

THINK GREEN

How bioeconomy and forestry can mitigate
climate change and make EU prosperous



THE GROWTH

Active forestry is the best for the climate

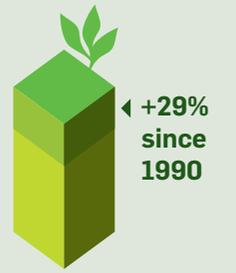
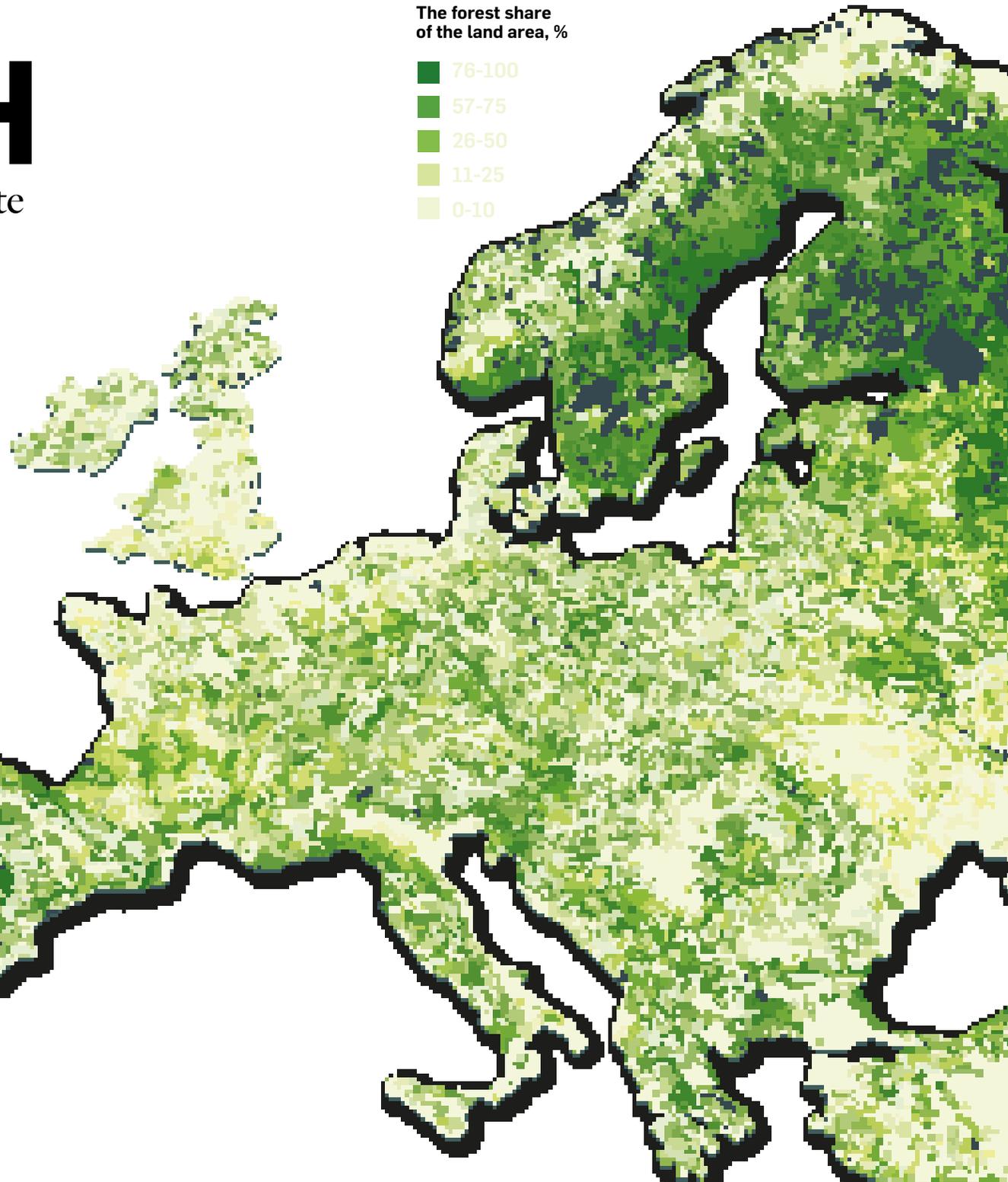
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These are Europe's rapidly expanding forests, which are scattered unevenly. 40 per cent of the total land area is covered by forest. Best for the climate is to use the forests. The flow of carbon dioxide from the atmosphere is then not only stored in growing forests, but also gives the goods in form of bio-based products and energy.

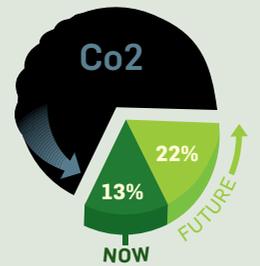


The forest share of the land area, %

- 76-100
- 57-75
- 26-50
- 11-25
- 0-10



The timber stock
The timber stock in Europe's forest amounts to 35 billion cubic metres. Since 1990, the forest stock has seen an annual average increase of 403 million cubic metres. This equates to a total increase of 29% (or 1.4 per cent per year). The best way to increase growth is through active and sustainable forestry.



Climate benefit
European forests and the forest-based sector are already contributing significantly to climate change mitigation. The mitigating effect reduces EU emissions with 13%. They have the potential to contribute more – up to an additional 9% – through Climate Smart Forestry, according to European Forest Institute.



Forests preserve biodiversity
Sustainable forest management maintains forest biodiversity and the ecological, economic and social values of forestry and forests. In Europe, more than 30 million hectares of forest, or about 14 percent of totally 215 hectares, have been protected with the main aim of conserving biodiversity and/or landscape values.

THE VISION

Ex-prime ministers fight for bioeconomy

European leaders must exercise political leadership and decouple economic growth from environmental degradation. This is where the bioeconomy comes in. The bioeconomy can also tackle other major challenges facing society. So write two former prime ministers, Göran Persson (Sweden) and Esko Aho (Finland).

In a statement from the European Forest Institute (EFI), Göran Persson and Esko Aho emphasise that we are living in a time of accelerated change and unprecedented global challenges. However, the 21st century also offers fantastic opportunities. The bioeconomy is one of them.

Unfortunately, the bioeconomy's development is threatened by a major obstacle. This obstacle is the privileged position enjoyed by the fossil-based economy.

The fossil economy generates major environmental costs that are not absorbed by the markets in any way. Furthermore, in many cases, the fossil economy benefits from different types of subsidies. Facing this operating framework, the

development of the bioeconomy cannot be left to the markets and technology alone.

Decoupling growth from environmental degradation requires a major shift towards a low-carbon, renewable and resource-efficient society that has a sustainable economy. Such a shift requires political leadership, vision and strategic action. As outlined below, Göran Persson and Esko Aho set out three strategic policy developments required to develop Europe's bioeconomy:

► **A global carbon price:** This would create a global incentive for fossil-based industries to move towards low-carbon alternatives. Carbon pricing mechanisms (e.g. fees, taxes, or cap and trade systems) offer incredible benefits for the development of the bioeconomy.

► **A long-term, predictable and coherent bioeconomy policy framework:** To coun-

'It is time to enter a new era.'

GÖRAN PERSSON AND ESKO AHO

teract current regulatory and market failures to ensure a level playing field for different uses of biomass, any policy should be rooted in the principles of sustainability, resource efficiency and diversity. Such a framework is necessary to move the bioeconomy from "niche to norm".

► **Closer communication with society:** Bioeconomy has to be sustainable, not only in rhetoric, but also in action. The first generation of biofuels emerged a decade ago. Their arrival was accompanied by negative environmental issues. These have provided a lesson in how not to start bioeconomic development.

NEW DEVELOPMENT WILL create new bioproducts that, by outperforming and replacing fossil-based products, will enhance the move to a low-carbon economy. Rapid advances in bioscience, biotechnology and biorefineries mean that virtually everything that is now made from oil can also be made from renewable biological resources. The bioeconomy will also support new jobs in rural and urban areas, states Göran Persson and Esko Aho.



FOTO: KAI WIDELL

New wood engineering products such as cross-laminated timber modules are now triggering a true revolution in construction.



FOTO: KAI WIDELL

The bioeconomy can catalyse social, technological, and economic transformation towards inclusive, smart and sustainable growth.

Bioeconomy can tackle society's grand challenges, states Göran Persson and Esko Aho, ex-prime ministers in Sweden and Finland.

REAL CHANGE – NOT A BUZZWORD...

The term "bioeconomy" is used in large parts of the world. Over 40 countries have developed a national bioeconomy strategy. Despite this, the term lacks an agreed definition. This is why it is important that the EU develops a definition that encompasses all aspects of the use of biomass from forests and from all other land and water environments.

In North America, bioeconomy means the business world's commercialisation of biotechnological processes. In Europe, on the other hand, the focus is on biomass, i.e. the raw materials.

In the update of the EU's bioeconomy strategy that is currently being processed by the Directorate General for Research and Innovation (DG RTD), it is important that these two definitions should be married together or reconciled.

Developing new products from biomass, irrespective of whether it comes from land or water, is a question of biochemistry and finding new processes. As regards forest raw materials, it is also a question of starting from the existing industrial structure.

Several European countries have developed their own definitions of bioeconomy. These definitions are often pervaded by national characteristics. The EU needs a shared and mutual definition of bioeconomy as something that, being renewable and sustainable, is distinct from the fossil economy.

THE PRODUCTS

All this can be made from wood!

Everything made using fossil-based materials today can be made from forest-based inputs tomorrow. The transition can even start from today's industrial operations and build on the process knowledge they offer.

The EU needs to create fairer market conditions for biobased products that have high added value. This could strengthen the EU's competitiveness, even in face of the Union's high energy and labour costs.

Furthermore, high added value promotes greater cascade use. Such use improves resource efficiency. In turn, this opens a way for the EU to achieve the targets in its Circular Economy Package.



Multi-storey wood buildings
Several examples already exist. Key success factors are industrial production systems, speed and wood as a light, eco-friendly and renewable building material.

Biofuels
Forest industry residues are already being used as a vehicle fuel. However, the biofuel volumes from raw materials can increase substantially and also be used by aircrafts.

Lignin-based carbon fibre
Lignin is the substance that binds together the fibres in growing trees. It can be used as a biobased carbon fibre that replaces steel in high-value products that have to be strong and light. Wind turbines, aircraft, vehicle chassis, sports equipment (tennis racquets, bicycles, etc.) and even vehicle batteries are just a few examples.

Nanocellulose
This transparent gel has a host of uses. It can, for example, be used as a texture agent in foodstuffs, an emulsifier in paints, a biobased barrier in drinks cartons and insulation in buildings.

Pharmaceuticals
Cellulose powder is used as a drug carrier in tablets and affects how quickly a drug is taken up by the body.

Biocomposites
Wood fibre is an element in various composites used to make items such as instrument panels, furniture and containers.

Printed electronics
Electronics can be printed on paper in an ordinary printing press. The results can be used for smart packaging, printable solar cells, advertising signs and new types of sensors.

Fish feed
Forest industry residue streams can be used to replace fishmeal in fish feed. Microfungi eat the wood's sugar and are then ground into a powder.

Textiles
Fabrics made from wood fibre are in demand from the fashion industry. They can also be used in "technical fibres" for furniture, partitions, surface coverings, car interiors and agrotexile ground covers.

Windows
Wood can be made transparent and thus used for windows, partitions, displays and touchscreens. Wood insulates better than glass. It is also stronger.

THE POTENTIAL

How to make the EU a global bioeconomy hub

“Europe has great potential to develop its bioeconomy. We have the raw material resources and the industrial expertise that is needed to become a global leader,” says Joanna Dupont-Inglis, Director of Industrial Biotechnology at EuropaBio (European Association for Bioindustries).

There is no doubt that a bioeconomy offering sustainable growth would bring many economic benefits to Europe. It would create jobs, add value to many sectors (e.g. farming and forestry) and revitalise rural areas. The environmental benefits would, of course, also be huge.

According to the European Bioeconomy Alliance (EUBA), the bioeconomy offers a viable solution to today’s fossil carbon equivalents. It has the potential to remove up to 2.5 billion tonnes of CO₂ emissions each year. This amount is more than half the greenhouse gas emissions generated by EU industries and households in 2013.

“In Europe, there is a growing appreciation of sustainability. This will increase the demand for renewable

alternatives to traditional fossil-carbon based products. The challenges we face are commercialising emerging bio-based products on a larger scale and creating new markets for these,” says Joanna Dupont-Inglis at EuropaBio.



Johanna Dupont-Inglis

What is needed to unlock the full potential of the European bioeconomy?

“In terms of policy, we need a holistic, predictable and supportive EU framework. This would stimulate the necessary cooperation between different sectors. Instead of the old linear fossil-carbon models, we have to work in new, innovative and more complex ways with many different industri-

‘There is a growing appreciation of sustainability’

JOANNA DUPONT-INGLIS

es. It is also important that each EU country and region makes efforts to encourage productivity and sustainability in agriculture and forestry.”

How important is the forest industry?

“The forest industry already makes a very significant contribution to the development of Europe’s bioeconomy. For example, the industry is investing heavily in biorefineries and the development of new biobased packaging materials and new forest products.”

What might happen if Europe does not seize the growth potential?

“At the moment, Europe has the technology and expertise to lead the global transition. However, other regions are acting very fast. What we do not want to see is all the investment, jobs and technology going overseas to regions which have more attractive and supportive conditions. We have the potential to be a real asset in the EU’s quest to create jobs, growth and competitive, sustainable, biobased solutions. We must not lose this.”

A NEW ECONOMY WORTH TRILLIONS

The European bioeconomy is already worth EUR 2 trillion annually. Primarily in agriculture, forestry and fishery, it creates jobs for over 22 million Europeans.

As yet, there has not been a comprehensive forecast of the bioeconomy’s total growth potential. Most experts be-

lieve that it is significant. One example of this confidence is that members of the Bio-based Industries Consortium (BIC) currently invest more than EUR 2.1 billion in biobased industries. Most of the investments are in lignocellulosic and other forestry-based value chains.

GREAT POTENTIAL IN WOOD CONSTRUCTION

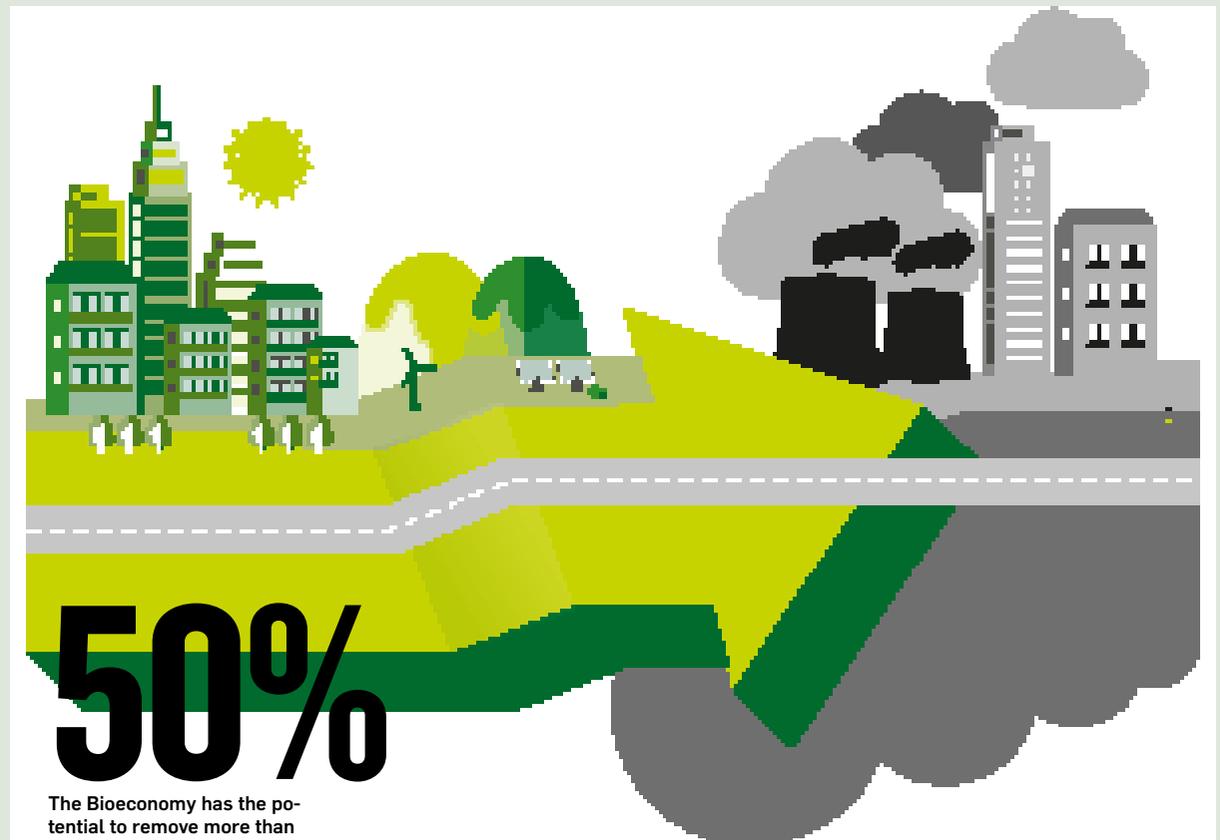
Several studies show that there are considerable potential in modern wood construction and off-site prefabrication of multistorey wood buildings.

During the past decade modern wood construction has achieved a real breakthrough in Sweden. If this trend continues apartment buildings made of wood will soon account for 20% of the market,

predicts Swedish Wood Building Council.

Moreover, a study of the European market for industrial biotechnology-derived products shows an expected growth rate of 7% per annum. This growth will largely be driven by an increase in the demand for biofuels, biobased chemicals and biobased plastics.

BIOECONOMY MITIGATES CLIMATE CHANGE



The Bioeconomy has the potential to remove more than half the greenhouse gas emissions generated by EU industries and households.

THE ROAD AHEAD

The EU must take the right decisions

To reach its climate targets, the EU should emphasise the importance and potential of the bioeconomy. Many important decisions will need to be taken. To realise the full potential, there needs to be a meeting of ministers where the focus is on the bioeconomy.

It is no secret that gaining support for issues spanning several areas is not easy within the EU. The bioeconomy stretches across a number of EU processes and is influenced by a host of directives.

For bioeconomy to be a leading issue in the EU, there must be a transborder collaboration without too detailed legislation. With the right decisions, market forces will support bioeconomic develop-

'There must be a transborder collaboration without too detailed legislation'

ment. Detailed regulation, however, would impede it.

The EU has a bioeconomy strategy that is currently being updated in line with the new climate targets. To demonstrate serious commitment to realising the EU's climate targets for 2030, would it not be a good idea to hold a ministerial meeting to link all the processes under the bioeconomy umbrella?

The right decisions for the forest industry to drive ahead a growing bioeconomy are:

- ▶ Promote active forestry with sustainable felling and production of timber products, fibre and energy.
- ▶ Maintain the competitiveness of existing industries in order to exploit the process expertise it has amassed. Allow the market's economic forces to provide impetus.
- ▶ Avoid detailed control. It limits competitiveness and creates obstacles to the flow of raw materials from forests. One example that may inhibit

the development of the bioeconomy is legislation on cascading use. The principle is excellent, but avoid legislation.

▶ Create the right conditions for cluster growth and industrial symbiosis (which is cascade use in practice). Besides maximising added value, this creates "side flows" in production. Through biomass, it also benefits the climate.

▶ Increase construction with wood in Europe. This will rapidly give the most direct climate benefit.

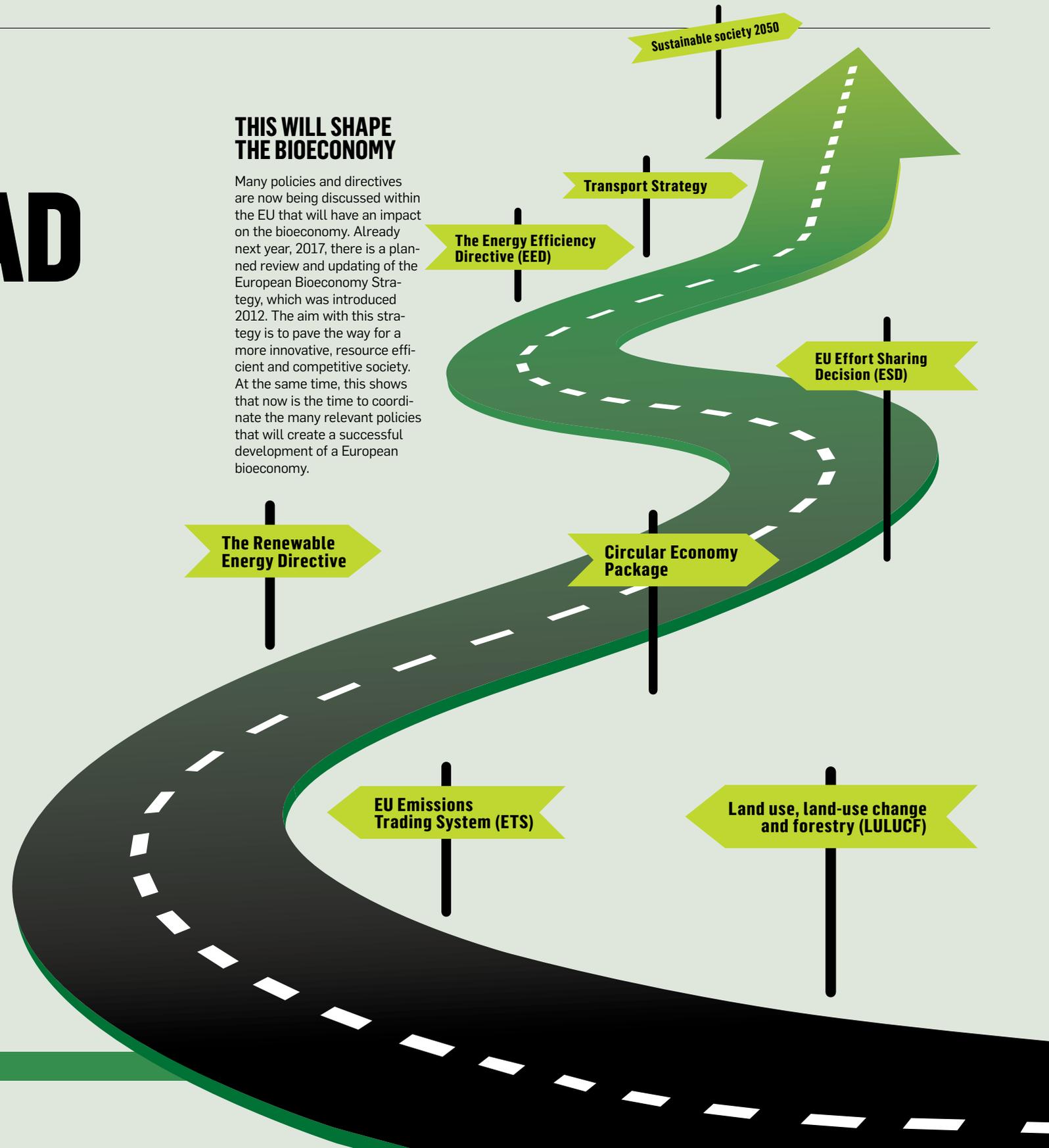
▶ Support innovation and research and development that facilitate the journey from laboratory to demo plant to manufacture.

▶ Review the rules regarding state support. To meet the climate challenge, make green options cheaper than fossil options.

▶ Develop public procurement standards and rules that promote the development of what is truly sustainable.

THIS WILL SHAPE THE BIOECONOMY

Many policies and directives are now being discussed within the EU that will have an impact on the bioeconomy. Already next year, 2017, there is a planned review and updating of the European Bioeconomy Strategy, which was introduced 2012. The aim with this strategy is to pave the way for a more innovative, resource efficient and competitive society. At the same time, this shows that now is the time to coordinate the many relevant policies that will create a successful development of a European bioeconomy.



10 INSIGHTS

on the Swedish forests



Anyone travelling through the Nordic countries soon realises that there is a lot of forest. An enormous amount in fact. Here are ten facts about the Swedish forests and the importance of our green industry.

- ▶ In Sweden alone, forest covers 70 per cent of the surface. There are 87 billion trees.
- ▶ There is now twice as much wood in Sweden as there was 90 years ago.
- ▶ One per cent of our forest is felled annually. Nonetheless, growth outpaces felling.

- ▶ For every tree harvested at least two new are planted.
- ▶ Sweden is the world's third largest exporter of forest-based products.
- ▶ 80 per cent of our forestry based products are exported.
- ▶ The substitution effect of the Swedish forest industry products are equivalent to Sweden's annual carbon dioxide emissions.
- ▶ Environmental and production targets in forestry are brought in line with each other, since the Swedish Forestry Act was updated in 1993.
- ▶ Sweden's forest industry has reduced its emissions by over 60 per cent

since 2005 and also uses almost no fossil fuels in its processes.

▶ The forest industry is one of Sweden's most important business sectors. It directly employs 70,000 people in Sweden.

WE WELCOME YOU to visit our active, Swedish forests. It is an extraordinary experience. Do not hesitate to contact us for further details about why forest industry is a crucial answer to meeting the EU's climate challenge.

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