

## GENETICALLY MODIFIED FOOD

# Let's talk about GM food

As climate change and population growth threaten the world's food system, global hunger grows. Genetic modification and editing technologies may be able to help feed many of those in need. These technologies can add significant value to current plant breeding by, for example, improving resilience and decreasing the need for harmful pesticides.

However, European Union legislation has failed to keep up with technological development. European companies and researchers are either at a standstill or lagging behind market leaders in plant breeding, such as the United States, China and Argentina. While researchers have identified the potential of genetic modification, customers remain distrustful of GM foods.

### **Hello, reader!**

You're holding a fact sheet produced by Food Tech Platform, an Allied ICT Finland network orchestrated by the University of Turku. This leaflet provides you with an easily approachable overview of the current state of genetically modified foods. It covers the topic from four different points of view:

## Science-based advice for policy makers

Eva-Mari Aro

2.6.2020

04.03.2020

# European GMO Laws no Longer fit

## Press release

The current EU rules on genetically modified organisms (GMO) are not fit for purpose anymore, leading scientists warn in a newly released EASAC commentary. They call for a radical reform of the legal framework. “There is a societal cost of not using new genome editing techniques or being slow in adoption.”



# The regulation of genome-edited plants in the European Union

EASAC (2004). Genomics and crop plant science in Europe. EASAC policy report 2.

EASAC (2011). Plant genetic resources for food and agriculture: roles and research priorities in the European Union. EASAC policy report 17.

EASAC (2013). Planting the future: opportunities and challenges for using crop genetic improvement technologies for sustainable agriculture. EASAC policy report 21.

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EASAC (2017b). Opportunities and challenges for research on food and nutrition security and agriculture in Europe. EASAC policy report 34.

EASAC (2018). EASAC and the new planting techniques. See [https://easac.eu/fileadmin/PDF\\_s/reports\\_statements/Genome\\_Editing/EASAC\\_and\\_New\\_Plant\\_Breeding\\_Techniques\\_July\\_2018\\_final.pdf](https://easac.eu/fileadmin/PDF_s/reports_statements/Genome_Editing/EASAC_and_New_Plant_Breeding_Techniques_July_2018_final.pdf).

# THE SCENE

The production of more food, more sustainably, requires the development of crops that can make better use of limited resources and will contribute significantly to attaining multiple Sustainable Development Goals (SDGs).

New breeding techniques are emerging rapidly from advances in genomics research, for application in crop improvement. They enable targeted changes in the genome and they have significant potential for the sustainable intensification of agriculture, when used as part of the deployment of all available approaches to achieving food and nutrition security and building on existing good agronomic practice.

European Academies



European Commission is requested to set out the strategic options for EU agricultural innovation and responsibilities in the wider international context, leading to a reopening of Directive 2001/18/EC.



# UN - Sustainable Development Goals agreed by 193 Countries



UNITED NATIONS  
DEVELOPMENT PROGRAMME

## SDGs

## THE GLOBAL GOALS

For Sustainable Development



# Towards Sustainable Future

- **Environmental sustainability**

e.g. climate change, pollution, biodiversity

- **Societal sustainability**

e.g. poverty, health, food security, hunger, peace, justice, equality

- **Economical sustainability**

e.g. business, industry, employment

# Commentary

European Academies



Science Advisory Council

## How can science help to guide the European Union's green recovery after COVID-19?

### Summary

Following the enormous health and social costs imposed by the COVID-19 pandemic in Europe, increasing attention is turning to facilitating a green recovery, to promote economic activity while also tackling the global climate emergency. Policy development for a green recovery must be based on robust and transparent scientific evidence. In this Commentary EASAC, independent of commercial or political vested interests, draws upon its previous work on assessing energy, environmental and health priorities to advise on some of the key issues for rebuilding economies to deliver benefits fairly for planetary and human health.

Solutions are within reach. While our advice endorses some existing or planned European Union policies, we also urge fundamental green recovery transitions: in particular for a rapid reduction in generation and use of high-carbon energy;

# EU policies for sustainability until 2050

The 7<sup>th</sup> Environment Action programme (7<sup>th</sup> EAP) entered into force in 2014.

**It is now up to the EU institutions and the Member States to ensure that priority objectives set out are met by 2020.**

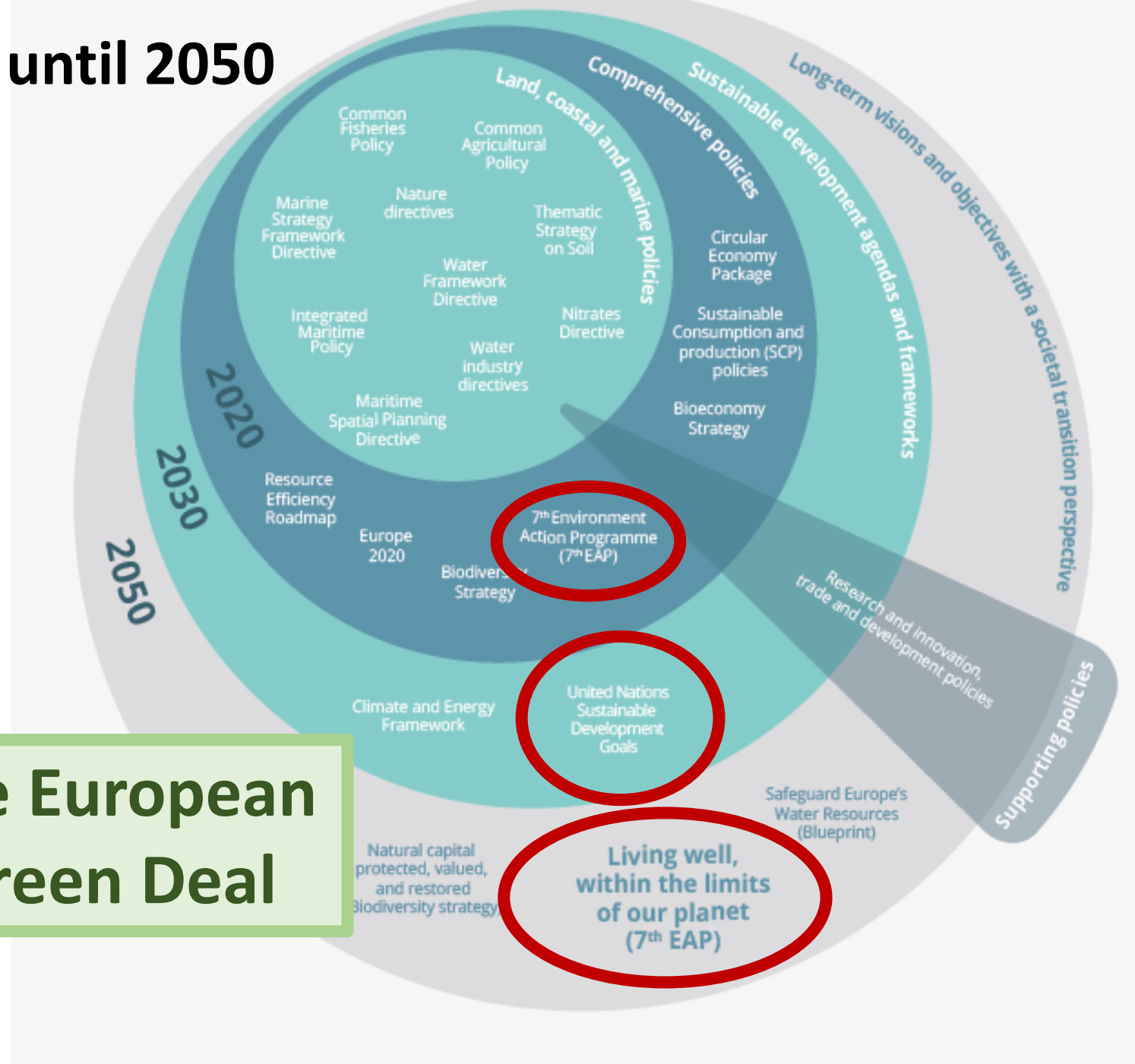


## Harnessing Research and Innovation for FOOD 2030: A science policy dialogue

Conference outcome report  
16 Oct 2017, Brussels



#FOOD2030EU



## The European Green Deal





EUROPEAN  
COMMISSION

Brussels, 20.5.2020  
COM(2020) 381 final

**COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN  
PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL  
COMMITTEE AND THE COMMITTEE OF THE REGIONS**

**A Farm to Fork Strategy  
for a fair, healthy and environmentally-friendly food system**

## 1. NEED FOR ACTION

The **European Green Deal** sets out how to make Europe the first climate-neutral continent by 2050. It maps a new, sustainable and inclusive growth strategy to boost the economy, improve people's health and quality of life, care for nature, and leave no one behind.

The Farm to Fork Strategy is at the heart of the Green Deal. It addresses comprehensively the challenges of sustainable food systems and recognises the inextricable links between healthy people, healthy societies and a healthy planet. The strategy is also central to the Commission's agenda to achieve the United Nations' Sustainable Development Goals (SDGs). All citizens and operators across value chains, in the EU and elsewhere, should benefit from a **just transition**, especially in the aftermath of the COVID-19 pandemic and the economic downturn. A shift to a sustainable food system can bring environmental, health and social benefits, offer economic gains and ensure that the recovery from the crisis puts us onto a sustainable path<sup>1</sup>. Ensuring a sustainable livelihood for primary producers, who still lag behind in terms of income<sup>2</sup>, is essential for the success of the recovery and the transition.

The COVID-19 pandemic has underlined the importance of a **robust and resilient food system** that functions in all circumstances, and is capable of ensuring access to a sufficient supply of affordable food for citizens. It has also made us acutely aware of the interrelations between our health, ecosystems, supply chains, consumption patterns and planetary boundaries. It is clear that we need to do much more to keep ourselves and the planet healthy. The current pandemic is just one example. The increasing recurrence of droughts, floods, forest fires and new pests are a constant reminder that our food system is under threat and must become more sustainable and resilient.





## Sunday Evening News 179 Wek 21 - Woche 21

### The Green Deal

EU-Kommission: **A Farm to Fork Strategy** for a fair, healthy and environmentally-friendly food system

[https://ec.europa.eu/info/sites/info/files/communication-annex-farm-fork-green-deal\\_en.pdf](https://ec.europa.eu/info/sites/info/files/communication-annex-farm-fork-green-deal_en.pdf)

EU Biodiversity Strategy for 2030 - Bringing nature back into our lives

[https://ec.europa.eu/info/sites/info/files/communication-annex-eu-biodiversity-strategy-2030\\_en.pdf](https://ec.europa.eu/info/sites/info/files/communication-annex-eu-biodiversity-strategy-2030_en.pdf)

Maybe the most important sentence in respect to gene engineering and NBTs

*"New innovative techniques, including biotechnology and the development of bio-based products, may play a role in increasing sustainability, provided they are safe for consumers and the environment while bringing benefits for society as a whole. They can also accelerate the process of reducing dependency on pesticides. In response to the request of Member States, the Commission is carrying out a study which will look at the potential of new genomic techniques to improve sustainability along the food supply chain."*

### Press releases – Media Reports

Stokstad E.: **United States relaxes rules for biotech crops**

<https://www.sciencemag.org/news/2020/05/united-states-relaxes-rules-biotech-crops#>

EU-Commission: **Farm to Fork Strategy – for a fair, healthy and environmentally-friendly food system**

[https://ec.europa.eu/food/farm2fork\\_en](https://ec.europa.eu/food/farm2fork_en)

Food Navigator: **What does the farm to fork strategy mean for the future of food in-Europe?**

[https://www.foodnavigator.com/Article/2020/05/22/What-does-the-farm-to-fork-strategy-mean-for-the-future-of-food-in-Europe?utm\\_source=newsletter\\_daily&utm\\_medium=email&utm\\_campaign=22-May-2020](https://www.foodnavigator.com/Article/2020/05/22/What-does-the-farm-to-fork-strategy-mean-for-the-future-of-food-in-Europe?utm_source=newsletter_daily&utm_medium=email&utm_campaign=22-May-2020)

Whitworth J.: **EU 'farm-to-fork' proposal opens door to gene editing, drawing fire from anti-GMO groups**

<https://geneticliteracyproject.org/2020/05/22/eu-farm-to-fork-proposal-opens-door-to-gene-editing-drawing-fire-from-anti-gmo-groups/>





## **New Genomic Techniques: global market applications**

**the Joint Research Centre (JRC) of the European Commission (EC) carries out a review of current applications of New Genomic Techniques (NGTs) that are marketed worldwide, or are in a near-market development stage, in agricultural, pharmaceutical or industrial fields.**



# Science Advice for the Benefit of Europe

EASAC is the voice of independent science advice, mobilising Europe's leading scientists to guide EU policy for the benefit of society. It brings together the National Academies of Science of the EU Member States, Norway and Switzerland.

- **International Academic Partnership (Europe, Americas, Africa, Asia)**
- **Strong connections to UN and implementation of SDGs**
- **Part of SAPEA and the Science Advise Mechanism (SAM) of EU Commission**



Collective voice of the National Academies of Science of the EU member states

Established 2000, 28 members (includes Norway and Switzerland and all EU Academies)

Source of *independent* scientific analysis and advice for policy-makers

- Interdisciplinary approach (18-25 experts from related research fields)
- Independent of commercial and political bias
- Scientific excellence
- Transparent processes
- Implementation of **SDGs**



# The regulation of genome-edited plants in the European Union

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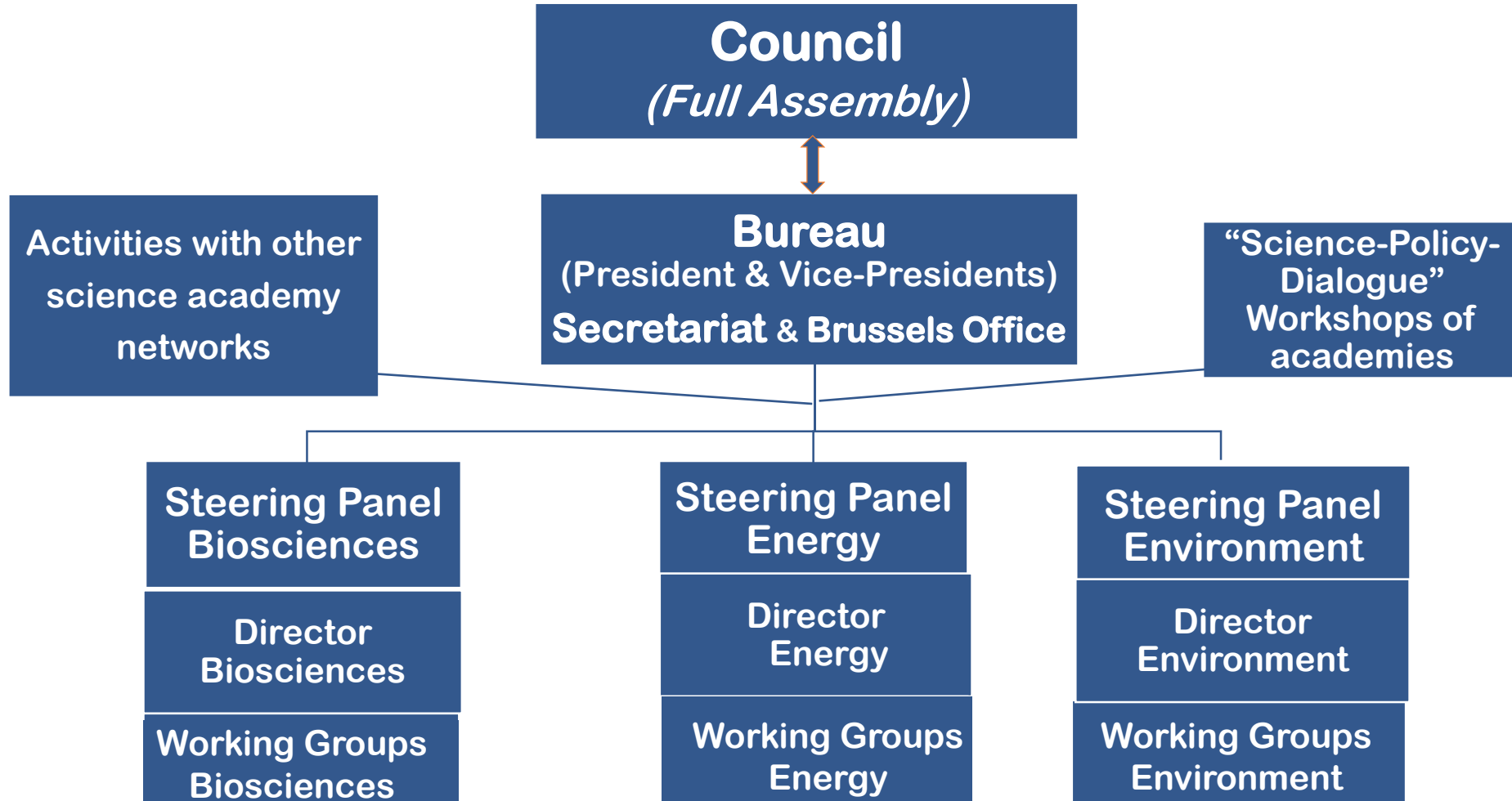
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# EASAC's structure





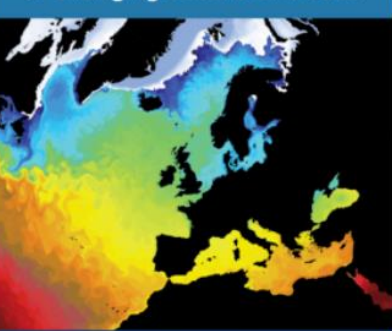
## Opportunities and challenges for research on food and nutrition security and agriculture in Europe



EASAC policy report 34  
December 2017

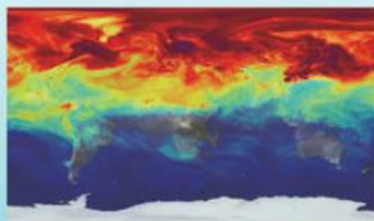
ISBN: 978-3-8047-3815-4  
This report can be found at [www.easac.eu](http://www.easac.eu)

## Marine sustainability in an age of changing oceans and seas



Report by the European Academies' Science Advisory Council (EASAC) and the Joint Research Centre (JRC) of the European Commission  
EASAC policy report 28  
January 2016

## Negative emission technologies: What role in meeting Paris Agreement targets?



EASAC policy report 35  
February 2018  
ISBN: 978-3-8047-3845-4  
This report can be found at [www.easac.eu](http://www.easac.eu)

Science Advice for the Benefit of Europe

## Valuing dedicated storage in electricity grids



EASAC policy report 33  
May 2017  
ISBN: 978-3-8047-3729-7  
This report can be found at [www.easac.eu](http://www.easac.eu)

Science Advice for the Benefit of Europe

## Multi-functionality and sustainability in the European Union's forests



EASAC policy report 32  
April 2017  
ISBN: 978-3-8047-3728-0  
This report can be found at [www.easac.eu](http://www.easac.eu)

Science Advice for the Benefit of Europe

## Shale gas extraction: issues of particular relevance to the European Union

### Background and scope of this statement

Following the rapid increase over the past decade in the production of shale gas in the USA<sup>1</sup>, political interest in Europe has grown on the local potential of gas obtained by hydraulic fracturing of shale ("fracking"). Potential attractions are seen from the energy security, local economic consequences and to a lesser extent employment opportunities, while the overall environmental advantages and disadvantages remain a matter of debate. Public concern has been high, with significant local opposition to attempts in a number of European Union (EU) countries to conduct regulatory drilling, and in some countries (e.g. France) a vote in Parliament on halting hydraulic fracturing by law. A number of EASAC member academies have already completed reviews on the risks from shale gas extraction and their management (see Royal Society and Royal Academy of Engineering 2011; Académie des sciences 2012; académie – German Academy of Science and Engineering 2014; Lithuanian Academy of Sciences 2014; Polish Academy of Sciences 2014; Swiss Academies of Arts and Sciences 2014).

On 22 January 2016, the European Commission adopted a non-binding Recommendation for "Minimum principles for the exploration and production of hydrocarbons from shale gas and using high-volume hydraulic fracturing" (European Commission 2016). Member States have been invited to implement these recommendations within 6 months of publication and the Commission will review the Recommendation's effectiveness in July 2017. Recognising the public and political interest in the issue around fracking and the underlying science, EASAC, an expert review group advised after was discussing EASAC Council in May 2016.

EASAC Council noted that scientific and engineering assessments are now available from a number of science and engineering academies, both within Europe (Royal Society and Royal Academy of Engineering 2011; Académie des sciences 2014; académie – German Academy of Science and Engineering 2014; Lithuanian Academy of Sciences 2014; Polish Academy of Sciences 2014; Swiss Academies of Arts and Sciences 2014) and elsewhere (see, for example, International Energy Agency 2013; Australian Council of Learned Academies 2015; International Geoscience and Earth History Commission 2015). EASAC Council noted that scientific and engineering assessments are now available from a number of science and engineering academies, both within Europe (Royal Society and Royal Academy of Engineering 2011; Académie des sciences 2014; académie – German Academy of Science and Engineering 2014; Lithuanian Academy of Sciences 2014; Polish Academy of Sciences 2014; Swiss Academies of Arts and Sciences 2014) and elsewhere (see, for example, International Energy Agency 2013; Australian Council of Learned Academies 2015; International Geoscience and Earth History Commission 2015).

1. See abstract from main document through executive summary and introduction. Further details are available in the full report on the EASAC website.

Transcription: 1. October 2016

## Facing critical decisions on climate change in 2015

### Summary

This statement has three main purposes. Firstly, to provide scientific background to some issues with particular media connections, secondly, to highlight some recent science (see the Fifth Assessment Report of the United Nations Intergovernmental Panel on Climate Change (IPCC AR5)) that has improved our understanding of the pace at which the climate is changing, and thirdly to emphasize issues of particular importance to European Union (EU) policy makers.

We start with a brief overview of current scientific assessments of carbon dioxide (CO<sub>2</sub>). We then consider the importance of short-lived greenhouse gases (including methane) and the response of natural ecosystems to global warming. We highlight the importance of adaptation and resilience in parallel with mitigation. (New scientific evidence, we provide a detailed evaluation of why the media image of a "warming pause" is incorrect). We provide updated information on the role of melting in the cryosphere (Arctic, Antarctic and Greenland), and local effects on world GNP (GDP).

Our conclusion is that recent evidence suggests that climate model predictions are in some ways too optimistic. The important policy consequence about the pace at which climate change is occurring. This emphasizes the urgency for the 2015 United Nations Climate Change Conference in Paris (COP21) to produce an agreement that can deliver not just the target of a 2 °C limit but the **best scenario, below that figure**. This has major implications for the world's use of fossil fuels in the coming decades, the impact of whose measures must extend beyond this century if there is to be a 50% chance of limiting warming to 2 °C.

We note that the EU's Climate and Energy policy framework for 2030 puts the EU's ambition of limiting through its target of reducing emissions by at least 40% below 1990 levels. We discuss whether that, for COP21, the EU should:

- negotiate separately for an agreement that is capable of reducing emissions sufficient to limit global warming to less than 2 °C;
- independently of the outcome of COP21, strengthen its leading position by implementing its commitment to reduce emissions by 50% by 2050;
- emphasize the importance of global efforts to reduce emissions to the levels agreed by reasonable climate change.

For further information, visit [www.easac.eu](http://www.easac.eu)

Climate Science and Policy Change | October 2015

## Current Projects

Updated

## Climate Change and Health

EASAC has a significant tradition of interest in climate change issues across the Programmes. The Biosciences Programme...

## Decarbonisation of Transport

The GHG emissions from the European transport sector currently represent approximately 30% of total GHG emissions from...

## Sustainability of Europe's soils

The pressures on maintaining the sustainability of Europe's soils and their ability to meet targets of food production,...

## All Projects →



## SCIENCE POLICY

# Global food and nutrition security needs more and new science

**T**oday, the number of hungry, undernourished people across the planet is increasing, with micronutrient deficiencies impairing the overall health of more than 2 billion people worldwide. Early child mortality and morbidity are unacceptably high, and problems related to unsafe food, food waste, and poorly managed agricultural systems continue, as do problems associated with overconsumption. The impacts of inadequately managed agricultural systems are damaging land, water, and atmospheric systems, which, together, are posing unprecedented threats to global food security. These problems are rooted in deficient and deeply intertwined policies and practices that need to be addressed on a global scale. These challenges—all related to food distribution, agricultural systems, and planetary health—lie squarely in the path of achieving global Sustainable Development Goals (SDGs) and equity in the distribution of resources across global populations.

Although research related to crop cultivation has made great contributions to agricultural productivity, global leaders have begun to recognize the severity of problems rooted in inequity and the expanding demands of populations. In response, they have been increasing efforts to identify scientific endeavors to foster responsible innovation in food systems and, in tandem, shape necessary related local, national, and international policies.

Such scientific leadership has recently coalesced in the form of a global network of academies of science, medicine, and engineering called the InterAcademy Partnership (IAP). The IAP was launched in 2016 by bringing

profound regional differences in agricultural productivity and cultural preferences. The reports powerfully clarify the urgent need for investment in research infrastructure together with the obligation by participants to share robust and verifiable data related to population health, nutrition, agricultural practices and outputs, climate change, ecological systems and sustainability, and human behavior.

Policy-makers must aggressively push for additional and plentiful funding for research related to food and nutrition security because the impact of innovative science is already clear and unequivocal. For example, we already know that gene sequencing and editing can lead to improved and efficient means to breed plants and farm animals with characteristics that serve both the health of people and the environment. New advancements in science have also shown the potential for capitalizing on new understandings of diet-gut microbiome-disease linkages and expanding the use of innovative functional foods and personalized nutrition coupled with smart monitoring of individual status. Of course, the use of any advance must be grounded in stringently reformed regulatory systems that are acceptable to stakeholders.

IAP reports highlight the very large body of scientific knowledge already available to shape and promote more effective food and nutrition security. With a focus on the availability of new information, policy-makers can use this evidence to develop sustainable systems that will support healthy populations, linking these goals to other policy objectives including those related to the



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# The regulation of genome-edited plants in the European Union

**EASAC endorses the Leopoldina et al. (2019) recommendations and now also reiterates our core recommendations on new breeding techniques from the previous EASAC work (2015, 2018)**





# Summary of EASAC messages

- Products of new technologies and their use, rather than the technology itself, should be evaluated according to the scientific evidence base.
- The potential costs of not using a new technology, or being slow in adoption, must be acknowledged. There is no time to lose in resolving the problems for food and nutrition security in Europe.
- If a product of genome editing does not contain foreign DNA, it should not fall within the scope of EU legislation on GMOs.



# Summary of EASAC messages

- More broadly, there should be full transparency in disclosing the process used and the EU should seek to regulate the trait and/or product rather than the technology used in generating that product. That is, when considering safety issues, the focus should be on assessing whether the novel attributes of the plant might represent a risk to the environment or human health, irrespective of the breeding technique employed.

# Summary of EASAC messages

- The European Commission should continue to commit to supporting fundamental research in plant sciences to provide the tools and other resources for future innovation in plant breeding and farming practices.
- There is also continuing need for wide-ranging engagement to discuss critical, including ethical, issues to build trust between scientists and the public.

# The regulation of genome-edited plants in the European Union



**The request by the European Council to the European Commission to clarify options to update the existing legislation, might be interpreted minimally by some only as an examination of how to deal with products where the mode of molecular change cannot be detected, but in our view, this would be a missed opportunity.**

**The request from the Member States should rather be viewed as an invitation to the European Commission to set out the strategic options for EU agricultural innovation and responsibilities in a wider international context leading to a reopening of Directive 2001/18/EC**

# The regulation of genome-edited plants in the European Union

**EASAC reaffirms the importance of exploiting radical reform and urges the EU institutions to explore the options recommended by Leopoldina et al. (2019 and others:**

- **First, to revise the GMO definition/exemptions to enable the EU to capitalize on the plant breeding opportunities afforded by genome editing.**
- **Secondly, to develop a new legal framework to focus on traits not processes.**

**Reform is needed urgently: If provision is not made soon for an evidence-based flexible and proportionate regulatory framework, there is little prospect of agricultural innovation realizing its potential in achieving the Sustainable Development Goal targets by 2030 or the EU maintaining international competitiveness.**





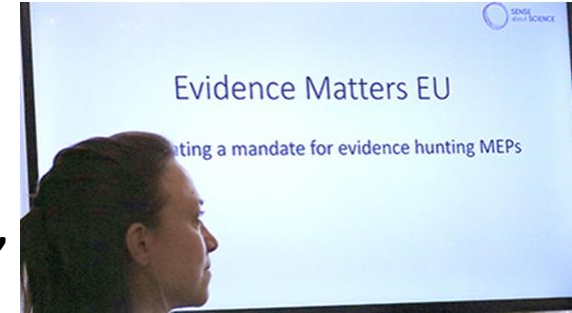
# Generation of an efficient system for science advice (SoFi) has been a key activity of the Finnish Academies

## Collaboration with Finnish Government

### Promotion of EASAC reports in Finland



### Workshop with a British organisation "Sense about Science"



### Science and the Society Theme day 11.11.2019

## IMPACT:

New Government Program (2019-2022):  
Government is committed to science-based decision making!

### **Box 1 Summary of recommendations from Leopoldina *et al.* (2019)**

The first step is to amend EU genetic engineering legislation to include revising the GMO definition, or the associated exemptions, in order to exempt genome-edited organisms from the scope of the legislation if (1) no foreign genetic information is inserted and/or (2) if there is a combination of genetic material that could also result naturally or through traditional breeding methods.

Beyond the short-term amendment of current genetic engineering legislation, a second step should comprise developing a fundamentally new legal framework that is detached from the previous process-based regulatory approach. The new, science-based, legal framework must link the requirements of authorisation and registration to the resulting traits.

To ensure continuing development of the science base and responsible innovation in agriculture, it is also important for the European Commission and Member States to do the following.

Make field trials of new crop varieties practicable again as quickly as possible.

Support public engagement about new breeding methods, to take account of, and inform, consumer views.

Enable freedom of choice by consumers, using consistent labelling rules.



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Provide broader support for responsible innovation in agriculture, e.g. by public funding of research on the health, environmental, economic, ethical and societal consequences of products and application scenarios of new molecular breeding methods. Support for innovation must also ensure that the precautionary principle is not linked to speculative risks but rather applied in the context of potential benefit-risk considerations and the risk of doing nothing.

Increase market competition by targeted incentives with particular regard to small and medium-sized enterprises currently deterred by high bureaucratic and cost obstacles.

Source: Leopoldina *et al.* (2019) with summarising by EASAC of original text on recommendations.