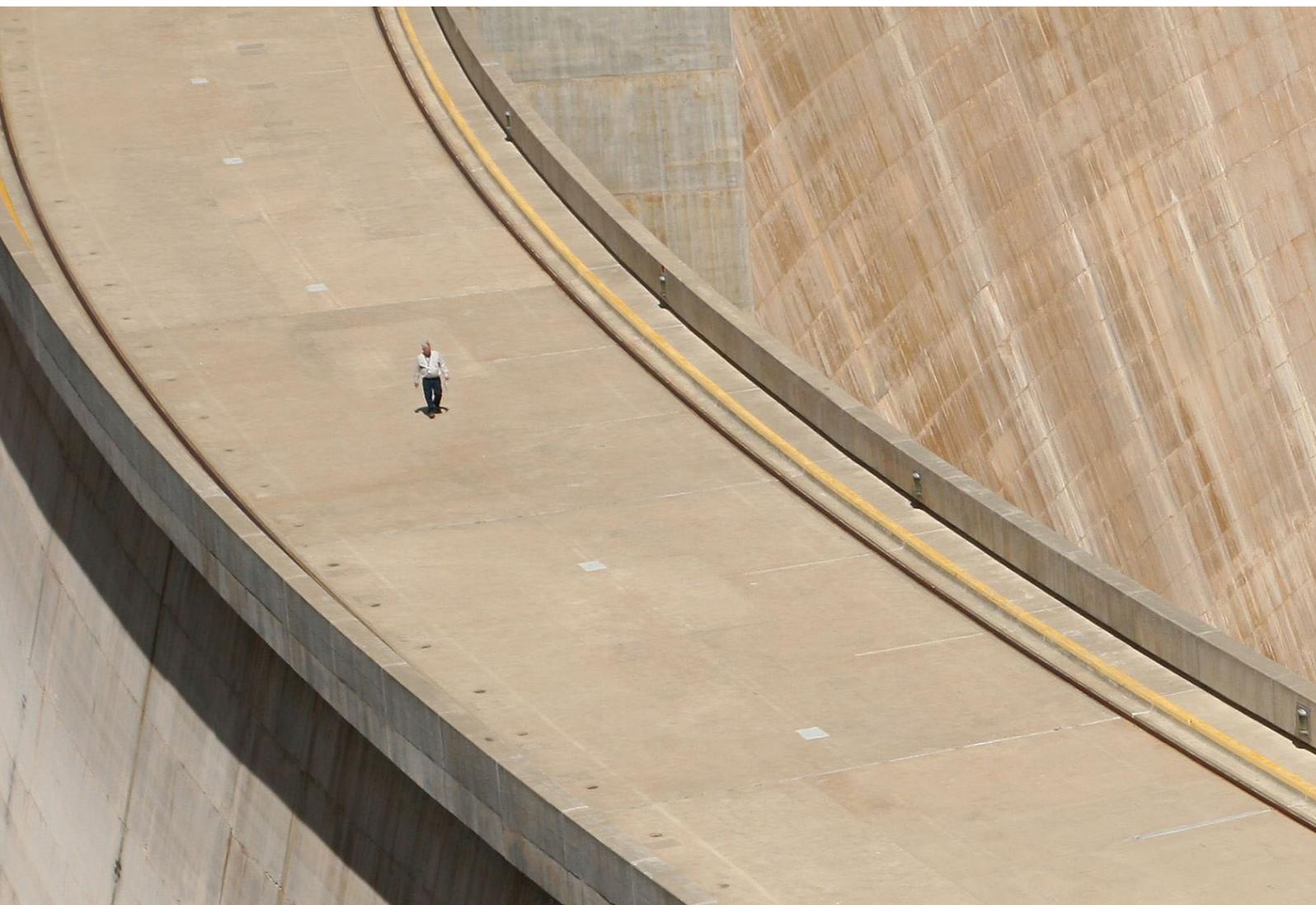


More from less — material resource efficiency in Europe  
2015 overview of policies, instruments and targets in 32 countries



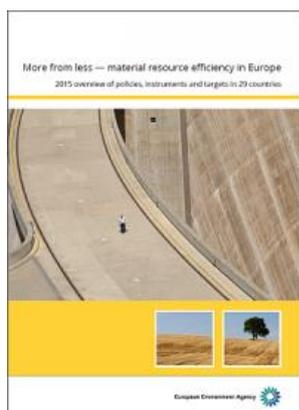
**Finland** 

May 2016



This country profile is based on information collected by Hanna Salmenperä and Johanna Laaksonen from the Finnish Environment Institute. This document should not be seen as an official list of government priorities and is not necessarily an exhaustive list of all national material resource efficiency policies, objectives, targets or activities in place. The information is current as of January 2016.

This country profile was prepared as part of the 2015 EEA review of material resource efficiency policies, that aimed to collect, analyse and disseminate information about the development and implementation of material resource efficiency policies in EEA member and cooperating countries. The work resulted in the following outcomes:



**32 short country profiles** (this document) – self assessments prepared by countries, describing the current status of material resource efficiency policies including key strategies and action plans, policy objectives, instruments, targets and indicators, and the institutional setup. Countries were also invited to share reflections on the future direction of resource efficiency policies.

**EEA report *More From Less – material resource efficiency in Europe*** – prepared by the EEA and ETC/WMGE, the report analyses trends, similarities and differences in policy responses, showcases selected policy initiatives from the countries, and offers some considerations for the development of future policies.

The EEA report *More from less – material resource efficiency in Europe* and the 32 country profiles are available at: <http://www.eea.europa.eu/resource-efficiency>

For information about trends and policies on municipal waste management in the participating countries, please visit: <http://www.eea.europa.eu/publications/managing-municipal-solid-waste>

Information about EU Member States' waste prevention programmes can be found at: <http://www.eea.europa.eu/publications/waste-prevention-in-europe-2015>

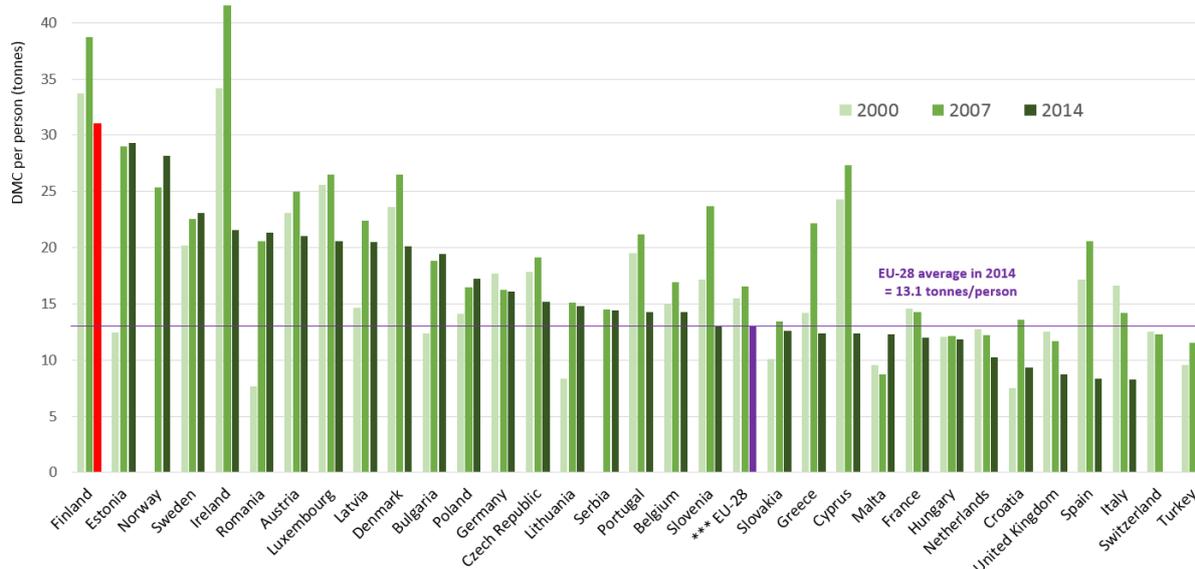
For information on climate- and energy-related policies, including those on energy efficiency, in the participating countries, please visit: <http://www.eea.europa.eu/themes/climate/ghg-country-profiles>

## Finland, facts and figures

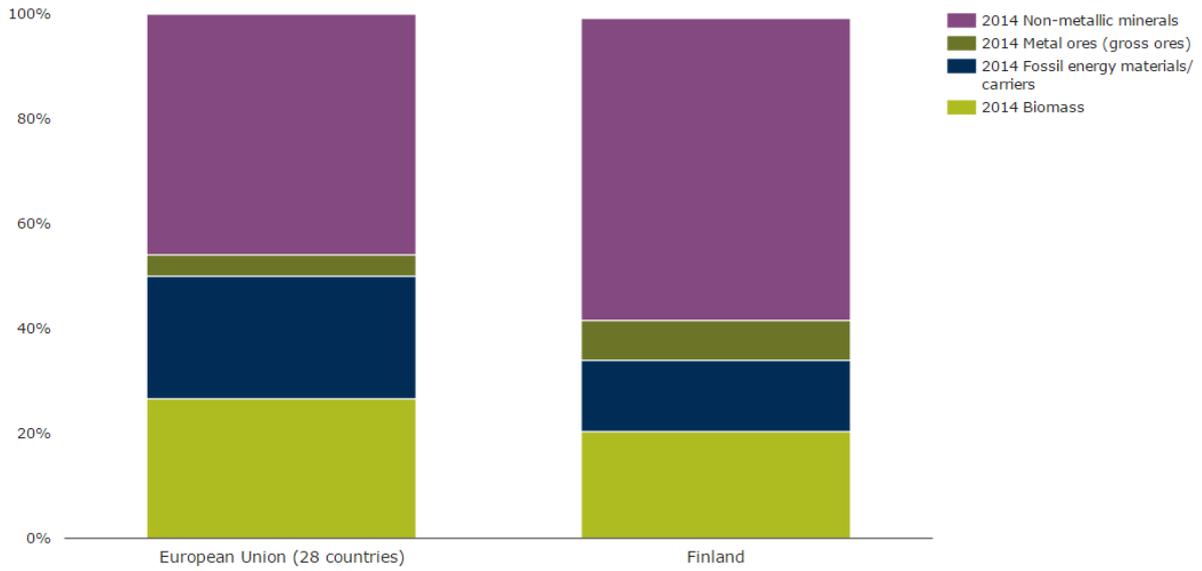
Source: Eurostat

	<p><b>GDP:</b> EUR 205 billion (1.5 % of EU-28 total in 2014)</p>
	<p><b>Per person GDP:</b> EUR 30,300 (in purchasing power standard) (111 % of EU-28 average per person in 2014)</p>
	<p><b>Use of materials:</b> 170 million tonnes DMC (2.6 % of EU-28 total in 2014) 31.1 tonnes DMC/person (238 % of EU-28 average per person in 2014) Resource productivity 1.10 EUR/kg (55 % of EU-28 average in 2014)</p>
	<p><b>Structure of the economy:</b> agriculture: 2.7 % industry: 27.0 % services: 70.3 % (2014 est.)</p>
	<p><b>Surface area:</b> 338,400 square kilometres (7.6 % of EU-28 total)</p>
	<p><b>Population:</b> 5.5 million (1.1 % of EU-28 total)</p>

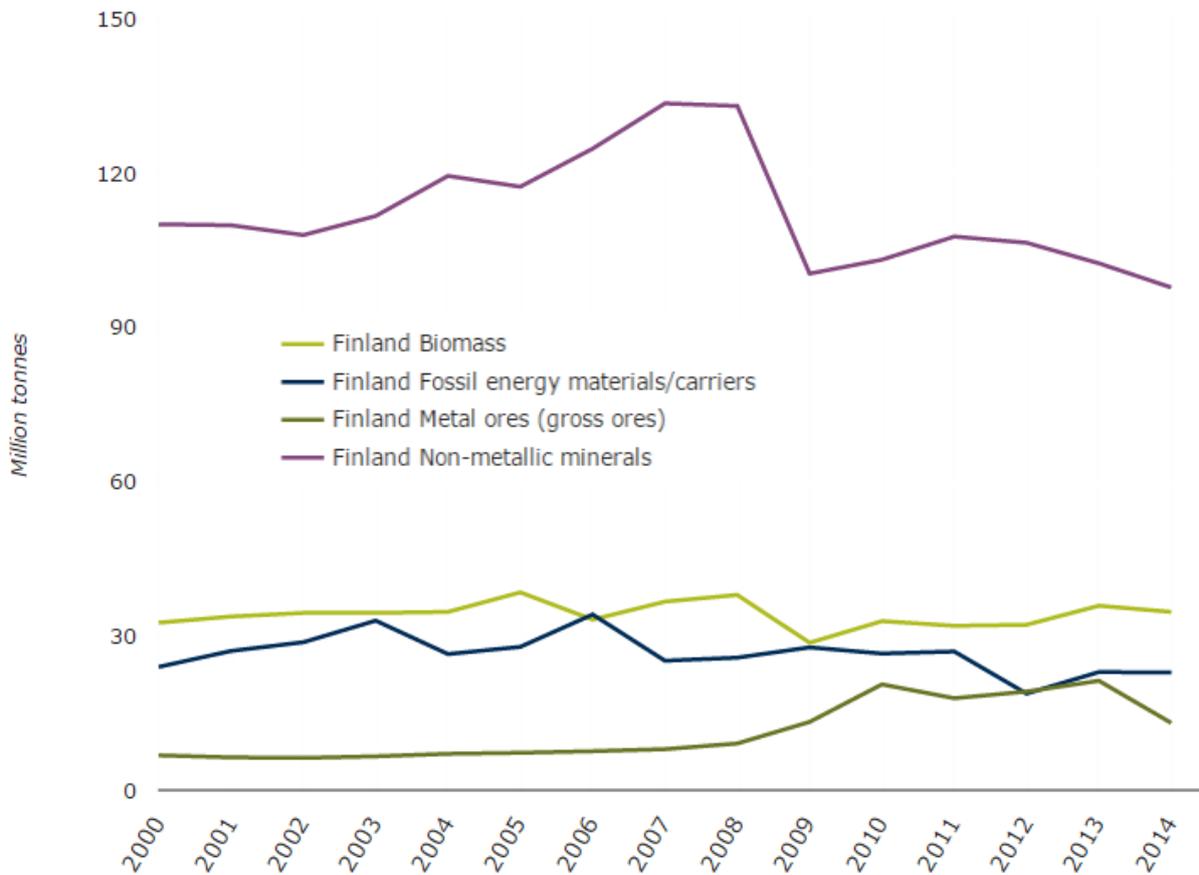
Use of materials (DMC) per person, participating countries and EU-28  
(2000, 2007 and 2014)



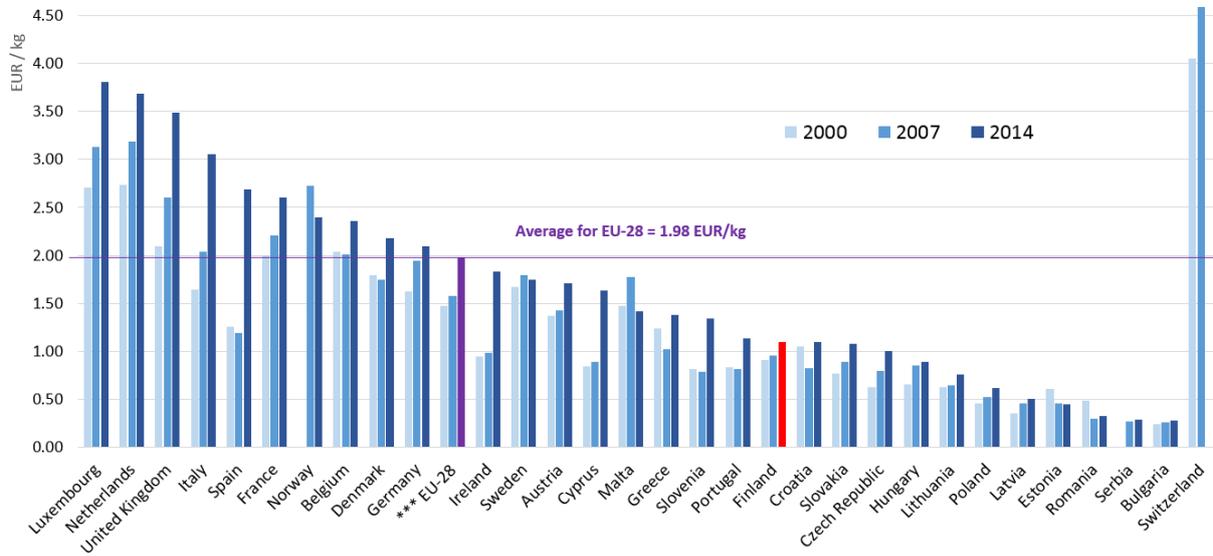
### Domestic material consumption by category, EU-28 average and Finland (2014)



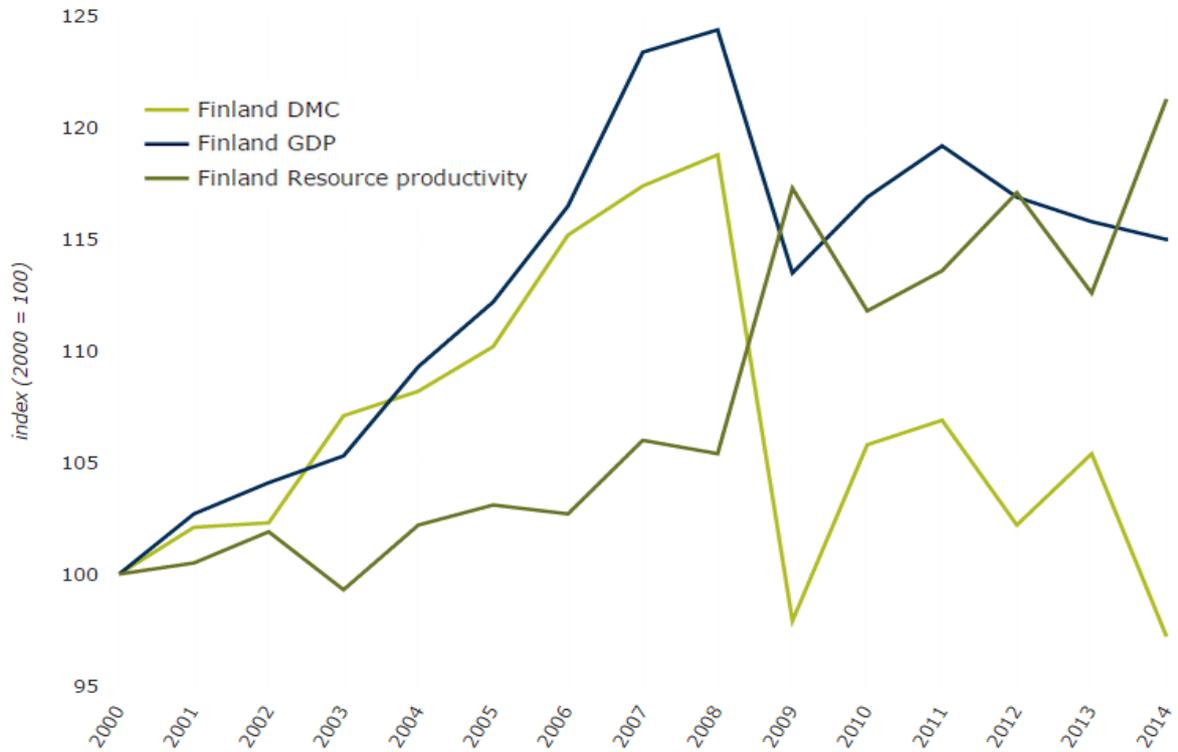
### Trends in material consumption, Finland by category (2000–2014)



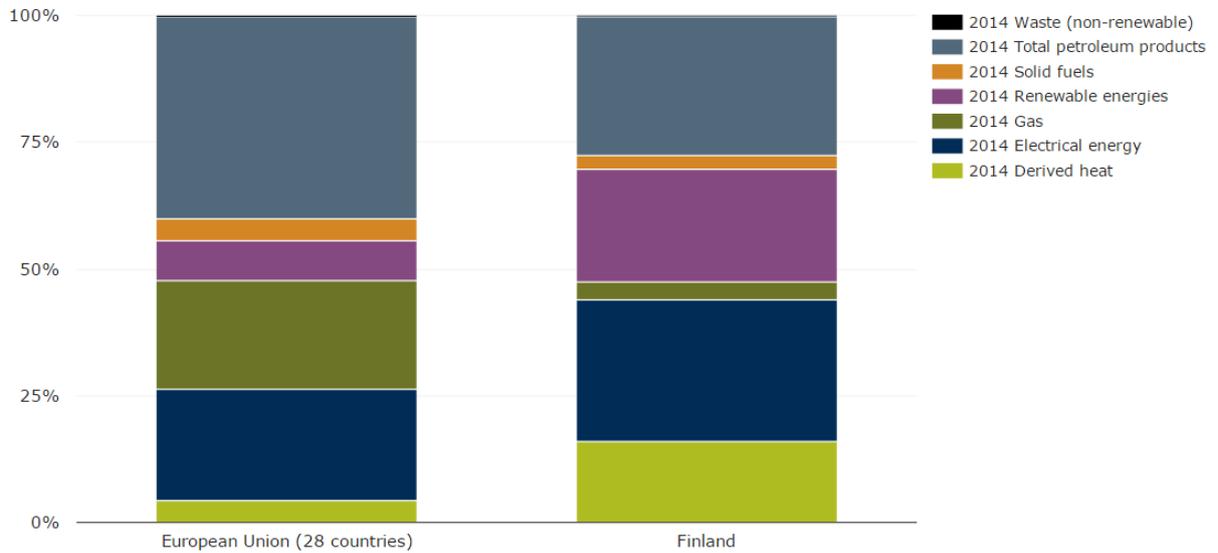
**Resource productivity (GDP/DMC), participating countries and EU-28  
 (2000, 2007 and 2014)**



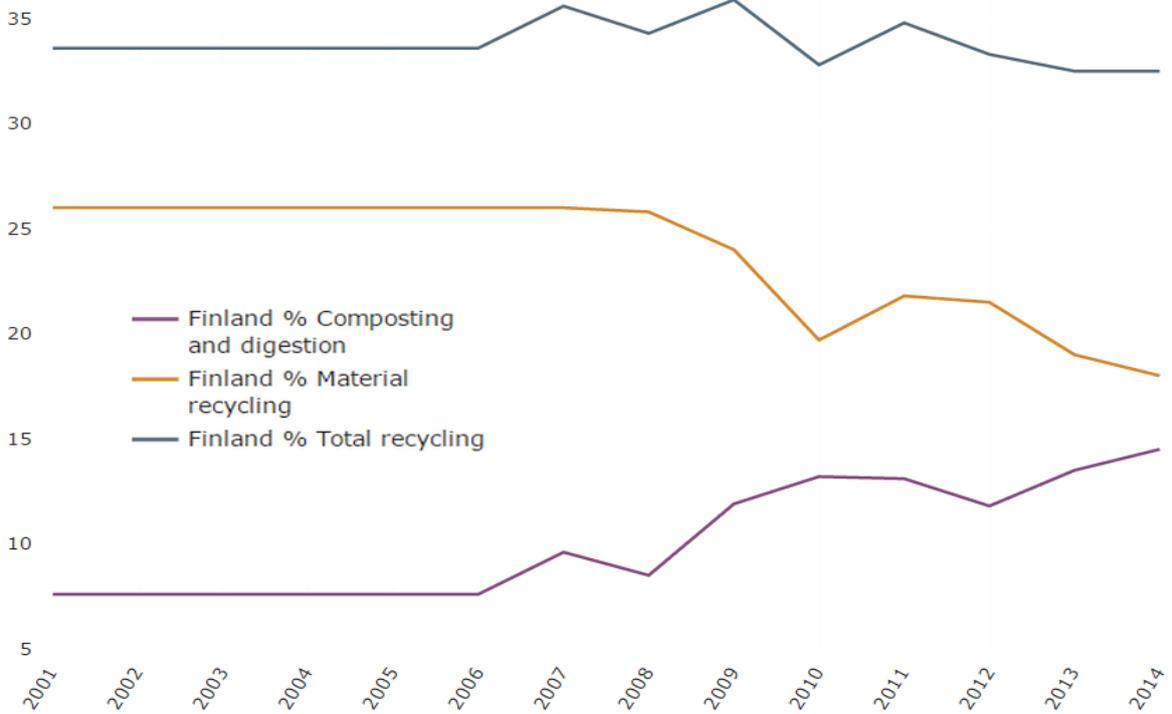
**GDP, DMC and resource productivity trends, Finland (2000–2014)**



### Share of final energy consumption by fuel type, EU-28 and Finland (2014)



### Recycling of municipal waste, Finland (2001–2014)



## Introduction

Finland does have a dedicated resource efficiency strategy, in the form of the 2013 National Material Efficiency Programme. [https://www.tem.fi/files/38764/TEMjul\\_8\\_2014\\_web\\_27022014.pdf](https://www.tem.fi/files/38764/TEMjul_8_2014_web_27022014.pdf)

There are also several other strategies, including the Bioeconomy Strategy (2014), that are strongly linked to the themes of material efficiency in Finland.

## Scope of material resource efficiency

According to the Material Efficiency Programme, material efficiency in production means the sparing use of natural resources, the effective management of secondary flows and wastes, a reduction in the volume of waste and the recycling of materials at different phases of a product's life cycle.

## Driving forces of material resource efficiency

Material efficiency programme describes conditions that affect the use of resources in Finland. Finland differs from many other EU countries in that it has many natural resources, such as minerals and forests, while it also has space and clean water. Finland also differs with respect to its consumption of materials. The country produces paper for more than 100 million people around the world, and aims to meet a significant portion of its renewable energy target sustainably with domestic bioenergy. Through the improved utilisation of waste and secondary flows as well as collaboration between different sectors, landfill will eventually become unnecessary. Ecodesign, in which the impact of the whole life cycle of a product is taken into consideration, also helps consumers make better choices.

Finland's per person consumption of energy and materials is high compared to most EU Member States and a correspondingly large amount of waste is generated. The reasons for this lie in Finland's production structure and conditions. The Finnish climate and cold winters and the sparse population scattered over long distances demand a lot of resources for the road system. The forest industry and mining sectors are major users of natural resources while infrastructure construction involves conditions that require a large amount of material. However, there is significant potential for sustainable use of resources.

## Priority material resources, sectors and consumption categories

### Priority materials

- Natural resources: water, forests, minerals and other natural products.
- Energy carriers like fossil fuels, and renewable and indigenous energy sources.
- Resources used in construction and the built environment.
- Waste (prevention, recycling, reuse).

### Priority industries and economic sectors

**Material Efficiency Programme:** no specific sectors are identified in the Programme, which has a generic character. In addition, industrial symbioses are seen as a new possibility.

**Bioeconomy Strategy:** timber construction, food industry, chemical industry, health sector, service industry, clean-tech business.

**Programme for material efficiency in the field of real estate and construction:** specific attention paid to materials used in the real estate and construction sector.

### Priority consumption categories

Housing, food and transport.

## Policy framework

### National strategies or action plans for material resource efficiency

According to Finland's National Material Efficiency Programme, material efficiency involves the sparing use of natural resources, the efficient management of by-products, a reduction in the volume of waste and the recycling of materials at different phases of the life cycle. The goal is also to reduce harmful impacts to the environment throughout the life cycle of a product. Material efficiency can be seen at different phases of the value chain: in the production, refining, trade and consumption of raw materials as well as the sustainability of products or an opportunity for reuse, recycling and waste recovery.

Bioeconomy as a key strategy in Finland is strongly connected to resource efficiency. Over the decades, Finland has accumulated considerable expertise in refining biomass, and a strong industrial framework. The most important renewable resources in Finland are the biomass, or organic matter, in forests, soils, fields, water bodies and the sea, and fresh water. Ecosystem services are the services offered by the environment, including carbon dioxide sequestration and opportunities for recreation. Another key aspect of the bioeconomy is not wasting natural resources but using and recycling them efficiently.

- **The Strategic Programme of Prime Minister Juha Sipilä's Government (29 May 2015): Finland, a land of solutions**, available in Finnish, Swedish and English. <http://valtioneuvosto.fi/en/sipila/government-programme>
- Finland has a **National Material Efficiency Programme** (2013), the goal of which is to stimulate the development of the European Union's (EU) material resource efficiency policy instruments. The focus of the Programme is to promote material efficiency so that there are fewer harmful environmental impacts and the competitiveness of companies is enhanced. Measures focus on the development of seamless environmental administration and company performance and assessment tools. The Material Efficiency Programme forms an entity with cutting-edge bioeconomy, sustainable mining and clean-tech projects. [https://www.tem.fi/files/38764/TEMjul\\_8\\_2014\\_web\\_27022014.pdf](https://www.tem.fi/files/38764/TEMjul_8_2014_web_27022014.pdf)
- **A Natural Resource Strategy for Finland: Using natural resources intelligently** (2009), available in Finnish, Swedish and English. [http://www.sitra.fi/fi/Innovaatiotoiminta/kansallinen\\_luonnonvarastrategia/materiaaleja/materiaaleja.htm](http://www.sitra.fi/fi/Innovaatiotoiminta/kansallinen_luonnonvarastrategia/materiaaleja/materiaaleja.htm)
- **The Finnish Bioeconomy Strategy: Sustainable growth from bioeconomy** (2014), available in Finnish, Swedish and English. <http://www.biotalous.fi/facts-and-contacts/finnish-bioeconomy-strategy/?lang=en>
- **The Programme to Promote Sustainable Consumption and Production: Getting more from less** (2005), revised in 2012. [http://www.ym.fi/en-US/The\\_environment/Sustainable\\_consumption\\_and\\_production/Programme\\_to\\_Promote\\_Sustainable\\_Consump%2810503%29](http://www.ym.fi/en-US/The_environment/Sustainable_consumption_and_production/Programme_to_Promote_Sustainable_Consump%2810503%29)
- **Towards a recycling society: National Waste Plan until 2016** (2008), available in Finnish, Swedish and English. [http://www.ym.fi/en-us/The\\_environment/Waste/The\\_National\\_Waste\\_Plan](http://www.ym.fi/en-us/The_environment/Waste/The_National_Waste_Plan)
- **Finland's Mineral Strategy** (2010), available in Finnish, Swedish and English. <http://www.mineraalistrategia.fi/>
- **Finland's Energy and Climate Strategy**, updated 2013. [http://www.tem.fi/files/36292/Energia-ja\\_ilmastostrategia\\_nettijulkaisu\\_ENGLANNINKIELINEN.pdf](http://www.tem.fi/files/36292/Energia-ja_ilmastostrategia_nettijulkaisu_ENGLANNINKIELINEN.pdf)

## The circular economy and closing material loops

According to the **Strategic Programme of Prime Minister Juha Sipilä's Government** (2015), the growing opportunities offered by a circular economy are to be utilised, with a focus on achieving the greatest impact. Measures to promote a good ecological status for the Baltic Sea – one of the main areas of focus – are being implemented in cooperation with domestic and international actors. Amounts of nutrients and organic material leaching into the waters will be reduced, while the nutrient and energy self-sufficiency of agriculture will be enhanced. The recovery of nutrients will be increased, especially in areas that affect the Baltic Sea and other water bodies, so that at least 50 % of the manure and community wastewater sludge will undergo advanced treatment processes by 2025. The recycling rate of municipal waste will be raised to at least 50 %. Taking recyclable waste to landfill will be prohibited by law from 2025. The Waste Act will be amended so that the privileges given to municipalities in the Waste Act are restricted to residential waste, taking into account special local features.

**The new National Waste Management Plan and Waste Prevention Programme**, which are designed to support the circular economy, are being prepared and are expected to come into effect in 2017. The steering group has approved seven goals, which represent the anticipated status of waste management in Finland in 2030. [www.ymparisto.fi/valtsu](http://www.ymparisto.fi/valtsu) (only in Finnish)

The goals are as follows:

- waste management will be part of Finnish circular economy;
- material-efficient production and consumption are resource efficient and create new job opportunities;
- waste quantities have diminished and recycling has reached a new level;
- markets for recycled materials and products are working well;
- the recovery of valuable raw materials, even those found in small concentrations in recyclables, is efficient;
- harmful substances are being recovered safely from material cycles and, at the same time, less harmful substances are being used in production processes;
- quality research and pilot projects are underway on waste management and the level of waste management in general is high.

## General policy objectives for material resource efficiency

Finland sees resource efficiency as a possibility in solving many challenges. The government objective is to replace imported fossil fuel-based energy with clean and renewable domestic energy and to see a growth in clean-tech enterprise, the sustainable use of natural resources, diversified rural enterprises and an efficient circular economy, all contributing to the creation of new jobs.

According to Finland's National Material Efficiency Programme, material efficiency involves the sparing use of natural resources, the efficient management of secondary flows and by-products, a

reduction in the volume of waste and the recycling of materials at different phases of the life cycle. The goal is also to reduce harmful impacts to the environment throughout the life cycle of a product. Material efficiency can be seen at different phases of the value chain: in the production, refining, trade and consumption of raw materials as well as the sustainability of products or an opportunity for reuse, recycling and waste recovery.

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**The National Material Efficiency Programme** proposes eight measures for the advancement of material efficiency. The Programme's objectives are: to create preconditions for ecologically sustainable growth and employment; to promote competitiveness and balanced operational preconditions for business; to utilise non-renewable natural resources in a sustainable manner; and to promote the production of high added-value products based on strong knowledge and skills.

The goal of the Programme is '*sustainable growth through material efficiency*', aiming simultaneously at economic growth, the sensible use of natural resources, and disengagement from harmful environmental effects.

The Programme proposes that a research and innovation programme be established to increase knowledge, improve the flow of information and create synergy between different players. To improve the operational environment of companies, the Programme proposes that the administrative burden be eased by, among other things, clarifying the waste and environmental permit system. This would make it easier to introduce new technologies, to implement reference and experimental facilities rapidly and in an appropriate manner, and to utilise waste and industrial secondary flows in a sustainable way.

A proposal for easing and clarifying the procedure for environmental permits is firmly connected with the government's structural policy programme of 30 August 2013 and the decision on its implementation, made on 29 November, 2013.

The National Material Efficiency Programme also proposes support for a fixed-term material review project. This would be used to encourage companies to clarify the flow of materials and to recognise possibilities for greater efficiency with the help of a model developed by Motiva Oy. The model has been successfully tried in a few companies, resulting in savings in material costs of up to 20 %. Simplified methods need to be made available for small and medium-sized enterprises. In addition, the Programme proposes the trial implementation of a material-efficiency contract between the administration and companies as a way of spurring material efficiency – something that has worked well in the Netherlands. In addition, the Programme calls for the strengthening of EU preparations for material and resource efficiency regulations.

[https://www.tem.fi/files/38764/TEMjul\\_8\\_2014\\_web\\_27022014.pdf](https://www.tem.fi/files/38764/TEMjul_8_2014_web_27022014.pdf)

**The Programme to Promote Sustainable Consumption and Production, Getting more from less,** (2005) was revised in 2012. The revised Programme, **More from less – wisely**, aims to reduce the environmental impacts and greenhouse gas emissions of households and the public sector. Launched in 2013, the Programme aims to give people new ways of reducing the environmental impact of their everyday lives, especially in three key areas: housing, food and transport. It proposes that the state and municipalities set an example by creating the preconditions for more sustainable solutions. This will also create new jobs in, and opportunities for, the green economy. The Programme aims to promote energy-smart and comfortable living, high-quality food without waste and smooth and environmentally friendly transport. [http://www.ym.fi/en-US/The\\_environment/Sustainable\\_consumption\\_and\\_production/Programme\\_to\\_Promote\\_Sustainable\\_Consump%2810503%29](http://www.ym.fi/en-US/The_environment/Sustainable_consumption_and_production/Programme_to_Promote_Sustainable_Consump%2810503%29); <http://www.ym.fi/download/noname/%7B11E6CBCF-402F-4338-848A-A6F7676D0ADD%7D/58318> (brochure in English)

The objective of the 2014 **Finnish Bioeconomy Strategy** is to generate new economic growth and new jobs *from an increase in the bioeconomy business and from high added-value products and services while securing the appropriate operating conditions of natural ecosystems*. The leading idea of the Strategy is that competitive and sustainable bioeconomy solutions for global problems will be created in Finland, and that new business will be generated both in Finnish and international markets, thus boosting the welfare of the whole of Finland. The vision and quantitative targets of the Bioeconomy Strategy will be implemented by means of four strategic goals:

1. *a competitive operating environment for the bioeconomy* – a competitive operating environment will be created for bioeconomy growth;
2. *new business from the bioeconomy* – new business will be generated in the bioeconomy by means of risk financing, bold experiments and the crossing of sectoral boundaries;
3. *a strong bioeconomy competence base* – the bioeconomy competence base will be upgraded by developing education, training and research;
4. *accessibility and sustainability of biomass* – the availability of biomass, well-functioning raw material markets and the sustainable use of biomass will be secured.

**The National Waste Plan until 2016.** The government has approved this National Waste Plan on the proposal of the Ministry of the Environment. It contains proposals for measures aimed at promoting the rational use of natural resources, developing waste management, combating the hazards caused by waste and preventing its environmental and health impacts. The term ‘natural resources’ is not defined in the Plan; however the first objective states that: ‘Studies will be carried out on which natural resources should, from the point of view of the environmental policy, be subjected to economic steering’. The Plan will remain in force until 31 December 2016 or until the coming into force of the next waste plan.

The central objective of waste policy is to reduce the harmful health and environmental impacts of waste. In order to meet this objective, it is particularly important to:

- prevent the generation of waste;
- promote reuse of waste;
- promote biological recovery of waste and recycling of materials;
- promote energy use of waste not suited for recycling;
- ensure that the treatment and disposal of waste does not cause any harmful impacts.

The main climate-related objective of waste policy is to reduce the greenhouse gas emissions generated by waste, particularly by reducing methane emissions resulting from treatment at landfill sites. In order to reach the objective, the amount of biodegradable waste sent to landfill will be substantially reduced, while at the same time measures will be taken to increase the recovery rates of methane generated at landfill sites.

A new National Waste Management Plan is under development.

In 2012, the Ministry of the Environment appointed a working group to highlight the perspective of **material efficiency in the field of real estate and construction**, and create a framework for realising the objectives outlined in the EU Waste Framework Directive. The target year for implementing the measures envisaged in the programme is 2020, and progress is being monitored annually. The working group suggested the following measures:

- the life-cycle flexibility and material efficiency of new construction should be improved;
- systematic property maintenance, economical renovation and the recycling of construction waste in renovation should be promoted;
- the material efficiency expertise of the real estate and construction sector should be improved;
- waste management guidance, reporting and statistics on construction projects should be developed;
- the regional availability of construction waste management and utilisation services should be ensured;
- the prerequisites for reuse and recycling of construction materials, especially wood, should be improved;
- technology related to the sorting and recycling of construction materials and waste should be promoted.

[http://www.ymparisto.fi/fi-FI/Ymparisto/Jatteet/Rakennusjatteesta\\_arvokkaaksi\\_resurssiksi%2829942%29](http://www.ymparisto.fi/fi-FI/Ymparisto/Jatteet/Rakennusjatteesta_arvokkaaksi_resurssiksi%2829942%29)

(only in Finnish)

## Institutional set-up and stakeholder involvement

### Institutional set-up for material resource efficiency policies

The material and resource efficiency policies mainly address the Ministries of Environment, Employment and the Economy, Transport and Communications, Agriculture and Forestry, and Finance.

In addition, there is a group of governmental organisations like Sitra – the Finnish Innovation Fund, a public fund reporting directly to Finnish Parliament – implementing material efficiency policy among other topics. Sitra's tasks are defined by law. Sitra has a strong focus on sustainable development. During 2012, it adopted a project-based organisational model that focuses on three themes: empowering society, resource-wise and carbon-neutral society, and new working life and sustainable economy.

In addition, a number of different funding organisations – such as the Finnish Funding Agency for Technology and Innovation (Tekes) and governmental agencies which administer, for example, the European Regional Development Fund (ERDF) – are promoting material resource efficiency policies. The themes and programmes of these organisations are closely linked to general resource efficiency targets.

### Process to ensure stakeholder participation

All strategies and initiatives are commonly built in broad cooperation with different stakeholders in Finland. A good example of this is the National Waste Plan, which engages all major parties within the waste field to join the process from beginning to end.

## Policy instruments

### Policy instruments commonly used for material resource efficiency

There is a wide range of different policy instruments in place to promote efficient use of materials in Finland. Regulatory and economic instruments have been seen to be the most effective, some of which are described below.

#### **Government Decision on Energy Efficiency Measures (2010)**

The promotion of energy efficiency in Finland and the measures this requires are increasingly based on the common objectives set by the EU. Efforts to achieve the EU's energy efficiency objectives are

being made through, for example, regulations promoting energy services and the energy efficiency of equipment, buildings and vehicles.

Trading in carbon dioxide emissions also provides incentives for improving energy efficiency. Furthermore, obligatory renewable energy targets and the target for reducing greenhouse gases outside emissions trading require substantial efficiency improvements in final energy consumption.

### **Government decision-in-principle on the promotion of sustainable environmental and energy solutions (clean-tech solutions) in public procurement**

The goal of the government decision-in-principle on the promotion of environmental and energy solutions (hereinafter referred to as clean-tech solutions) in public procurement is to reduce energy and material consumption and adverse environmental impacts for the entire life cycle of the product, service or building, as well as to create incentives for the creation and implementation of new clean-tech solutions.

Clean-tech solutions are products, services, processes and systems that promote the sustainable use of natural resources and reduce adverse environmental impacts. Solutions that are defined as clean-tech are better and more effective in terms of their environmental impact than typical alternatives for the duration of their life cycle. This often means a reduction in costs over the entire life cycle.

The goal of the decision-in-principle is to promote the creation and implementation of clean-tech solutions as first references. First references are new or essentially improved clean-tech solutions.

Clean-tech solutions include, among others, those which improve material and energy efficiency and enhance processes, solutions and services which have less impact on the state of the environment, and measurement and monitoring solutions. The applicability of clean-tech solutions is always assessed on a case-specific basis in procurements.

The decision-in-principle requests the public sector to promote clean-tech solutions, placing an emphasis on the creation and implementation of first references in all its procurements, but particularly in construction, the energy sector, transport and waste management. In order to achieve the goals laid out in the decision-in-principle and attain as much influence as possible, it is vital that the governmental and municipal sector adhere to its goals.

### **Drinks packaging tax**

Drinks packaging taxes are currently paid on packaging for alcoholic beverages, beer and soft drinks. Bottled water and certain other drinks packages are also subject to the tax. This form of taxation aims to further encourage the reuse of drinks packages, to reduce the quantity of such materials ending up in landfill, and to prevent litter.

The taxation level currently amounts to EUR 0.51 per litre. This tax does not apply to packaging covered by approved returnable deposit systems that involve the collection of packaging for refilling or material recycling.

Finland's returnable deposit system is defined in special legislation on the taxation of the manufacture of certain types of drinks packaging (1037/2004), as well as statutes in the Waste Act and a related decree on collection systems for returnable drinks packaging (180/2005).

Finland's deposit-based system for beverage packaging enables the efficient collection of packaging for recycling. The deposits encourage consumers to return empty beverage packaging for recycling.

This prevents it from ending up in the environment or in mixed waste. The deposit is a good incentive for recycling. Other aspects, such as the location of the nearest return point and the functionality of the reverse vending machines, affect the will to recycle.

Habits and attitudes also have an effect: in Finland, returning bottles is learned in childhood, and it is considered important. Therefore, the recycling rates of beverage packaging in Finland are among the best in the world.

### Examples of good practice

**Sitra – the Finnish Innovation Fund**, is an independent public foundation operating directly under the supervision of the Finnish parliament. Sitra's decision-making processes are tied to parliamentary systems. Sitra's administration includes a Supervisory Board, Board and President. Administration and accounts are audited by accountants appointed by parliament.

It is a future-oriented organisation that promotes Finland's competitiveness and the well-being of the Finnish people. Sitra anticipates societal change, tries out new operating models and accelerates business activities aimed at creating sustainable well-being.

Sitra provides funds for surveys, forward-thinking activities, experiments, and shared strategy processes that promote well-being and are ecologically and socially sustainable. Project funding must be related to Sitra's themes or key areas. Material resource efficiency is especially represented under the theme of a Resource-Wise and Carbon-Neutral Society, which aims to create the conditions necessary for the advancement of the theme itself as well as encouraging businesses that promote it. All of Sitra's operating activities are funded by the return on its endowment capital and corporate investments. From Sitra's Annual Report 2014, it can be seen that in 2014 the total costs of the Resource-Wise and Carbon-Neutral Society project was EUR 1.9 million.

<http://www.sitra.fi/en>; <http://www.sitra.fi/en/news/organisation/sitras-annual-report-2014-future-built-taking-action-today>

**Motiva Oy**, a state-owned company, promotes material and energy efficiency on a national level. Motiva produces expert services in order to promote efficient energy and material use in Finland. The company's services are utilised by public administration, businesses, communities and consumers. **The Material Efficiency Centre** was established in Motiva in spring 2008. The Centre aims at being a well-known and independent national coordinator, information source and networker in the field of material efficiency. The Centre initiates and coordinates interactive networks of material-efficiency professionals and acts as a data and knowledge centre. Motiva promotes material efficiency by emphasising the importance of pro-activity and early adaptation. The best results in material efficiency are achieved by early intervention in planning and by promoting ecodesign. In an optimal situation, the whole value chain benefits from life-cycle considerations in product development. <http://www.motiva.fi/en>

Motiva's key services include material efficiency audit tools for companies and help for environmental technology procurement. The material audit procedure was developed

collaboratively by Motiva, the target companies and audit consultants. This development work was carried out in connection with the first pilot audits made in five medium-sized companies, which detected a significant number of concrete measures for improvement. Companies started carrying out the improvement measures as soon as the results of the audits were clarified. The savings potential of the measures identified was EUR 0.3 –1 million per company, of which 20–50 % is realised during the first year of implementation. A systematic analysis of the material flows of the process will bring together the savings measures related to various activities and material flows, as well as enabling the discovery of wholly new savings targets.

Motiva also acts as a focal point for sustainable and innovative public procurement, giving advice and consultancy services to public procurers around sustainable and clean-tech procurements, and covering all stages of the procurement process. The objective of the service is to provide product-group-specific procurement guidance and advice according to the knowledge base and ambition level of the procuring entity. [http://www.motivanhankintapalvelu.fi/in\\_english](http://www.motivanhankintapalvelu.fi/in_english)

During the year 2013, Motiva together with Sitra undertook a pilot project on how the British National Industrial Symbiosis Programme (NISP) model could be applied to Finland. The project, which was funded by Sitra, the Ministry of Employment and Economy and the Ministry of the Environment, aimed to test NISP working methods and to discover what would be the most effective way of promoting industrial symbiosis at the national level in Finland. The project assessed the possibility of implementing a programme and proposed a plan for its preparation.

The working methods of NISP were tested by arranging three workshops bringing together companies and other organisations in different cities: Helsinki, Jyväskylä and Rauma. In these workshops, 548 resources and 640 potential synergies were identified. After the workshops Motiva input the resource data into the SYNERGie database and worked on facilitating these synergies with about 40 companies. This experience showed that the NISP methodology, based on facilitated industrial symbiosis, is functional and that it is a great opportunity for companies to develop new cross-sectoral business cooperation and to work in a more resource-efficient and sustainable way.

Based on the results of the pilot project, Motiva has prepared a full-scale national approach called Finnish Industrial Symbiosis System (FISS). The system is based on NISP methodology adapted to the Finnish operational environment. Motiva acts as a national coordinator and the delivery is organised by regional delivery bodies. [http://www.motiva.fi/toimialueet/teolliset\\_symbiosit](http://www.motiva.fi/toimialueet/teolliset_symbiosit) (only in Finnish)

### **Carbon Neutral Municipalities (HINKU)**

In 2008, five Finnish municipalities committed themselves to act as laboratories by striving to curb their carbon dioxide emissions ahead of schedule. When the project was launched in 2008, five municipalities were committed to an 80 % reduction in greenhouse gas emissions relative to the 2007 level by 2030. Since then, several new municipalities have made the same commitment. The project is coordinated by the Finnish Environment Institute. A large group of companies and experts are involved as partners.

The Carbon Neutral Municipalities project brings municipalities, businesses, citizens and experts together to create and carry out solutions to reduce greenhouse gas emissions. The municipalities involved are committed to reducing emissions more extensively and rapidly than EU targets and schedules would require. The project aims to create solutions that have economic and social benefits as well as environmental advantages.

The municipal authorities, business representatives, local residents, research institutes and experts work together to devise and tailor new cost-effective solutions for reducing emissions, especially in the contexts of transportation, housing and food. Information about the new tools and ideas are publicised in Finland and internationally. <http://www.hinku-foorumi.fi/en-US>

### **Finnish Sustainable Communities (FISU)**

This is a new network for forerunner municipalities aiming at carbon neutrality, no-waste and globally sustainable consumption by 2050. In a FISU municipality, companies and other local actors build a common vision and a roadmap to achieve their targets. Partners identify new possibilities for cooperation and ways of working. The aim is to strengthen the local economy, create jobs and promote sustainable well-being. The cities of Forssa, Jyväskylä, Lappeenranta and Turku currently belong to FISU. The network is coordinated by the Finnish Environment Institute and Motiva. FISU is steered by an advisory committee comprising representatives from Sitra, Motiva, the Finnish Environment Institute, the Finnish Funding Agency for Innovation Tekes, the Association of Finnish Local and Regional Authorities, the Ministries of Environment, Employment and the Economy, Transport and Communications, and Agriculture and Forestry, and the FISU municipalities.

In the 2013–2015 joint project Towards Resource Wisdom, Sitra and the city of Jyväskylä developed an operating model through which cities and municipalities can promote the wise use of natural resources and create the preconditions for sustainable well-being and success. The operating model was piloted in Forssa, Lappeenranta and Turku in spring 2015, by drawing up a resource-wisdom roadmap for each city.

Many cities have expressed an interest in joining FISU, which is currently searching for new members. Becoming a member requires that the region adopts the resource-wise operating model and commits to setting zero-waste and zero-carbon targets for 2050 or sooner. <http://www.fisu-verkosto.fi/fi-FI> (currently only in Finnish)

While network members compete to see who will reach the targets the fastest, they also share information on best practice. This way, the best ideas are spread and also have a positive impact outside the regions where they were created.

The FISU network currently operates only in Finland, but the plan is to extend it beyond Finland's borders at some stage. Climate change and dwindling natural resources are topical themes all over the world. The FISU network's operating model attracted a lot of interest at the World Resources Forum in Peru and at the European Resources Forum in Berlin in 2014.

International cooperation is already conducted between large cities through, for instance, the C40 Cities Climate Leadership Group. The FISU network also offers a cooperation platform for smaller cities, and by extending it into an international network FISU could help revitalise regions and stimulate sustainable development activities anywhere in the world. <http://www.fisu-verkosto.fi/fi-FI> (only in Finnish)

### **Tekes – the Finnish Funding Agency for Innovation**

Tekes is the most important publicly funded expert organisation for financing research, development and innovation in Finland, and works with the country's top innovative companies and research units. Every year, Tekes finances some 1 500 business research and development projects, and

almost 600 public research projects at universities, research institutes and universities of applied sciences. Research, development and innovation funding is targeted to projects that create in the long-term the greatest benefits for the economy and society. Tekes does not derive any financial profit from its activities, nor claim any intellectual property rights. <http://www.tekes.fi/en/tekes/>

Tekes has had and still has several funding programmes aiming towards better material resource efficiency.

- **Green Growth programme 2011–2015.** The aim of the Green Growth programme is to identify potential new growth areas for the sustainable economy business, which are essentially based on lower energy consumption and sustainable use of natural resources. The programme aims at a leap forward in energy and material efficiency of production and service chains over the entire life span of products. The programme is aimed for companies seeking to grow or renew their business in the face of changes in energy and raw material prices and impacts of laws and regulations. The programme will support the generation of new innovations especially on boundaries between sectors, as future sustainable economy solutions will not be defined by traditional sectoral divisions. Research organisations will play an important role in generating new anticipatory information and skills.
- **Green Mining programme 2011–2016.** The main objective of the Green Mining programme by Tekes is to make Finland a global leader of sustainable mineral industry by 2020. The programme creates new business that requires new, specialised expertise alongside the growing field of traditional mining. A central goal is to increase the number of SMEs targeting the export market in the mineral cluster. The programme aims to achieve global leader status for the research in selected sectors. The central content of the programme consists of two thematic areas: 1) Intelligent and minimum-impact mines and 2) New mineral resources.

Under the **Programme to Promote Sustainable Consumption and Production**, several tools and pilot projects have been developed to promote sustainable consumption in everyday life. A few examples follow.

- The **Peloton Club is a centre for energy-smart start-ups.** The idea is to help start-ups to create solutions for the world's biggest challenges, such as energy and resource scarcity. [www.peloton.me](http://www.peloton.me) (only in Finnish)
- The **Ekokoti – ecological solutions to everyday life** project provided tools for households to estimate their environmental effects and to make choosing sustainable services and products easier. <http://www.syke.fi/hankkeet/ekokoti> (only in Finnish)
- The **Ilmastolounas (Climate Lunch)** project provided guidelines for a 'climate lunch', which is served in public canteens. <https://portal.mtt.fi/portal/page/portal/mtt/hankkeet/ilmastolounas> (only in Finnish)
- The **Save the Food** project undertook a pilot scheme to establish the feasibility of sharing left-over food and groceries between the inhabitants of a housing cooperative. In addition, an internet portal was created providing information on where to buy sustainable grocery bags. <http://www.saasyoda.fi/> (only in Finnish)

## Targets and indicators

### Targets for material resource efficiency

The quantitative objectives concerning waste prevention and recovery in the **National Waste Plan** are as follows.

- The amount of municipal waste should stabilise at the level of the early years of this century (2.3–2.5 million tonnes annually) and then ensure that the trend will be downwards by the year 2016.
- In 2016, some 50 % of all municipal waste is to be recycled for materials and 30 % used for energy recovery. Not more than 20 % of the total should be sent to landfill. Municipal waste includes waste generated by households and similar waste generated by industrial, service and other operations.
- By 2016, 100 % of municipal sludge should be recovered, either to be used as energy or for soil conditioning. It is estimated that the amount of municipal sludge generated will remain more or less at present levels.
- All manure generated in connection with rural businesses should be recovered. Some 10 % of this or about 2.1 million tonnes would be treated in biogas plants at farms. At least 10 % of all sludge generated in rural areas and collected using septic tanks and cesspools would also be treated in these plants. The aim is that in 2016, some 90 % of all sludge generated in rural areas would be treated in wastewater treatment plants and the remaining 10 % in biogas plants at farms. Tighter legislation on wastewater emissions in rural areas will probably increase the amount of sludge generated outside built-up areas.
- In 2016, at least 70 % of all construction waste will be used for material and energy recovery. The focus of construction is expected to shift from new construction to renovation, which would also mean that most of the construction waste would be generated in connection with renovation.
- By 2016, some 5 % (3–4 million tonnes) of the gravel and crushed stone used in earthworks should be replaced by waste generated by industry and mineral extraction.

There is not enough information available on other industrial waste categories and therefore no quantitative objectives can be set for them.

In the **Programme to Promote Sustainable Consumption and Production**, targets for purchases made by central government organisations are as follows.

- Purchased electricity should come from renewable sources.
- By 2017 new public buildings should all be near-zero-energy buildings.
- Finnish public-sector workers have been striving to rearrange their working routines so that they will have travelled 10 % less in 2015 compared to 2010. By 2015 all vehicles purchased for mass transport should have emissions lower than 100 grams per kilometre, or at least 30 % of vehicle fleets should use electric, ethanol, gas or hybrid solutions.
- Catering facilities should systematically save energy, reduce food waste, and increase the share of organic food to 10 % by 2015 and 20 % by 2020.

Procurement officials will be obliged to follow a new set of environmental purchasing principles, including energy efficiency considerations and the use of life-cycle analyses when assessing the impacts of alternative products and services. Progress towards these targets will be closely monitored.

### Indicators to monitor the use of materials and resource efficiency:

The 2013 National Material Efficiency Programme recognised that monitoring material efficiency is challenging and must therefore be further developed. The Programme does not set specific indicators to be followed. Thus, although compiled, indicators based on material flow accounting (MFA), such as domestic material consumption (DMC) and raw material consumption (RMC) are not currently used for monitoring policy implementation in Finland. However, the Programme states that RMC is a better indicator because it takes the indirect consumption of materials into account, thus measuring the global impacts of resource use and the impacts of domestic consumption more effectively than DMC. However, as with DMC, RMC fails to take into account water use and unused extraction of natural resources (hidden import flows).

Finnish material use and efficiency trends for 2008–2030 have been calculated with various indicators in a pre-study for the National Material Efficiency Programme by the Finnish environment Institute and Thule-institute. The trend for Finnish resource productivity (material productivity) has been estimated using two different calculation methods: DMC and RMC.

	2008	2030	Change (%)
Population ('000)	5 313	5 850	10
Gross domestic product (GDP) (EUR, 2008 prices)	186	251	35
DMC (million tonnes)	208	331	59
RMC (million tonnes)	209	239	14
DMC per person (tonnes)	39	57	45
RMC per person (tonnes)	39	41	4
Material productivity (GDP/DMC) (EUR per tonne)	894	758	-15
Raw material productivity (GDP/RMC) (EUR per tonne)	889	1051	18

Source: Finnish Environment Institute and Thule-Institute: MATPOT-study 2013.

The **National Waste Plan** requires the elaboration of a monitoring programme for the assessment of its implementation and impact. The waste prevention indicators used are:

- generation of municipal waste (tonnes/year);
- generation of industrial waste/added value of industrial production (kg/EUR);
- industrial waste sent to landfill/added value of industrial production (kg/EUR);
- share of industrial waste used as raw materials in industry (%);
- total use of natural resources/economic growth (GDP) (kg/EUR);
- extractive industry waste sent to landfill/added value of the extractive industry (kg/EUR);
- amount of used stone material/total amount extracted (%);
- amount of used and wasted stone/added value of extraction industry (kg/EUR);
- construction waste sent to landfill/volume of the construction business (tonnes/EUR);
- amount of municipal waste/consumption of households (kg/EUR).

In addition, there are several subsidiary indicators supporting the above-mentioned main indicators. Two follow-up reports (2012 and 2014) present the indicators.

Member cities and municipalities in the **FISU Network** intend to make all activities in their region carbon neutral and waste free while bringing their use of natural resources within the Earth's carrying capacity by 2050 at the latest. Four indicators are used on a regular basis to evaluate the region's steps towards resource wisdom: 1) carbon footprint; 2) ecological footprint; 3) material loss; and 4) the perceived well-being of city residents. The FISU Network service centre provides expert assistance to municipalities in calculating these indicators.

### Reflections on the country's trends in the use of materials and resource efficiency

According to the National Material Efficiency Programme, a comparison of countries is challenging. The European Commission's comparison of resource productivity across EU Member States places Finland among those with the lowest material efficiency. As Finland has a wealth of natural resources, the export of material-intensive goods and national conditions, such as a cold climate and sparse population, partly explain Finland's placement. Although the indicator has its faults, it does open the door for discussing the intelligent promotion of material efficiency and ways to develop Finland's competitiveness.