POLICY BRIEF
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GOVERNMENT'S ANALYSIS, ASSESSMENT AND RESEARCH ACTIVITIES

Perspectives into topical issues in society and ways to support political decision making

Key indicators for green growth and material and resource efficiency in Finland

Jyri Seppälä[1], Sirpa Kurppa[2], Hannu Savolainen[3],Riina Antikainen[1], Jari Lyytimäki[1], Sirkka Koskela[1], Riina Känkänen[4], Joonas Hokkanen[4], Leo Kolttola[5], Ilkka Hippinen[6]
[1]Suomen ympäristökeskus, [2]Luonnonvarakeskus, [3]Oulun yliopisto, [4]Ramboll Finland Oy, [5]Tilastokeskus, [6]Motiva

Indicators to accelerate green growth

An indicator set suitable for Finnish conditions was created in a project called ”Key indicators for green growth and material and resource efficiency”. The indicators can be utilised in the preparation and implementation of national programmes and strategies in particular. The indicators also provide a knowledge base to companies and regional actors for developing their business and operations models.

Green growth is a great opportunity for Finland, but its realisation needs decision-making based on sustainability and determined knowledge. For this reason, key indicators should be updated continuously while taking the changing emphasis of societal goals into account. Furthermore, the knowledge base for indicators should be developed.

In the project, 19 key indicators were identified that showed a compact and multifaceted overview about the opportunities and challenges of green growth.

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FINLAND NEEDS GREEN GROWTH AND RESOURCE EFFICIENCY

As a concept, green growth is quite new and there are no established metrics for its monitoring. In the project called “Key indicators for green growth and material and resource efficiency” (VireAvain), the following issues were clarified: which indicators are the best metrics for monitoring the progression of green growth in Finland, what organisations will produce and maintain the indicators and how the indicators can be utilised. In this paper, a recommendation for key indicators will be presented shortly. The description of the selection process and detailed bases for the selection of indicators can be found from the final report of the project.

Green growth is based on the transition towards a low-carbon and resource efficient society with economic growth that safeguards the performance of ecosystems and enhances human well-being and social equality. Green growth offers possibilities for all actors in society, including the energy- and natural resource-intensive industries. Green growth is commonly understood as a narrower concept than sustainable development (Fig 1).

Nation-specific indicators are important, as Finland will be assessed abroad on the basis of its information. On the other hand, nation-specific indicators should describe development issues that are crucial to Finland, also at the regional and company level. This enables consistent decision-making and improves the predictability of the operational environment of business. With its own active work, Finland can influence the international development of indicator work.

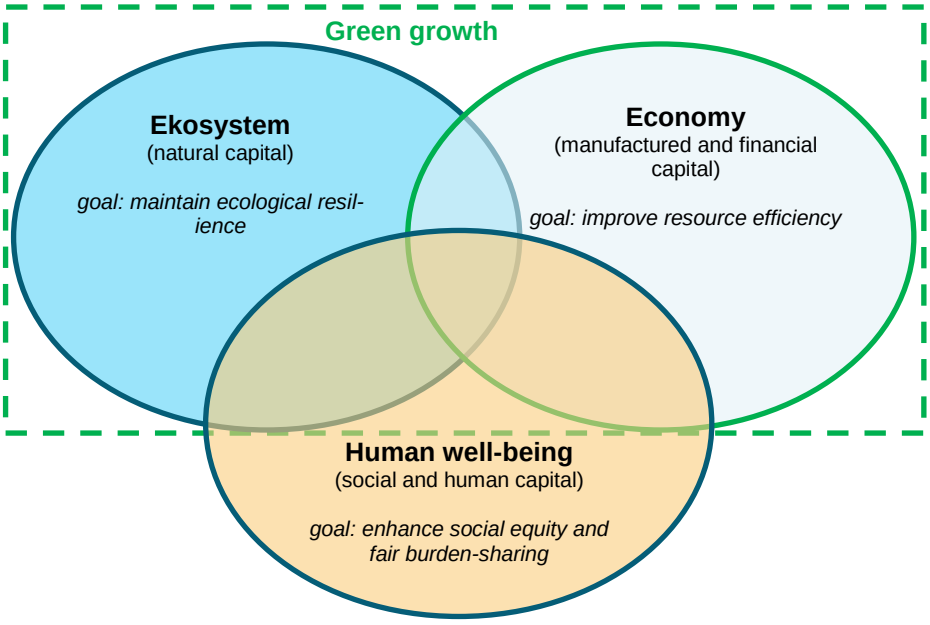

Fig 1. Green growth emphasises the interaction between the environment and the economy, which is also connected to human well-being (Sources: COM 571/2011, EEA 2012).

How were the indicators selected?

In the work, 19 key indicators were determined on the basis of their capability to describe the most important targets and changing directions related to green growth in Finland. In the selection of key indicators, stakeholder events were utilized utilised and the following criteria were taken into account:

- International linkages: indicators used internationally are taken into account in the determination of an indicator set
- Minimum size: there can be only limited numbers of key indicators
- Absence of redundancy: different indicators do not describe the same issue
- Relevance: indicators are relevant for decision-making and policy purposes
- Acceptability: an indicator is based on the best available and reliable data
- Measurability: database of an indicator is exact and measurable according to appropriate costs
- Comparability: an indicator is related to the ability to track trends over time, regions and economy sectors

Key indicators are categorised to three themes which describe the core questions of green growth:

- Low carbon and resource efficient society: sustainable energy economy and material efficiency
- Ecosystem services: sustainable use of natural services and environmental quality
- Economical possibilities and policy instruments: economical possibilities based on low carbon and resource efficient society, and measures and policy instruments which support to reach the possibilities

Key indicators describe the progress of green growth on the national level in particular. In addition, one starting point has been the possibility to monitor progress on a regional level with the help of indicators. However, this is not possible in all cases due to problems related to data accessibility.

The actions of companies play a key role in the progress of green growth. It is also important that companies can communicate their sustainability results with different stakeholders. For this reason, key indicators capable of monitoring the progress on the company and industrial sector levels have also been identified in the project.

A key indicator supports decision-making by summarising relevant information

Key indicators describe the multidimensionality of green growth

Key indicators recommended in the project have been categorised into three themes that describe various goals. Furthermore, key indicators will measure the fulfilment of the goals (Fig 2).

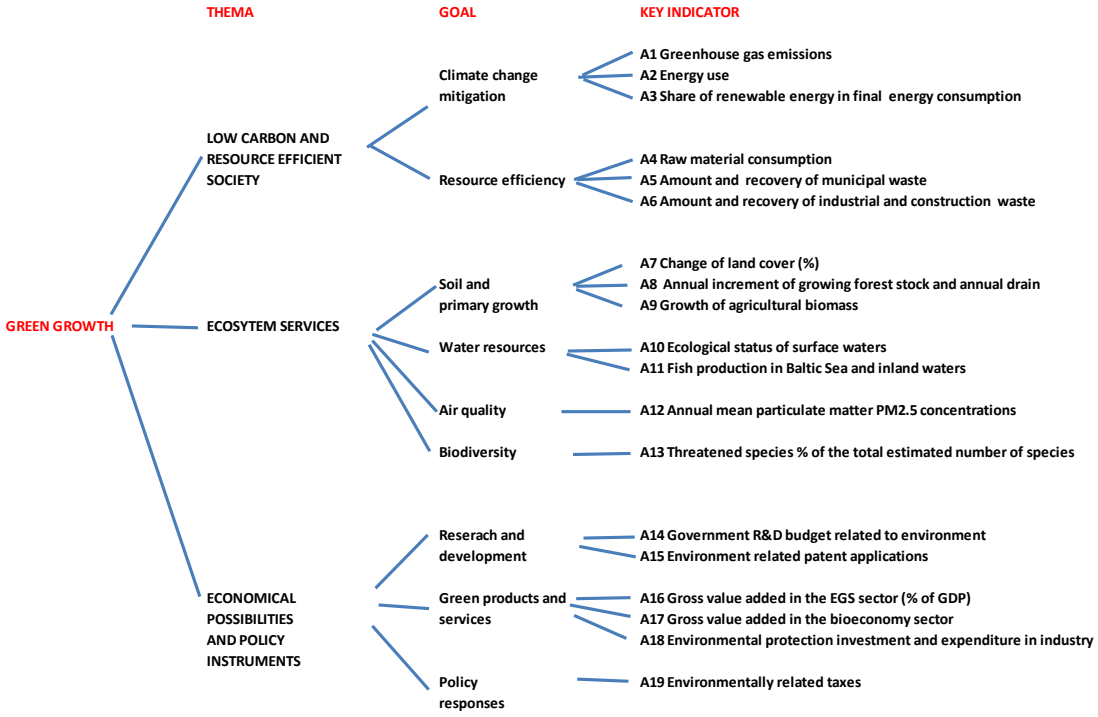

Figure 2. Key indicators for green growth and their categorisation into themes and goals.

In addition to key indicators and their goals, so-called **background indicators** have been determined. These can be used to fulfil the message of key indicators. For example, a key indicator at the national and regional levels can be put into perspective by dividing it by gross domestic product (GDP). An indicator set consists of 19 key indicators and 30 background indicators supporting the interpretation of key indicator results (tables 1-3). In the determination of the indicator set, the OECD's indicator set was the most important work used for the comparison.

In the study, indicators for further development were also identified. Such potential future key indicators suffer from a lack of data production, but they may have an important role in further describing the progress of green growth. In addition, 16 indicators of social change were presented in the study. They describe changes in economic growth and structure, competitiveness, productivity, employment, education and income in Finland. They are recommended to be used in parallel with the key indicators. The detailed descriptions of the indicators can be found in the final report of the study.

Directions of changes becoming visible

In the project, the developments of all the key indicators as well as background and social change indicators have been produced as graphical time series which provide a quick overview about recent progress in the different areas of green growth. Figures 3-5 present examples of the time series.

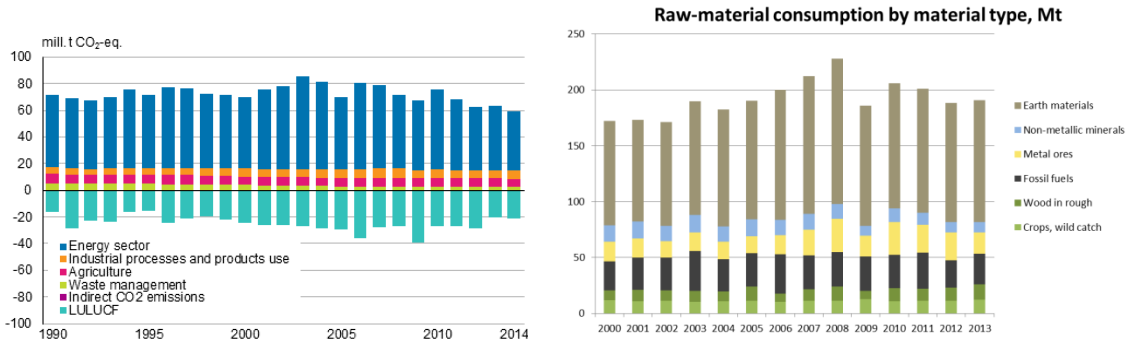

Fig 3. Finland's greenhouse gas emissions (A1) and raw material consumption (A4). (Sources: StatFin database 25.1.2016 and Ilmo Mäenpää (unpublished data, 15.2.2016).

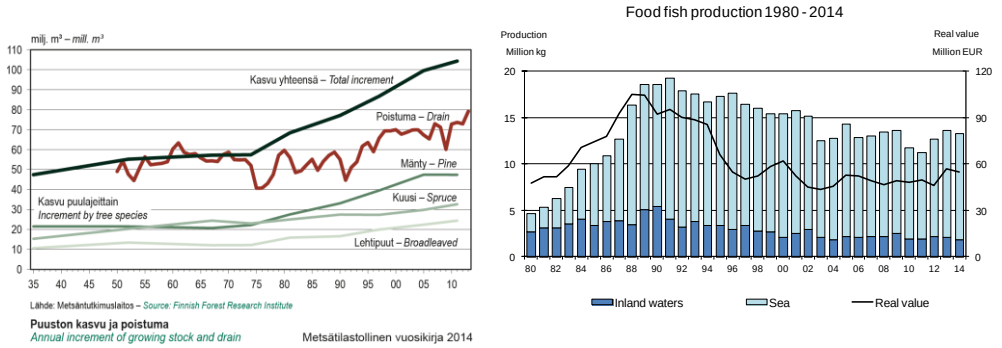

Fig 4. Annual increment of growing forest stock and annual drain (A8) and fish production in Baltic Sea and inland waters (A11). Source: Natural Resources Institute Finland.

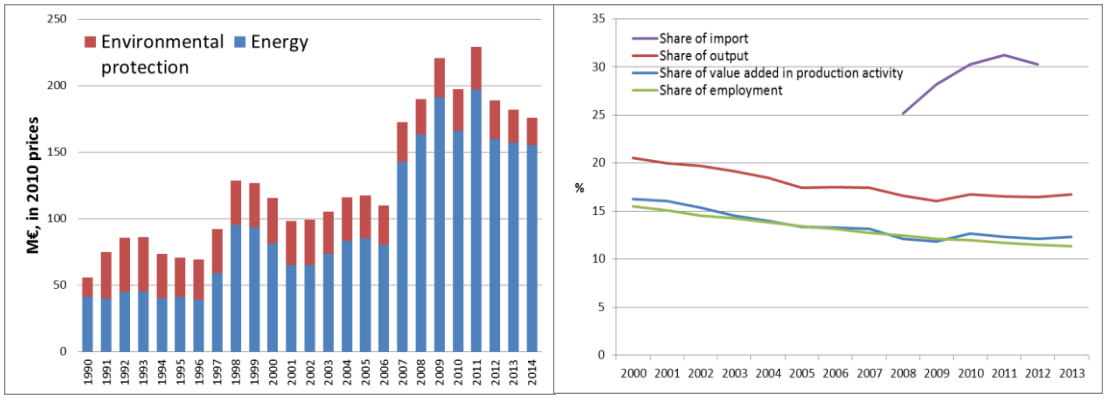

Fig 5. Government R&D budget related to environment (A14) and bioeconomy indicators (A17 with background indicators). Source: StatFin. 25.1.2016.

Key indicators for utilisation

The key indicators of green growth can be utilised, for example, in the implementation of circular economy, bioeconomy and cleantech, in the national sustainable development work and in the programme of green growth carried out by the Ministry of the Environment. The indicators are also suitable for supporting the development of the OECD's green growth indicator concept and the monitoring and updating of the EU's strategies promoting green growth. With the help of key indicators it is possible to identify the areas in which changes are required to happen, concretise the contents of programmes or strategies, support decision-making and implementation, and monitor and assess the progress. The indicators also promote green changes in business, sustainable consumption and the sustainable use of natural resources.

The main challenge for the development of indicators is getting adequate databases. There is also a risk that the use of indicators will remain small and be limited to only a certain core of actors. Indicators can be more influential if they are considered justifiable and reliable, and if they describe important issues in public debate. An interactive and participatory development process is central to improving the effectiveness of indicators.

In particular, the assessment of the economic dimension of green growth is challenging as there are insufficient amounts of statistics data about the relevant workplaces, companies and turnover. Data at the regional level is typically worse than data at the national level. At the company and industrial sector levels, it is usually reasonable to monitor the ratio values related to key indicators such as resource productivity or emission intensity.

There is a need to further develop and update key indicators

The indicator set created represents current understanding about the central themes and changing needs of green growth. In the future, it is expected that the emphasis of issues in society will change, which will cause challenges for data production. The identification of the "right issues" is not enough if their databases are insufficient. The monitoring of green growth and resource efficiency requires continuous improvements in the quality, coverage and availability of statistical data. Open data and the progress of digitalisation may provide a new basis for data production in the future.

The international applicability of indicators should be taken into account in the further development of domestic indicator work. In addition, it should be made certain that the indicators describe specific features of our country sufficiently. The indicators of green growth are developed and maintained internationally in the cooperation programme of the World Bank, OECD, UNEP and the Green Growth Knowledge Platform (GGKP), among others.

Table 1. Key indicators of low-carbon and resource efficient society and the background indicators used for supplementing their interpretation.

	CLIMATE CHANGE MITIGATION			
	Key indicators	**Level**	**OECD**	**Data availability**
A1	**Greenhouse gas emissions**		Modified	
	Greenhouse gas emissions and carbon sinks in Finland	Nation	-	***
	Greenhouse gas emissions by sector	Region	-	**
	Direct Greenhouse gas emissions in a sector / a company	Sector /company	-	*(*)
	Background indicators			
	Greenhouse gas emissions in Finland, CO_2-eq/GDP (€)	Nation	Modified	***
	Greenhouse gas emissions in Finland by sector	Nation	-	***
	Greenhouse gas emissions in Finland, emissions trading and non-emissions trading sectors	Nation	-	
	Consumption based greenhouse gas emissions in Finland, CO_2-eq/capita	Nation	Modified	*
	Key indicators			
A2	**Energy use**		Modified	
	Final energy consumption in Finland	Nation	-	***
	Final energy consumption in a region	Region	-	*
	Energy intensity in a sector / a company	Sector /company	Modified	***
	Background indicators			
	Intensity of final energy consumption, PJ/GDP (€)	Nation	Modified	***
	Final energy consumption in a region	Region	-	*
	Final energy consumption by sector (PJ / sector)	Sector	-	*
	Final electricity consumption	Nation	-	***
	Key indicators			
A3	**The share of renewable energy in final energy consumption (%), divided into different sources of renewable energy**	Nation	Modified	***
	- ” -	Region		(*)
	- ” -	Sector /company		**
	Background indicators			
	The share of fossil fuels in traffic fuels	Nation	-	***
	RESOURCE EFFICIENCY			
	Key indicators			
A4	**Raw material consumption (RMC)**	Nation	-	*
	Background indicators			
	Raw material intensity	Nation	-	*
	Raw material consumption (RMC) by sector	Sector	-	*
	The proportion of raw material consumption (RMC) to population	Nation	-	*
A5	**The amount and recovery of municipal waste**	Nation	-	***
A6	**The amount and recovery of industrial and construction waste**	Nation	-	**
	Background indicators			
	The proportion of material consumption to output value in a sector/ a company (€)	Sector /company	-	*

Data availability: *** = data available on continuous base, ** = data relatively reliable, available in certain years, * = data publication in preparation**; OECD similarity:** + = included in OECD green growth indicators, - = not included in OECD green growth indicators, Modified = Modified on the basis of OECD green growth indicators.

Table 2. Key indicators of ecosystem services and environmental quality and the background indicators used for supplementing their interpretation.

	ECOSYSTEM SERVICES BASED ON SOIL RESOURCES AND PRIMARY GROWTH			
	Key indicator	**Level of focus**	**OECD**	**Data availability**
A7	**Change of land cover (%)**	Nation	Modified	
	Background indicator			
	Land use categories and sectoral land use	Nation		*
	- ” -	Region		*
	Key indicator			
A8	**Annual increment of growing forest stock and annual drain**	Nation	Modified	***
	- ” -	Region	-	***
	Background indicators			
	Forest stock regionally and tree species composition	Nation	-	***
	- ” -	Region	-	***
	Total wood consumption in Finland	Nation	-	***
	Wood consumption and trends in wood consumption	Nation	-	***
	Key indicator			
A9	**Growth of agricultural biomass**	Nation	-	***
	- ” -	Region	-	***
	Background indicators			
	Yields of agricultural crops	Nation	-	***
	- ” -	Region		**
	Nutrient balances of agricultural soil	Nation	Modified	**
	- ” -	Region		**
	WATER BASED ECOSYSTEM SERVICES			
	Key indicator			
A10	**Ecological status of surface waters**	Nation	-	***
	- ” -	Drainage basins	-	***
	Background indicator			
	Discharge of nitrogen and phosphorus	Nation	-	***
	- ” -	Drainage basins	-	***
	- ” -	Sector/enterprises	-	***
A11	**Fish production in Baltic Sea and inland waters**	Nation	-	***
	- ” -	Drainage basins	-	***
	AIR QUALITY AS ECOSYSTEM SERVICE			
	Key indicator			
A12	**The annual mean particulate matter $PM_{2.5}$ concentrations**	Nation	+	*
	Background indicator			
	Emissions of particulate matter in Finland (PM_{10} ja $PM_{2.5}$)	Nation	-	***
	BIODIVERSITY AS ECOSYSTEM SERVICE			
	Key indicator			
A13	**Threatened species % of the total estimated number of species**	Nation	+	***
	Background indicator			
	Protected areas in hectares and as % of total area	Nation	-	***
	Mean volume of decayed and other dead trees on forest land, m^3/hectare	Nation	-	***

Data availability: *** = data available on continuous base, ** = data relatively reliable, available in certain years, * = data publication in preparation**; OECD similarity:** + = included in OECD green growth indicators, - = not included in OECD green growth indicators, Modified = Modified on the basis of OECD green growth indicators.

Table 3. Key indicators of economy growth and policy instruments and the background indicators used for supplementing their interpretation.

	RESEARCH AND DEVELOPMENT			
	Key indicator	**Level**	**OECD**	**Data availability**
A14	**Government R&D budget related to environment (M€ fixed prices)**	Nation	+	***
	Background indicator			
	Government R&D budget related to environment (% of all government R&D budget)	Nation	+	***
	Key indicator			
A15	**Environment related patent applications (% of country applications)**	Nation	+	***
	Background indicator			
	Structure and volume of environment-related patents	Nation	+	***
	GREEN PRODUCTS AND SERVICES			
	Key indicator			
A16	**Gross value added in the EGS sector (% of GDP)**	Nation	+	*(*)
	Background indicator			
	The EGS sector output (M€), export (M€) and employment	Nation	+	**
	Key indicator			
A17	**Gross value added in the bioeconomy sector**			
	Gross value added in the bioeconomy sector (% of GDP)	Nation	-	*(*)
	Gross value added in the bioeconomy sector (M€)	Region	-	*(*)
	Gross value added in the bioeconomy sector (M€)	Industry	-	*(*)
	Background indicators			
	Share of bioeconomy in output, export and employment	Nation	-	*(*)
	Bioeconomy in output (M€) and employment	Region	-	*(*)
	Bioeconomy in output (M€), export (M€) and employment	Sector	-	*(*)
	Key indicator			
A18	**Environmental protection investment and expenditure in industry (M€ fixed prices)**	Nation	-	***
	Background indicator			
	Allocation of environmental protection investments	Nation	-	***
	POLICY RESPONSES			
	Key indicators			
A19	**Environmentally related taxes**			
	Environmentally related tax revenue in % total tax revenue	Nation	+	***
	Environmental taxes by industry and tax type (M€)	Nation	+	***

Data availability: *** = data available on continuous base, ** = data relatively reliable, available in certain years, * = data publication in preparation**; OECD similarity:** + = included in OECD green growth indicators, - = not included in OECD green growth indicators, Modified = Modified on the basis of OECD green growth indicators.

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Further information:

Professor Jyri Seppälä is a director of the Centre for Sustainable Consumption and Production at the Finnish Environment Institute. He has expertise in energy and climate change policy and resource efficiency. jyri.seppala@mbnet.fi. Further information**:** http://www.syke.fi

Professor Sirpa Kurppa is working in a new business opportunities unit at the Natural Resource Institute Finland. She is a specialist in the sustainability issues of food systems, agricultural production and countryside. sirpa.kurppa@luke.fi

Researcher Hannu Savolainen is working at Oulu Business School and at the Finnish Environment Institute. He is a specialist in environmental and resource economics. hannu.savolainen@oulu.fi

Senior Consultant Joonas Hokkanen is working at Ramboll Finland Oy. He has expertise in resource efficiency, bio/circular economy and environmental impact assessment. joonas.hokkanen@ramboll.fi

Development director Leo Kolttola is working at Statistics Finland. He is a specialist in economic and environmental statistics and the measurement of sustainable development. leo.kolttola@tilastokeskus.fi

A project ”Key indicators for green growth and material and resource efficiency (VireAvain)” has been carried out as a part of Government’s analysis, assessment and research activities (2014).

A final report in Finnish: www.tietokayttoon.fi/julkaisut

Chair of steering group of the project: Counsellor Merja Saarnilehto,
Ministry of the Environment merja.saarnilehto@ymparisto.fi

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