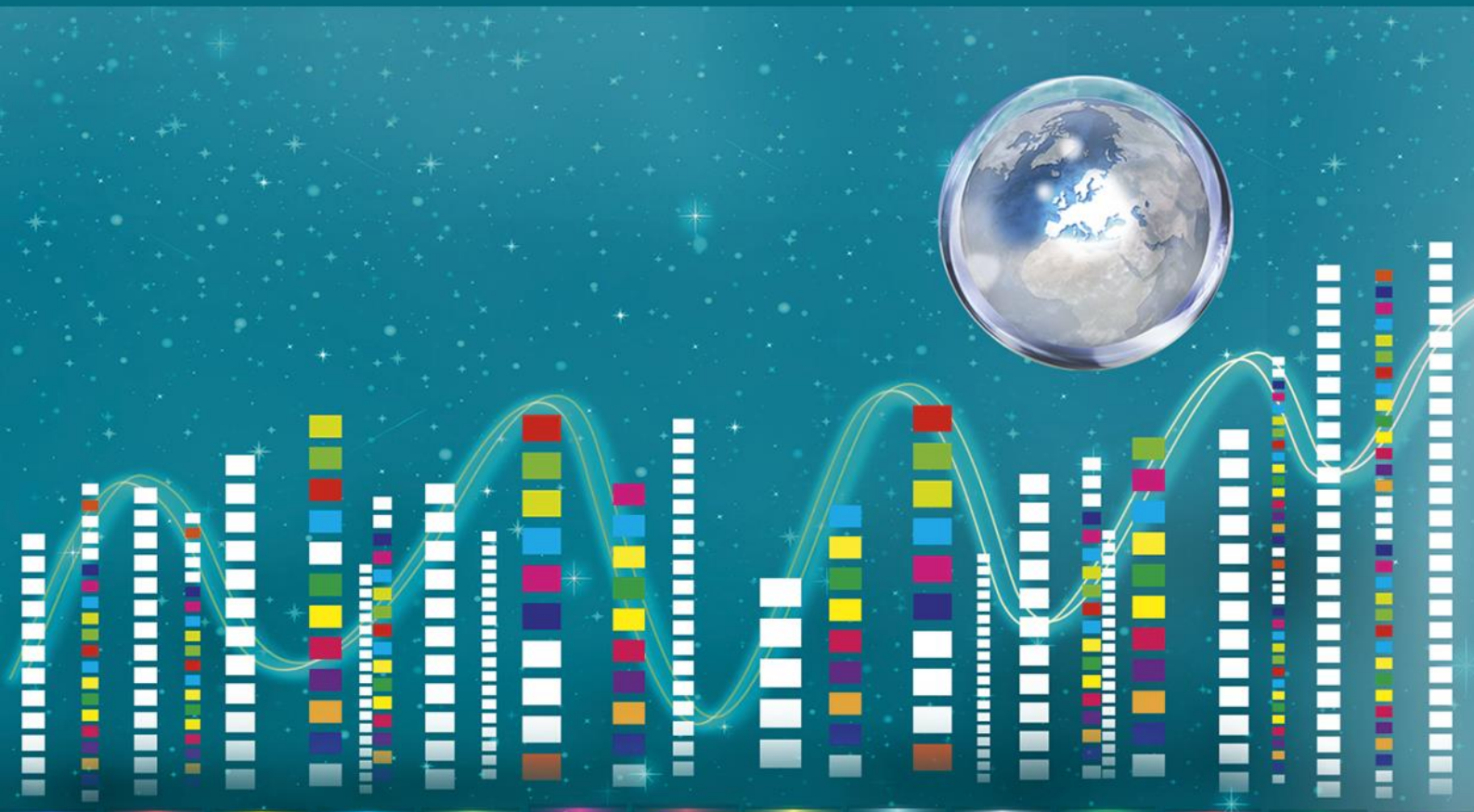
European Commission

Foresight

NATURE VALUED

Targeted scenario N°13

Glimpses of the future from the BOHEMIA study



***Nature Valued* - Targeted scenario N°13**

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EUROPEAN COMMISSION

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Directorate-General for Research and Innovation

2018

About BOHEMIA

BOHEMIA is a foresight study (contract N° Contract PP-03021-2015) designed specifically to support the preparation of the next framework programme.

The study put forward policy recommendations for the next framework programme, based on a foresight processes involving scenario development, a Delphi survey and an online consultation.

As part of its recommendations, the study identified 19 likely future scenarios with disruptive implications and associated priority directions for EU research and innovation.

The full range of the results of the study is available at https://ec.europa.eu/research/foresight

Targeted scenario N° 13

Nature Valued

Summary

Overexploitation of natural environments, intensive agriculture, and climate change have triggered further declines in wildlife with dramatic impacts on biodiversity, while also causing pollution, erosion and other forms of harm. In response there was a change in the economic policy paradigm promoting sustainable business and consumption patterns that respect planetary boundaries, and more generally makes a case for the importance of biodiversity and nature-based solutions.

UN Sustainable Development Goals (SDGs) most relevant to this scenario:

The scenario

It is 2040. Europe is a place with a high quality of life. Its inhabitants enjoy prosperity and a healthy environment. The diversity of its countryside, the recreational value of its forests, the potential of its biological resources are widely appreciated. While many challenges such as climate change and threats to biodiversity continue, Europe is now more resilient. To get there, Europe has succeeded to combine bold action, investment and advocacy for planetary health with the development of sustainable systems for consumption and production. Europe has played successfully its unique brand of valuing the environment and fairness. While it has been questioned if Europe alone can have an impact on planetary health, Europe's evidence-based engagement for sustainable development has had lighthouse effects globally and brought reputational benefits. Intelligent regulation has helped European companies thrive and develop sustainable solutions. Maintaining Europe's role as a frontrunner for sustainability remains a permanent endeavour as other parts of the world are following on its footsteps and closing in. While building or re-building natural capital has required major efforts, engagement and investments, it has opened opportunities for bioremediation and nature-based solutions industries. There has been growing recognition and awareness that nature can help provide viable solutions to economic and social problems, using the properties of natural ecosystems and the services that they provide in a smart, 'engineered' way. Building the economic case for nature and planetary health has been a key enabler for these advances. International initiatives have focussed on "making nature's values visible" by mainstreaming the values of biodiversity and ecosystem services into decision-making at all levels. The EU revised its fiscal policies to orientate private capital flows to sustainable investments. Public and private long-term investment decisions are now integrating wider risks and returns including those linked to the value of environment. Financial markets have increasingly learned to appreciate sustainable investments. Companies have seen the benefit to adopt sustainable business models and disclosing information on their environmental and social impact. A new economic model has emerged where natural capital and social capital are appropriately valued and investments into ecosystem services have become profitable. All in all a fair, inclusive post-fossil society which permanently regenerates its resources and is fully reconciled with nature emerged. Its social needs, new sustainable consumption patterns, and market-creating innovation directed towards a low-carbon future drive the value chains of a circular economy (bio-economy to a considerable degree), contributing to living well within the planet's boundaries and shared opportunities, and enhancing Europe's competitiveness as a world leader for sustainability.

Relevance for Europe

A healthy biosphere is necessary for humanity's biological resource base on land and in the oceans. It provides necessary ecosystem services, including food, biomass, medicines, pollination, soil fertility, genetic diversity, climate regulation, moderation of extreme events, and the cultural value of countryside. Many ecosystems in Europe need to be regenerated, restored or prevented from further decay. Respect for planetary boundaries and incorporation of natural and social capital into the economic rules of the game will ensure long-term resilience of our society, and frame new models of using nature in developed and developing nations.

Healthy nutrition for all can induce better human health outcomes. Europe's wide reservoir of biodiversity is an asset in the global race for novel therapeutics, prompted by microbial resistance to existing drugs and by currently incurable diseases. The obvious public health benefits are here doubled by humanitarian and economic ones.

Contribution towards the UN Sustainable Development Goals (SDGs)

The respect of our planetary boundaries which define a "safe operating space for humanity" is a precondition for meeting the Sustainable Development Goals (SDGs). This scenario relates very much to: SDG 12 - Ensure sustainable consumption and production patterns, in particular 12.2 (achieve the sustainable management and efficient use of natural resources); SDG 13 – Fighting climate change (e.g., 13. 2: Integrate climate change measures into national policies, strategies and planning), SDG 14 - Conserving and sustainably using the marine resources (e.g., 14.2: sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans) and well as land resources (SDG 15).

Implications for EU policy

Europe must find solutions to ensure economic well-being while minimizing the use of natural resources. These solutions may be replicable or adaptable for other countries as well. This is at the heart of EU environment and agriculture policies, as well as other policies that are concerned with land use (regional, industry, maritime etc.). More generally, the EU should explore policies and practices designed to preserve and use genetic resources, including scaling up the model of partly controlled natural habitats to land and water ecosystems. Successfully scaled up to large farms, such ecosystems would host greater genetic diversity. The paradigmatic shift in pricing the exploitation of our natural environment has also serious consequences the whole economy. Industrial policies for selected sectors are challenged to frame the restructuring process towards more sustainable production-consumption models, favouring, for instance, the parallel shifts to a circular and bio-economy.

Future Directions for EU R&I policy recommended by the public consultation

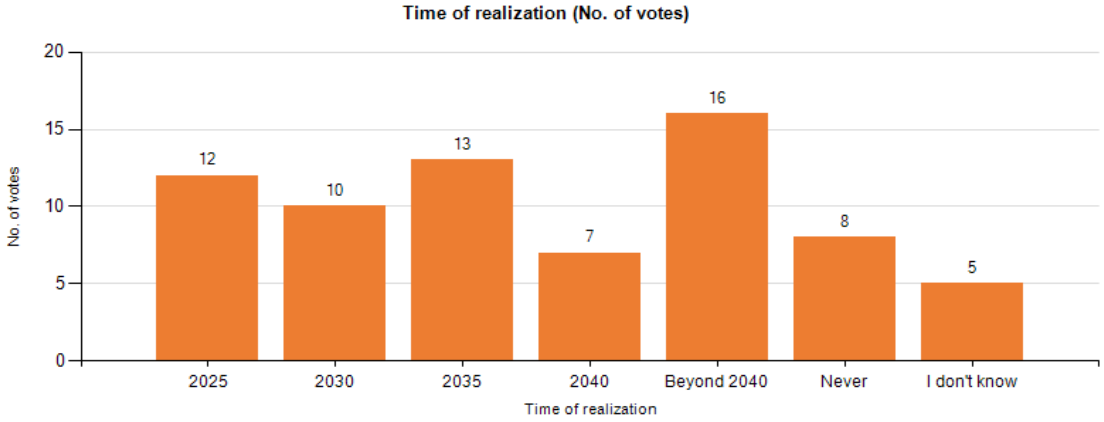
- **Building models for a sustainable circular economy based on renewable resources and renewable energy**
- **Inquiry into and development of solutions for environmental, social and economic impact assessment**
- **Designing solutions for the sustainable mobility of people and goods**
- **Exploring the intersection of ecology and technology, and in particular using technology for sustainable practices**
- **Biotechnology research for agriculture, food production, and medicine**
- **Developing educational solutions to balance individual needs and the consumption/production of goods**
- **Science-based approaches to regulations and policy-making**
- **Developing biological knowledge for Agro-ecological Food Systems and ecosystems services**

Annex: Relevant Data from the Delphi Survey

The Delphi survey of the BOHEMIA study asked experts about the time of realization of 143 statements about the future, and about the relevance of Research and Innovation for that realization, or about the relevance of the realization for Research and Innovation policy. The experts were asked to justify their judgements with arguments. The whole data set has been published and can be found at: https://ec.europa.eu/research/foresight

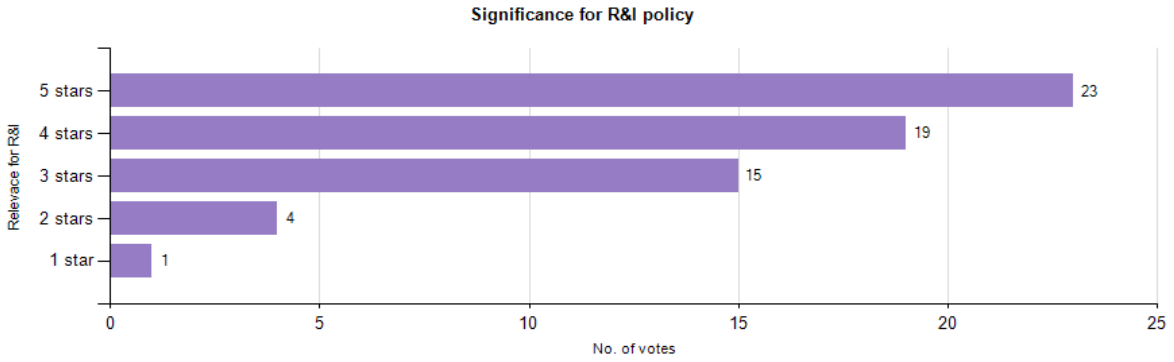
This annex includes the parts of the data set that are relevant to this scenario.

The environmental footprint is appropriately incorporated in the prices of all economic activities and products



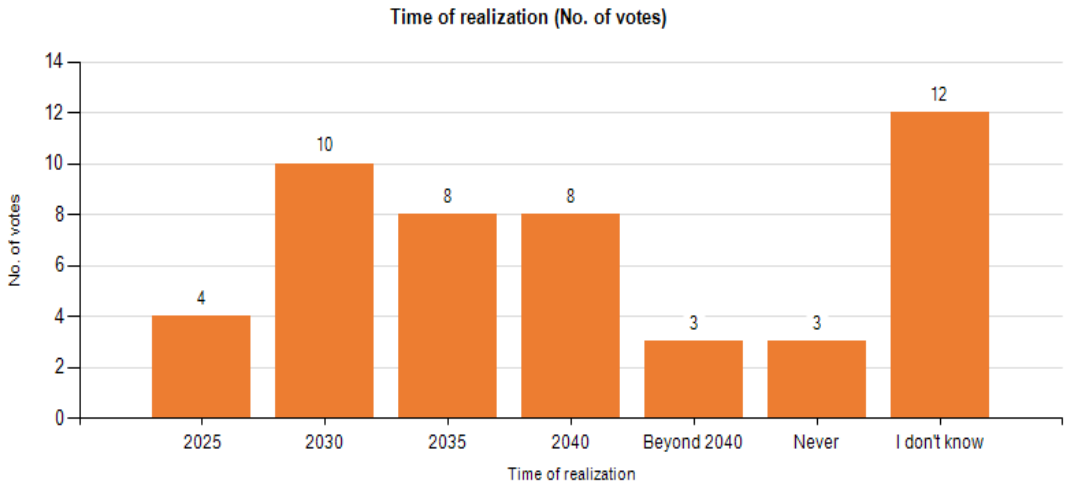
Number of respondents: 70

Arguments for time of realization	**No. of votes**
In "all activities and products" is too ambitious, maybe in 80% of all activities and products.	39
Globalisation will make it hard for a fair price increase to compensate the burden on the environmental footprint.	33
What other choice do we have on a finite planet? Let's to it sooner than later and take care for the next generations as well as biodiversity! EU must take the lead!	27
This initiative meets with the considerable opposition of businesses and remains unreliable. Useful progress is made too late while the footprint is enormous.	19
As long as the rules are set by those who benefit from them, this will never happen.	16
Denial of environmental problems will increase due to a changing political landscape.	15
Digitalization of society for other reasons will bring in a possibility to track the environmental footprint aspects also.	14
Lack of policy agreement/coordination between governments leads to a competitive race to the bottom.	9
The Pigovian tax would lead to an understanding by the consumer of the real costs of their behaviour.	6
Environmental Responsible behaviour must be driven through the household budgets of consumers.	6
Extrinsic motivations deny the proper environmental care.	6
This question carries a whole freight of smuggled assumptions. Don't ask high school questions. Oh god's sake, limits to text input.	5
The question is highly relevant but the possible underlying assumptions are too many. My greatest fear is to apply this scheme as a make believe and continue exploiting the poor and powerless!	4
This question ignores alternative modes of provisioning, such as commons, that do not necessarily require (direct) market exchange. The price-system presumes certain social relationships.	3



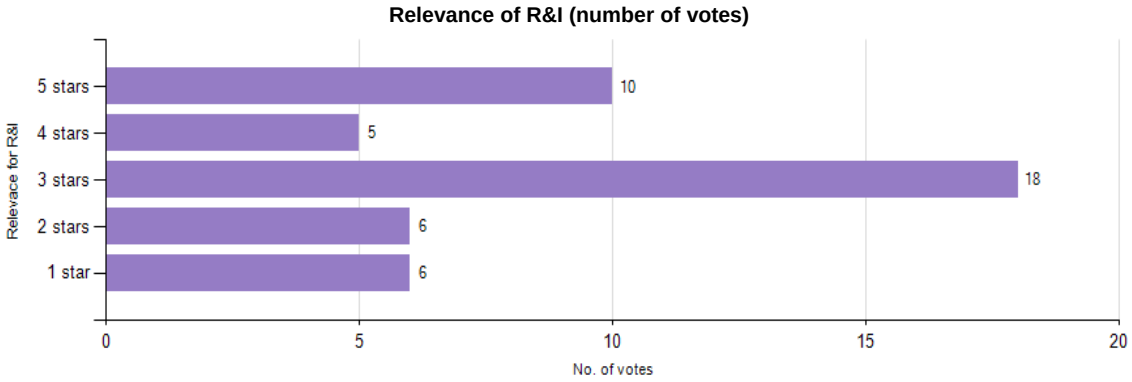
Arguments regarding the significance for R&I policy	**No. of votes**
The calculation of the footprint needs to be clearly defined for legal purposes.	39
A change in the economic structure and system is needed to accomplish the desired outcomes, not more regulations.	31
The footprint entails intense political debate which in turns trigger intense research influenced by political interests. It all depends on how the EU compromises between environment and business.	29
If the footprint was fully priced in this would require radically new approaches in several fields (e.g. manufacturing, ICT, energy, transport) with substantial R&I requirement as a consequence	23
If the footprint is priced-in in all activities, a discussion on the need for further environmental research could be triggered.	21
Research at European level will be crucial to build public consensus	12
For topics like these there needs to be communication about the role of the EU: In which areas it is necessary to intervene and steer the citizen's behaviour?	12
Why don't we replace footprint with 'LCA' (Life Cycle Assessment)? The scientific bases are available and findings can be implemented quickly.	10

Heritage or heirloom vegetables make up 20% or more of the vegetables in the EU ecosystem



Number of respondents: 47

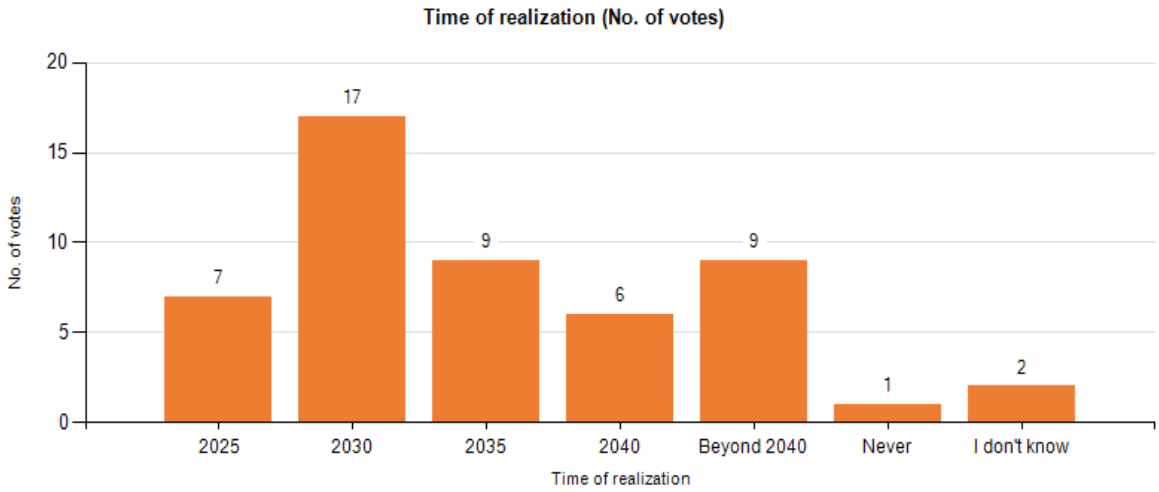
Arguments for time of realization	No. of votes
For a category of consumers interested in healthy eating, heritage vegetables may be an interesting niche market.	33
Heirloom varieties help strengthen small holder agriculture linked to the rediscovery of territory, agritourism and promotion of local food culture & identity.	27
Some older plant strains are assumed to be more healthy and contain more minerals or vitamins. They might be the first on the market.	20
Diversity-seeking behaviour increases the demand for 'different' vegetables, thus increases the demand for heirloom varieties.	15
The question is not clear: what is 20% of the EU ecosystem?	7
Heirloom vegetables, although adapted to local environments, tend to ripen at different stages, can't all be harvested at once, so are unsuitable for mass Agrifood.	2
Heritage and heirloom vegetables can be used as genetic resources for broadening the genetic diversity of modern vegetables.	2
Heirloom vegetables are rather having a nostalgic and cultural connotation. Nothing to do with food resilience... No sufficient yield for feeding the world. And... our taste changed!	2



Average: 3.16 **Dispersion:** 1.61

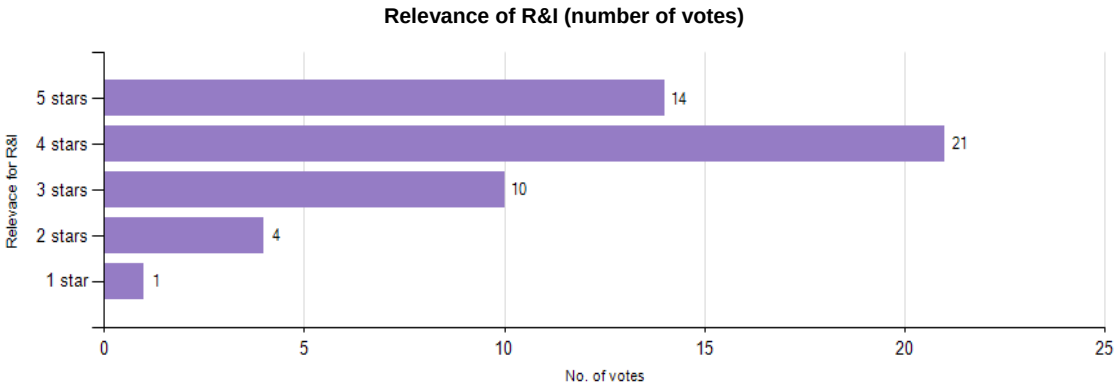
Arguments regarding the relevance of R&I	**No. of votes**
Biodiversity must be integrated into the development and implementation of other policies.	41
The exchange of seed needs to be promoted and enabled (it is currently illegal to buy or sell seed of some heirloom varieties)	24
European Agricultural Policies need to appreciate the quality of crop production in terms of contribution to crop diversification for sustainable agro-ecosystems and healthy food systems	22
The EU Biodiversity Strategy 2020 needs to expand to better address this issue.	12
The question is not clear	5

5 % or more of the production of food, medicine and bio-energy in the EU is based on algae



Number of respondents: 50

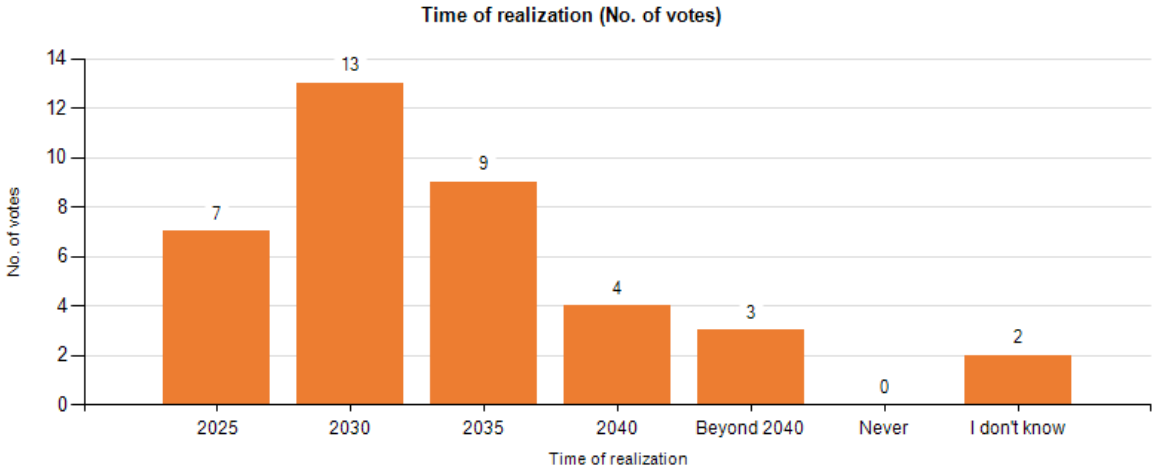
Arguments for time of realization	**No. of votes**
Industrial-scale demonstrations of sustainable algae cultures for biofuel production are available.	40
Algae research gives hope for renewable carbon-negative source of food and medicines.	29
Growing algae for food and biofuel contributes to the reduction of greenhouse emissions.	22
There are still simpler alternatives and options within the current land-based food system.	8



Average: 3.86 **Dispersion:** 0.96

Arguments regarding the relevance of R&I	**No. of votes**
There is need for further research on the manufacture of bio-compounds from microalgae with applications in food production.	44
New research may exploit the ability of algae to produce lipids using energy from photosynthesis.	31
research on algal growth conditions and on which variety to use for which purpose is still required	15
Further research on bio-refinery of algae and consumer acceptance of algal products is required.	4

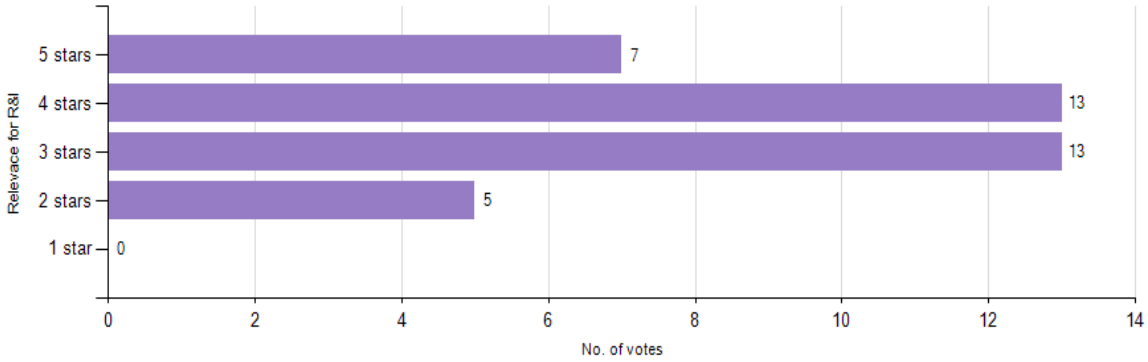
More than half the fish for human consumption in the world are produced by aquaculture including offshore aquaculture



Number of respondents: 37

Arguments regarding the time of realization	**No. of votes**
The resources for ocean fishing are diminishing very fast.	40
According to World Bank and FAO, aquaculture will provide close to two thirds of global fish consumption by 2030.	23
Microplastics in ocean waters lead increasingly to microplastics in fish meat, making it unfit for human consumption. Fishfarming with water filtration will provide higher quality fish.	13
Fisheries and aquaculture assure the livelihoods of 10–12% of the world's population (acording to The State of World Fisheries and Aquaculture/ FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS).	5
Integrated ocean aquaculture with pollution-reducing plants like hyacinths in floating-island concept may increase yields, clean waters up, and produce healthier fish.	5
Fish nutrition science is producing resource efficient solutions. Also, GMOs will provide new sources of key fatty acids.	5
EU overall output has been more or less constant in volume since 2000 whereas global production, at the same time, has been growing by nearly 7% per year.	4

Relevance of R&I (number of votes)



Average: 3.58 **Dispersion:** 0.87

Arguments regarding the relevance of R&I	**No. of votes**
Aquaculture nutrition and aquatic physiology represent important research areas.	32
Further research in this area is needed to develop and multiply the flora and fauna in the aquatic environment.	23
Up to 30 percent of farmed salmon are unfit for consumption because of illness. Research in fish health is needed.	9
We need GM-bred traits in oilseeds for key fatty acids.	5
Research is required on the impact of aquaplastics on suitability of aquacultured fish for human consumption.	5
Environmental impacts of aquaculture need to be understood, up to the point that lack of adequate water quality will harm production	5

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Overexploitation of natural environments, intensive agriculture, and climate change have triggered further declines in wildlife with dramatic impacts on biodiversity, while also causing pollution, erosion and other forms of harm. In response there was a change in the economic policy paradigm promoting sustainable business and consumption patterns that respect planetary boundaries, and more generally makes a case for the importance of biodiversity and nature-based solutions.

Studies and reports