taxation-based solutions

*Main actor: Ministry of Finance energy taxation working group, the Government*

- Pay attention to the potential for waste heat recovery at the early planning stage of data centre placement and increase awareness of successful case examples

*Main actor: data centre sector, cities and municipalities, district heating enterprises and other utilisers of heat*

- Study the potential for waste heat recovery at network base stations and IT sites

*Main actor: telecommunications operators, higher education institutions, research institutes*

**4) Take environmental aspects into account in network construction and promote network sharing**

- Maintain and develop a centralised information point for network sharing and joint network construction

*Main actor: Finnish Transport and Communications Agency Traficom*

- Highlight attention to environmental consideration in the Finnish expert group on passive infrastructure in order to promote best practices in network sharing

*Main actor: Finnish Transport and Communications Agency Traficom*

- Encourage joint construction in subsidised broadband projects

*Main actor: Ministry of Transport and Communications, Finnish Transport and Communications Agency Traficom*

- Engage in advocacy in EU initiatives relating to joint construction such as reform of the Broadband Cost Reduction Directive to locate new tools to promote joint construction

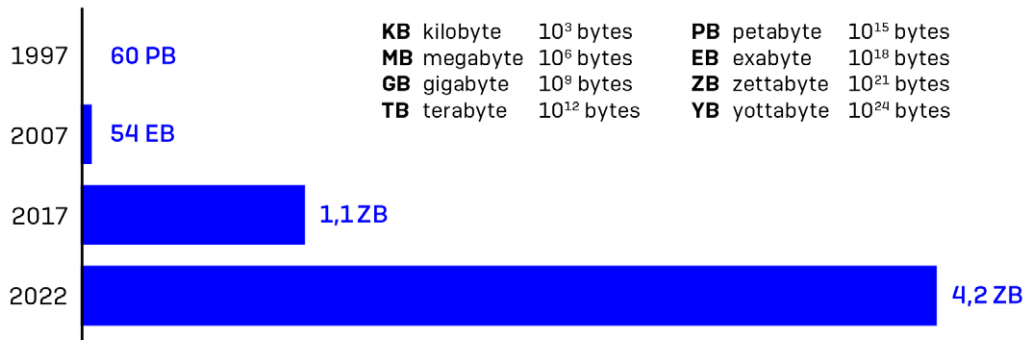
*Main actor: Ministry of Transport and Communications, Finnish Transport and Communications Agency Traficom*

## 3.2 Climate and environmental friendliness of the data economy

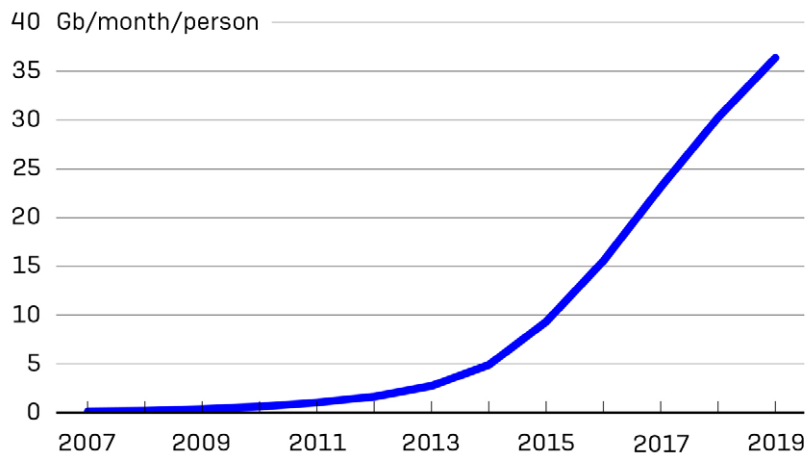


The services provided by the ICT sector, including solutions to reduce emissions, require data.

**Figure 4:** Global internet traffic is increasing strongly and increases the electricity demand of data centres, networks and end user devices. Source: International Energy Agency (IEA).



**Figure 5:** Dozens of times more data per capita is currently transmitted in Finland's mobile networks compared with the early 2010s. Source: Finnish Transport and Communications Agency Traficom.



## Measures to promote the climate and environmental friendliness of the data economy

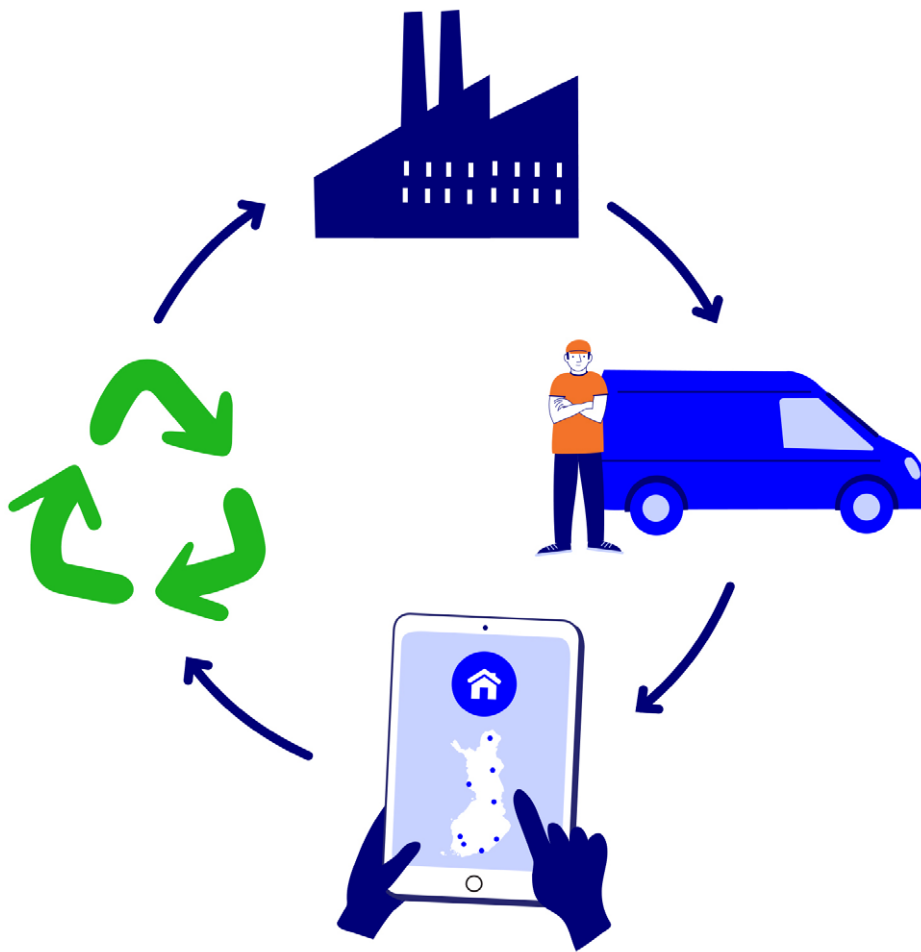
- 1) Strengthen attention to energy considerations in the design of software and services**
  - Initiate and take part in research projects into the energy and climate impacts of ICT services  
*Main actor: higher education institutions, research institutes, Academy of Finland*
  - Step up development in green software production and software solutions, including determination of the possibility of initiating a research programme  
*Main actor: software enterprises, higher education institutions, Academy of Finland, Business Finland*
  - Train talent for green coding and software production  
*Main actor: higher education institutions, vocational colleges, providers of course-based continuing education; to be driven by corporate demand*
  - Increase understanding of the significance of service provision in climate and environmental issues in Finland and in international contexts by means of training and education and communication  
*Main actor: higher education institutions, research institutes, technology industry enterprises, authorities, representatives of EU and ITU bodies*
  - Develop energy consumption verification methods (certificates) for software-based services in support of environmentally friendly procurement  
*Main actor: higher education institutions, research institutes, enterprises*
  
- 2) Strengthen attention to energy aspects in procurement of software and services**
  - Boost know-how in catering for climate and environmental considerations in the procurement of ICT services and the preparation of procurement criteria, highlight successful pilot solutions and learn from international best practices  
*Main actor: existing sustainable procurement networks and advisory organisations such as the KEINO Competence Centre for Sustainable and Innovative Public Procurement, public-sector ICT procurement units*



**3) Develop ICT solutions that deliver climate and environmental benefits and promote their take-up**

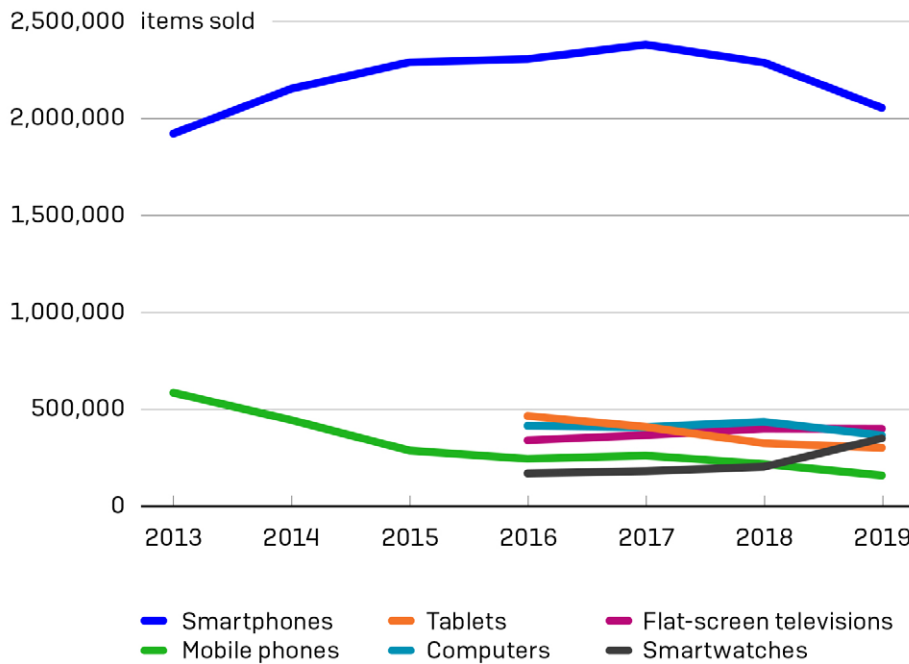
- Amplify climate and environmental solution generation perspectives in software sector training and education, explore the possibility to create a joint programme for higher education institutions  
*Main actor: higher education institutions, stakeholders*
- Encourage solution-generating software development through themed competitions and 'hackathons'  
*Main actor: enterprises, higher education institutions, research institutes*
- Allocate and make use of national (e.g. Academy of Finland, innovation funding) and EU funding to data economy tools addressing key climate and environmental challenges  
*Main actor: ministries in cooperation with stakeholders (enterprises, research institutes, higher education institutions)*
- Explore the potential for initiating regional environmentally friendly ICT service pilot projects and learning from these  
*Main actor: municipalities, cities, higher education institutions, research institutes, enterprises*

### 3.3 Sustainable material flows and the circular economy

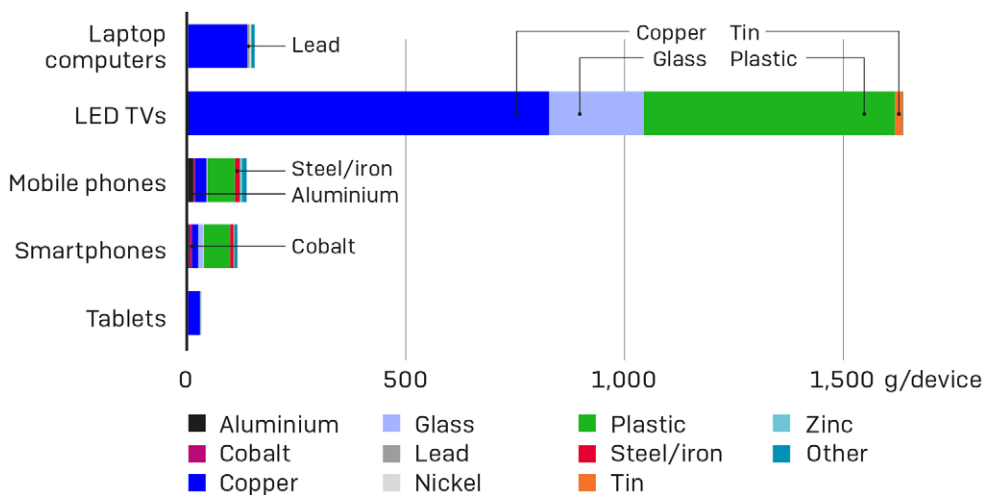


Extension of service life, the sharing economy and materials recycling are circular economy tools that can be promoted in Finland in order to reduce ICT equipment's burden on climate and the environment. The more sustainable management of cross-border material flows calls for international cooperation.

**Figure 6:** Smartphones considerably outsell all other ICT devices in Finland. In Finland, over 80% of the entire population use a smartphone. The sales of smartwatches and 4K capable UHD televisions have been on the rise recently. Sources: Association of Electronics Wholesalers (ETK), Finnish Federation for Communications and Teleinformatics (FiCom), Finnish Environment Institute SYKE.



**Figure 7:** End user devices involve extensive use of materials, only some of which are shown in the figure. The most valuable of these are the rare metals in batteries and displays. The same materials are required for multiple modern technologies. The extraction and processing of these materials burdens the environment and the recycling of the materials is deficient. Sources: SYKE, Cucchiella et al.



## Measures to promote sustainable material flows and the circular economy:

- 1) Extend the service life of devices by means of design, procurement and increased awareness**
  - Increase consumer awareness of product warranties and software updates  
*Main actor: basic education, vocational and general upper secondary education in the context of digital skills education, device retailers*
  - Influencing the reparability and service life of devices by means of eco-design and implementation of the EU Circular Economy Action Plan  
*Main actor: Ministry of the Environment, Energy Authority*
  - Explore the possibilities of financial incentives for extending the service life of devices (repair, re-use) and the conditions for the take-up of new circular economy business models  
*Main actor: financial incentives for the circular economy are explored as part of the implementation of both Finland's strategic programme to promote a circular economy and the EU Circular Economy Action Plan; actors include the Ministry of the Environment, the Ministry of Finance, support to research from the programmes of the Academy of Finland, among others*
  - Increase and update procurement competence in ICT device procurement; for example
    - share examples of successful 'device as a service' (DaaS) procurement (leasing) and procurement of used devices  
*Main actor: sustainable procurement networks and advisory organisations, public sector ICT procurement units*
    - update device procurement criteria in accordance with the EU Green Public Procurement criteria and develop, update and maintain guidelines and model criteria for the procurement of energy and resource efficient devices  
*Main actor: Motiva, public sector ICT procurement units*
  
- 2) Increase the efficiency of device collection and device materials recycling**
  - Increase awareness of the importance of forwarding devices to recycling, generate enthusiasm by means of e.g. gamification  
*Main actor: basic education, vocational and general upper secondary education, authorities, CSOs and device retailer enterprises by means of various campaigns, Finnish Innovation Fund Sitra via its European cooperation network*

- Make drop-offs to recycling easier and provide information on recycling, taking into account instructions relating to information security  
*Main actor: ICT Producer Co-operative, waste management operators, retailers*
- Increase the financial incentives of recycling, e.g. rebates when returning old devices  
*Main actor: campaigns of enterprises; financial incentives for the circular economy are explored as part of the implementation of both Finland's strategic programme to promote a circular economy and the EU Circular Economy Action Plan; actors include the Ministry of the Environment and the Ministry of Finance*
- Advocate for recyclability in EU eco-design and in EU circular economy initiatives  
*Main actor: Energy Authority, Ministry of the Environment*
- Support experimentation, innovation and research to boost recycling competence and related business  
*Main actor: support instruments from among both national and EU instruments (programmes of the Academy of Finland, among others); the recycling of battery metals and business based on this will be promoted in the implementation of the National Battery Strategy (follow-up Ministry of Economic Affairs and Employment)*

### **3) Promote the use of sustainable primary resources**

- Advocate for sustainable production and material traceability nationally and at the EU level by means that include the following:
  - develop ways to determine the origin of materials to verify sustainability; with regard to batteries and as a measure under the National Battery Strategy (Ministry of Economic Affairs and Employment), develop tools based on lifecycle methods to assess environmental impacts  
*Main actor: research institutes, higher education institutions, with support from the programmes of Business Finland and the Academy of Finland, among others*
  - take part in the development of product/material passports at the EU level  
*Main actor: Ministry of the Environment*

### 3.4 Knowledge base expansion and development of measuring



Lack of data transparency, data availability and variance in definitions and methodologies have proven both a national and international challenge with regard to the climate and environmental impacts of the ICT sector.

Development projects to improve measurability, monitoring and benchmarking are currently in the works in the EU and internationally. Comparable data is required on both the footprint of the ICT sector as well as on its positive handprint.

## Measures to expand the knowledge base and develop measuring:

### 1) Improve the compilation of statistics on data centre and network energy consumption and the monitoring of emission impacts

- Build up, by making use of research data, 1) transparent climate and environmental reporting and 2) the reporting of anonymised data and monitoring via Statistics Finland

*Main actor: telecommunications operators, data centre operators, government ICT service provision actors, Statistics Finland, Fingrid*

- Monitor and advocate for progress on EU initiatives relating to the transparency of energy consumption and emissions data and statistics with the aim of systematically collected and internationally comparable data

*Main actor: representation in EU working groups*

- Aggregate international method and indicator recommendations and guidelines on measuring and monitoring the environmental impacts of the ICT sector into a form that is appropriate for Finland

*Main actor: Finnish Transport and Communications Agency Traficom, wider discussion with experts in the field*

- Develop the comparable measurement calculation of the positive impacts of the ICT sector and follow international efforts in this field

*Main actor: higher education institutions, research institutes, EU cooperation, ITU SG5 Q9 working group (Finland represented by the Finnish Transport and Communications Agency Traficom)*

### 2) Grow body of knowledge on ICT sector material flow sustainability issues

- Study the unanswered questions regarding material flows in the ICT sector, the increasingly prevalent different applications of IoT devices and displays included, and share the findings internationally.

*Main actor: Finnish Innovation Fund Sitra (study to gain an overall picture of the environmental impacts of digitalisation from the viewpoint of natural resource consumption), higher education institutions, research institutes*

- Share findings of international studies and research in Finland

*Main actor: Network established in the context of the drafting of the climate and environmental strategy for the ICT sector*

**3) Grow body of knowledge on lifecycle impacts and rebound effects of digital solutions**

- Study the lifecycle impacts of digital solutions regarding themes rising to the fore during the drafting of the strategy and share the findings in international cooperation.

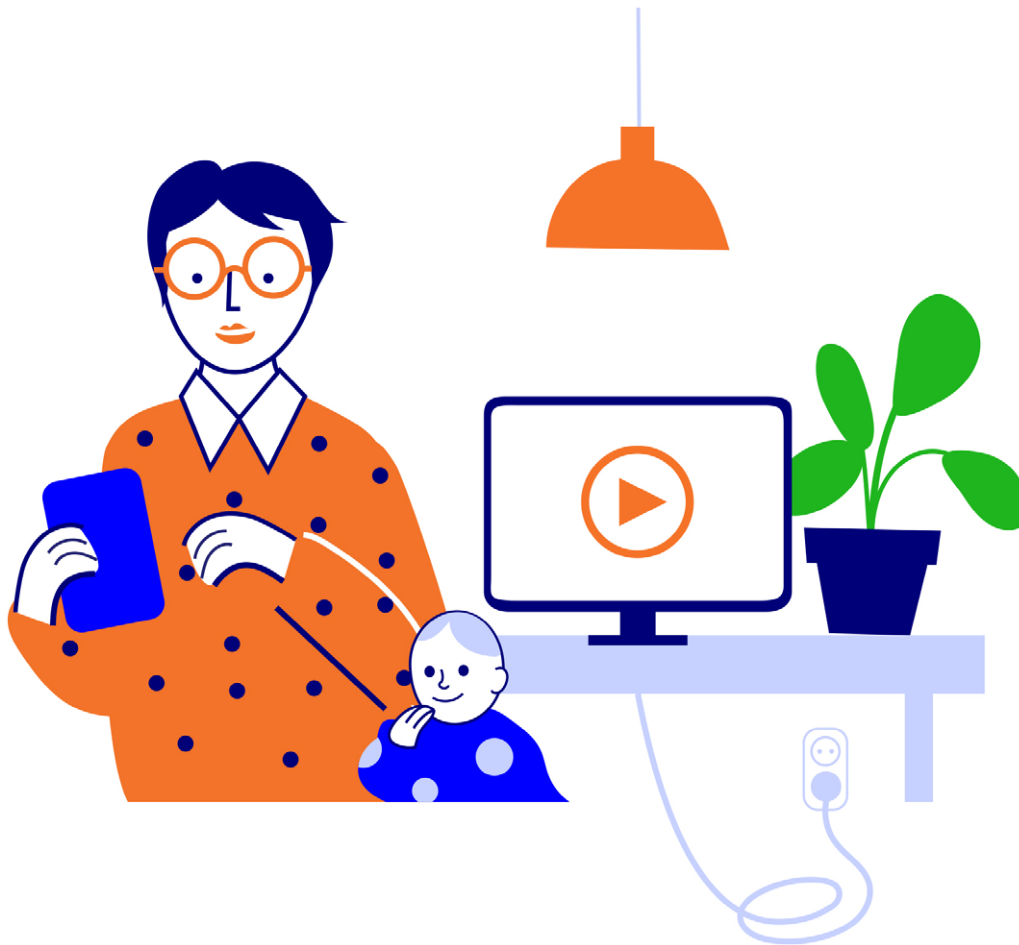
*Main actor: Ministry of Finance (public service digitalisation), Ministry of Education (digitalisation in education), Ministry of Transport and Communications (remote work, digitalisation of logistics), Finnish Innovation Fund Sitra, possible other actors (impact of outbound data traffic on Finland's digital footprint), higher education institutions, research institutes (overall/rebound effects, indirect/structural impacts of software on society and development of environmental impact assessment models for digitalisation projects)*

- Share findings of international studies and research in Finland

*Main actor: Network established in the context of the drafting of the climate and environmental strategy for the ICT sector*



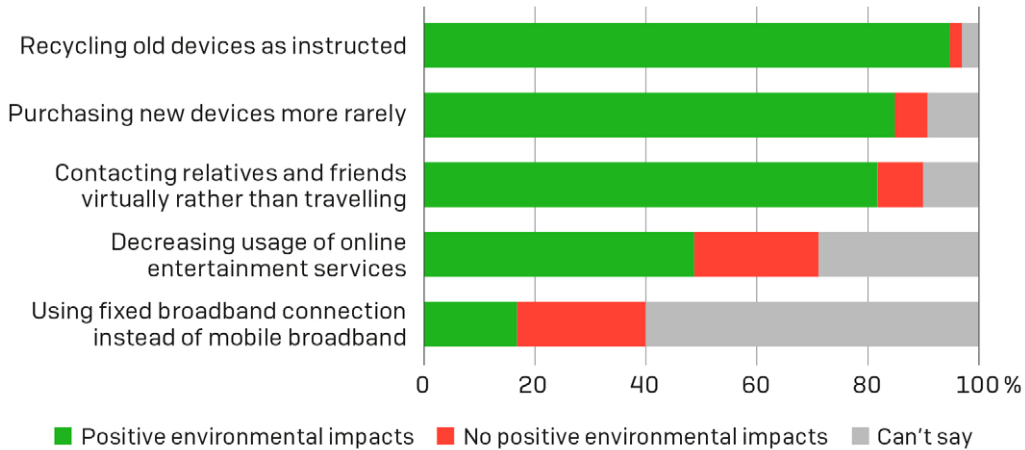
### 3.5 Increasing consumer awareness and competence



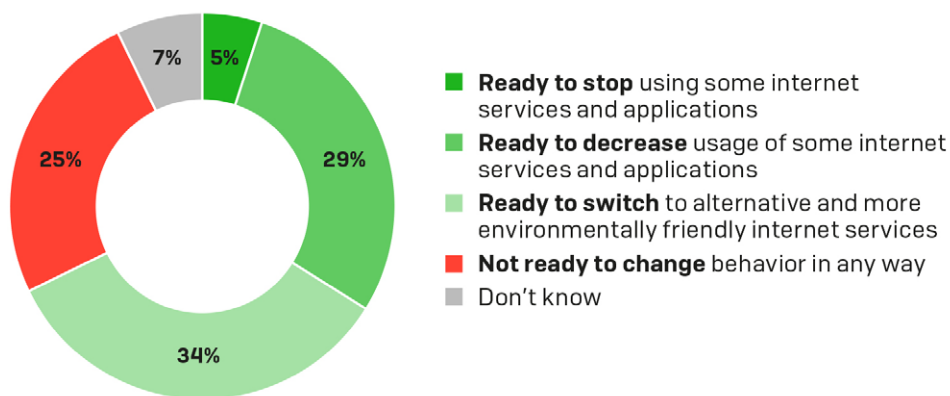
Consumer behaviour plays an important role in managing the environmental impacts of ICT sector products and services.

Based on a survey of telecommunications operators by the Finnish Transport and Communications Agency Traficom, for example, private internet subscriptions account for around 90% of all data transmission in the mobile network.

**Figure 8:** The Finnish population has a fairly good grasp of the fact that the environmental impacts of end user devices can be reduced by using the devices longer and taking devices no longer in use to be recycled. The climate and environmental impacts of service usage are less well known. For example high-resolution video streaming, large displays and the use of mobile data even when in a fixed location all increase energy consumption. Figure source: Finnish Transport and Communications Agency Traficom.



**Figure 9:** The majority of the population in Finland would be prepared to change the way they use internet services if they had more information on the environmental impact of their choices. The greatest degree of readiness was seen in switching over to alternative, more environmentally friendly services. One fourth of the population were not prepared to change the way they use internet services at all. Source: Finnish Transport and Communications Agency Traficom.



## Measures to increase consumer awareness and competence:

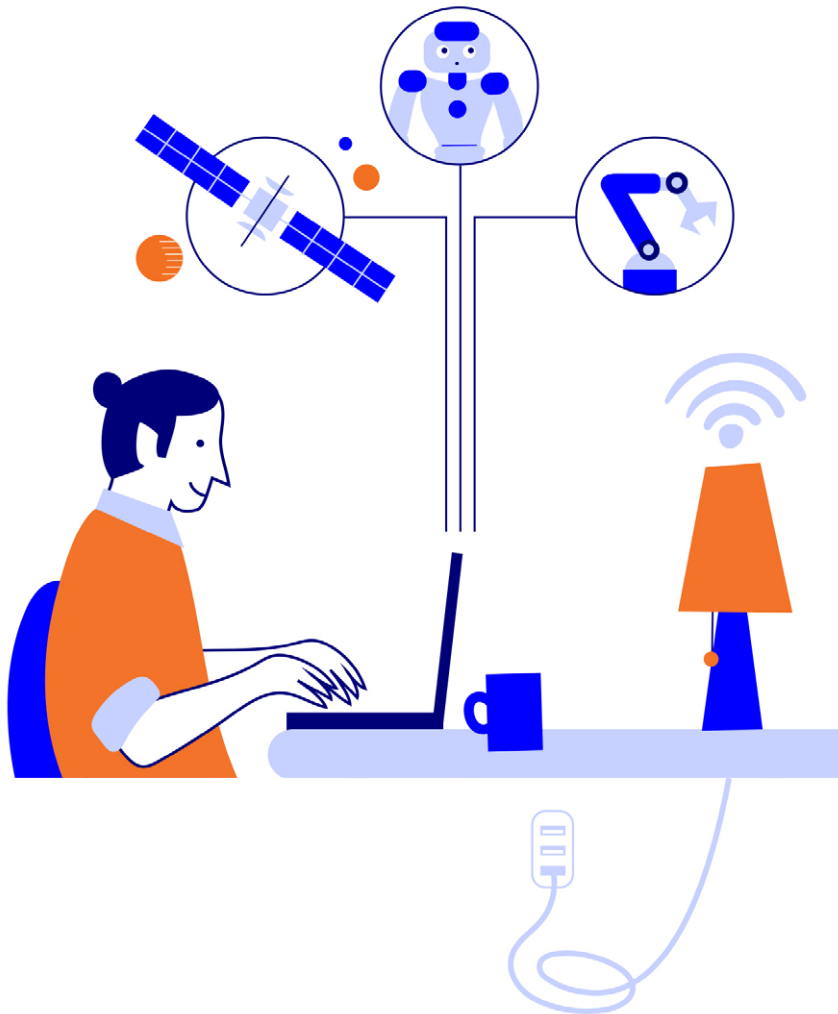
### 1) Increase awareness of the environmental impacts of ICT service usage

- Promote attention in digital skills education to the environmental impacts of ICT service usage and the different ways of using ICT services  
*Main actor: basic education, vocational and general upper secondary education, liberal adult education, digital skills projects; campaigns: authorities, CSOs, enterprises, device retailers*

### 2) Boost skills in using devices in an environmentally friendly manner

- Increase consumer competences in the energy-efficient usage of ICT devices  
*Main actor: basic education, vocational and general upper secondary education, liberal adult education, digital skills projects; campaigns: authorities, CSOs, enterprises, device retailers*

### 3.6 Utilising emerging technologies and responding to challenges



Enablers of the ICT solutions and services of the future include artificial intelligence, blockchains, quantum technology, robotics and automated systems, and the Internet of Things.

New solutions can help reduce the climate and environmental impacts generated in different sectors. On the other hand, many new applications also have fairly high energy consumption and their impacts on e.g. human behaviour cannot be predicted.

## Measures to utilise emerging technologies and respond to challenges:

### 1) Increase our understanding of the climate and environmental impacts of emerging technologies:

- Promote research into issues relating to the energy and materials requirements of emerging technologies and technologies in support of their take-up (such as new network technologies) and make use of the findings in steering activities

*Main actor: higher education institutions, research institutes, ITU working groups (including ITU-T FGAI4EE), ICT sector and public administration including the Finnish Transport and Communications Agency Traficom, in international cooperation*

- Invest in research into the ecologically sustainable application of emerging technologies and technologies in support of their take-up (such as new network technologies) and the sharing of best practices with the focus on fields in which Finland already has solid expertise, such as 6G, AI and small data machine learning, quantum technology)

*Main actor: higher education institutions, research institutes, EU and ITU working groups, ICT sector and public administration including the Finnish Transport and Communications Agency Traficom and the Academy of Finland, in international cooperation*

### 2) Grow the ecologically sustainable potential for utilising emerging technologies and their application

- Pay more systematic attention to climate and environmental impacts in projects that utilise emerging technologies and in the drafting of legislation concerning the ICT sector

*Main actor: project developers in the private and public sectors, law-drafters*

- Make the generation of positive climate and environmental solutions an award criterion when funding digitalisation projects

*Main actor: parties responsible for preparing grant of public funding*

- Enable the utilisation and take-up of new technologies in legislation governing different sectors in order to achieve positive climate and environmental impacts

*Main actor: law-drafters*

## 4 Monitoring of implementing and national coordination

The strategy is wide-ranging and will be implemented in many different quarters in both the public and private sectors. In the context of the drafting of the strategy, in the efforts of the working group and during the subsequent consultation round, an extensive group of Finnish experts have been identified who are knowledgeable of the different aspects of ICT sector climate and environmental impacts and encounter these in their everyday work. It is obvious that there is both interest in and need for national coordination and information-sharing also in the future. National coordination is also a condition for effective EU advocacy and wider international advocacy.

The Ministry of Transport and Communications and the Finnish Transport and Communications Agency Traficom in cooperation with the stakeholders will monitor the achievement of the strategy objectives and measures. In order to monitor the implementation of the strategy, an annual forum for those taking part in its drafting and other interested stakeholders will be arranged. All parties are encouraged to communicate the progress they have respectively made in promoting the strategy objectives. The need to update the strategy objectives and the possibility to determine the measures with the greatest impact and the targets for these will be assessed in each government term.

Both the Next Generation EU recovery package and recently prepared national programmes to advance the green transition all emphasise the role of digital solutions in achieving the aims. The benefits of ICT to promote low-carbon solutions and sustainable natural resource use as well as other environmental goals can only be seized by investing in a transformation of processes and ways of working in the various sectors. The significant potential of digitalisation as well as tangible next steps towards its take-up have been identified in e.g. various energy sector programmes, the national circular economy programme and the drafting of the roadmap for fossil-free transport as well as many other roadmaps, programmes and strategies in Finland. The utilisation of digital solutions in a given sector or theme will be monitored primarily in the context of monitoring the implementation of these sectoral or thematic programmes.

The measures necessary to implement the strategy cannot be advanced solely in forums focusing on climate and environmental issues. Many of the issues that are important to Finland both nationally and at the EU level are relevant also to the climate and environmental impacts of the ICT sector. In developing the data economy, for example, Finland's priority principles are the openness, availability and interoperability of data. These are also needed to grow the carbon handprint of the ICT sector. To take

another example, competence and education and training as well as Finland's attractiveness to international talent are key to improving ICT sector climate and environmental impact management.

With regard to central government funding, the strategy measures' possible needs for appropriations will be examined in more detail in the context of the preparation of the General Government Fiscal Plan.

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