GeneBEcon

National Policy Makers

Action Pathway towards New Genomic Techniques (NGTs)

Funded by the European Union

PRO CONSULTING

Authors: Xenia Schneider
Elena Aristodemou
* based on stakeholder co-created statements

GeneBEcon is funded by the European Union under the Grant Agreement no. 101061015. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them.

Executive Summary

The National Policy Makers Action Pathway is part of the GeneBEcon Transition Action Plan (TAP), which provides a structured and inclusive framework for adopting New Genomic Techniques (NGTs) across the European Union. NGTs offer targeted, efficient methods to improve crop traits, contributing to sustainability, food security, and bioeconomy goals. This document outlines a tailored roadmap for national policymakers to ensure responsible integration of NGTs and NGT products into regulatory, economic, and communication strategies.

Why NGTs products Matter

NGT products have the potential to:

- Enhance food quality and nutrition.
- Increase crop yields and resilience to climate change.
- Reduce pesticide and fertiliser usage.
- Lower greenhouse gas emissions.
- Promote circular bioeconomy solutions.

The Need for a Transition Action Plan (TAP)

Despite their advantages, NGTs and NGT products face skepticism from consumers due to misinformation and fragmented regulatory landscapes. The change that the NGTs innovation brings needs to be better managed. The GeneBEcon project, with active stakeholder involvement, has worked to facilitate this change and improve public understanding.

Transition Action Plan (TAP) Development

A structured, Responsible Research and Innovation (RRI) approach was used to develop the TAP across three phases:

- Mapping the NGT Landscape – Identified barriers and stakeholder needs.
- Co-developing SMART Actions – Created actionable, measurable strategies.
- Validating and Finalising TAPs – Developed tailored plans for six stakeholder groups.

Transition Action Plans (TAPs)

Each TAP is an actionable pathway tailored to a key stakeholder group. Each pathway includes practical, specific and measurable strategy for awareness, education, collaboration, and communication, enabling a unified transition toward NGT desirability and integration.

Consumer Associations
National Policymakers
Breeder Associations
Farmer Associations
The Food Industry
NGO Associations

To access all Transition Action Plans, please visit the link https://genebecon.eu/transition-action-plans-taps/

The Role of National Policymakers

National policymakers play a central role in enabling the responsible and inclusive integration of NGTs into national frameworks. The National Policy Makers TAP structured into two strategic phases, provides a roadmap that guides policymakers to:

- Design and implement tailored public awareness campaigns.
- Strengthen stakeholder-specific communication (farmers, breeders, consumers).
- Establish and maintain science-policy advisory networks.
- Enhance regulatory clarity, product surveillance, and labeling practices.
- Align national initiatives with broader EU legislative and policy frameworks.
- Analyse consumer perceptions and economic cost-benefit implications.
- Prepare long-term strategic foresight reports (e.g., IPCC-style for agriculture and biotechnology).

Each TAP action includes Specific, Measurable, Achievable, Relevant, and Time-bound (SMART) steps to ensure impact and accountability. The SMART actions can be adjusted by Policymakers to fit their goals and own information strategy.

Conclusion

The GeneBEcon National Policymakers TAP empowers national policymakers to guide the ethical, transparent, and effective integration of NGTs into European food and agriculture systems. Through evidence-based communication, regulatory coordination, and stakeholder engagement, this roadmap advances innovation while maintaining public trust and sustainability.

Table of Contents

Section I. General: Introduction and methodology

Section II: Specific Action Pathways for National Policy Makers

GeneBEcon

Section I. General: Introduction and methodology

Why NGTs?

New Genomic Techniques (NGTs): A Path to Sustainable Agriculture & Food Security

New Genomic Techniques (NGTs) are modern breeding methods that allow scientists to precisely edit the genetic material of plants and other organisms to improve their traits. Unlike traditional breeding, which relies on crossbreeding and takes many years to develop improved crops, NGTs can speed up the process by making targeted, natural-like modifications. Unlike transgenic genetically modified organisms (GMOs), NGT-derived products do not carry transgenes. This helps develop crops that are more resistant to pests and diseases, require fewer chemicals, and are better suited to climate change, making food production more sustainable, efficient, and secure. Nevertheless, the NGTs method is one of the many tools used for breeding.

A Smarter Approach to Agriculture 🌱

New Genomic Techniques (NGTs) provide precise genetic improvements that can boost crop yields, enhance resistance to pests and diseases, and reduce reliance on chemical inputs. Unlike traditional breeding, NGTs allow targeted modifications that support climate-resilient, resource-efficient, and sustainable farming. As Europe transitions to a bio-based economy, NGTs offer a way to secure food production while minimizing environmental impact.

Better Food for Consumers 🥦

NGTs can improve food quality, sustainability, and affordability by increasing nutritional value and reducing the need for chemical treatments. Research from GeneBEcon shows that while public awareness of NGTs is still low, **consumers become more open to NGT-derived products when given clear, science-based information**[1]. This highlights the key role of consumer associations in bridging the information gap and ensuring informed choices.

Benefits for a Sustainable Food System 🌍

✅ **Farmers & Breeders:** Stronger crops, reduced pesticide and fertilizer use, and higher yields for more resilient farming in less breeding time.

✅ **Food Industry:** Longer shelf life, better product quality, and more efficient resource use, supporting a circular bioeconomy.

✅ **Consumers:** Access to healthier, sustainable food choices with reduced environmental impact.

To fully unlock the potential of NGTs, industry, policymakers, and the public shall align efforts to ensure these innovations are accessible, appropriately-regulated, reliably and widely accepted. With transparency and trust, NGTs can help shape a more sustainable, resilient, and efficient food system for the future.

1 https://genebecon.eu/wp-content/uploads/2024/10/GeneBEcon_Deliverable1.2.pdf

Advantages and Challenges

NNGTs: Unlocking a More Sustainable & Resilient Food System

🔹 **What are the benefits of NGTs?**

New Genomic Techniques (NGTs) offer a range of benefits for agriculture, the food industry, and consumers:

✅ Healthier & More Nutritious Crops – NGTs can improve the nutritional quality of food, making it more beneficial for consumers.

✅ Less Dependence on Chemicals – By making crops naturally more fertilizer efficient, or resistant to pests and diseases, NGTs reduce the need for pesticides, lowering agriculture's environmental footprint.

✅ Faster Adaptation to Climate Change – Plant breeding can take years, the NGTs may help plants to better respond to changing climate conditions and thus enhancing food production.

✅ Lower Greenhouse Gas Emissions – Reducing chemical inputs and improving resource efficiency can help cut emissions from farming, supporting EU climate goals.

✅ Higher yields – Increasing pest and disease resistance can contribute to increasing yields by reducing yield loss. For example, the virus resistant potato developed by GeneBEcon.

✅ Conserve biodiversity - Environmental benefits by enabling gene drives to control invasive species or disease vectors and providing tools to restore endangered species.

🔹 **Why is consumer desirability and acceptance important?**

Consumers stand to benefit from healthier and tastier food choices, better food security, and more sustainable production. However, studies from the GeneBEcon project show that many people are unfamiliar with NGTs or mistakenly associate them with traditional GMOs. Key concerns include:

🛑 Lack of Awareness – Without clear information, consumers may not understand the benefits of NGTs. In the GeneBEcon consumer survey, an explanatory video enabled consumer understanding.

🛑 Misinformation & Trust Issues – Skepticism remains high, partly due to misunderstandings about genetic modification.

🛑 Ethical & Safety Concerns – While scientific studies confirm the safety of NGTs, people need transparent communication and clear regulations to feel confident about them.

🛑 Regulatory Gridlock in the EU – Divided voting behaviour among EU countries for risk management makes it difficult for NGT products to reach the market.

🔹 **What needs to be done?**

🌍 Enabling regulations – Regulatory hurdles and uncertainty in the EU remains a significant barrier, creating difficulties in market access and product approval.

📢 Better public communication – Providing transparent, fact-based, easy to understand, information will help consumers distinguish more precisely NGTs from older genetic modification techniques.

🛒 Affordable & accessible products – Studies, including GeneBEcon's own consumer survey, show that price incentives can encourage consumers to choose NGT-derived foods.

🔬 Building trust in oversight – Strengthening regulatory transparency will help NGT-product users make informed choices.

For NGTs to succeed, farmers, policymakers, industry, and consumer groups must collaborate. Clear communication, strong governance, and public engagement are essential for a healthier, more sustainable, and resilient food system — the goal of this NGT Transition Action Plan.

Benefits of NGT-plants and products

New Genomic Techniques (NGTs), such as plant gene editing, offer major opportunities for agri-food systems and the bioeconomy.

The GeneBEcon project has demonstrated their potential with two key examples: virus-resistant potato with an optimized tuber starch quality and microalgae producing healthy carotenoids.

Healthier, More Sustainable Potato Production

NGT potatoes can help reduce pesticide use and increase crop resilience. For example, by introducing resistance to the potyvirus PVY, gene-edited potatoes limit disease spread by aphids, cutting pesticide use across 1.7 million hectares (equivalent to Switzerland area) of European potato production by approximately 850,000 kg of active ingredients. This not only protects the environment but also secures the livelihoods of 1.5 million potato farmers.

Beyond pest resistance, NGTs can improve the starch quality of potato tubers, eliminating the need for chemical modifications during processing. This innovation could save up to 75,000 tonnes of chemicals and 7.5GWh energy annually, lowering production costs and reducing environmental impact.

Gene-Edited Microalgae: A Sustainable Bioeconomy Booster

NGTs can also enhance microalgae's ability to produce high-value compounds, such as:
✅ Omega-3 fatty acids for food and nutrition.
✅ Antioxidant pigments, such as carotenoid lutein, for cosmetics and pharmaceuticals.

Microalgae also act as natural CO_2 absorbers, turning atmospheric CO_2 into valuable organic compounds. This makes them a climate-friendly production system, reducing greenhouse gas emissions while promoting sustainable innovation.

A Circular Approach: Zero Waste, More Value
NGT microalgae can maximize resource use by repurposing residual biomass as a high-quality poultry feed. This provides a sustainable alternative to legume-based feed ingredients, reducing reliance on traditional crops while enhancing animal nutrition and health. Increased microalgae production could generate economic gains of €11.2 million across Europe.

Conclusion
These examples from GeneBEcon show how NGTs can improve food and industrial production by enhancing crop resilience, reducing environmental impact, and supporting a circular bioeconomy. By integrating NGT innovations, Europe can achieve sustainable, resource-efficient agriculture while fostering economic growth. To realise these benefits though, it is necessary to either develop new enabling legislation or to modify the implementation of existing legislation. Under the current circumstances, NGT-derived potato and microalgae have an extremely low chance of getting commercialized in the EU.

Relevance to European Policies

NGTs offer a significant opportunity to enhance **food security, sustainability, and consumer benefits** in Europe. These advanced breeding methods improve **crop resilience**, reduce the need for **chemical inputs**, and support **environmentally friendly food production**. For consumers, this means access to healthier, more sustainable, and potentially more affordable food products.

NGT products can support the newly defined **Vision for Agriculture and Food** for a competitive, resilient, future-oriented, and fair EU food production system contributing to EU's food security. NGTs also align with key EU policies, including the **European Green Deal** and the **Farm to Fork Strategy**, by ensuring that food systems are resilient, resource-efficient, and capable of mitigating climate change.

NGTs support the EU's target of halving pesticide use by 2030 by reducing dependency on chemical pesticides and fertilisers. Enhancing plant resilience through NGTs also lowers agricultural emissions, mitigates climate change impacts, and strengthens food security. However, consumer desirability and acceptance remain critical for market integration, requiring clear communication about the benefits and safety of NGT-derived products.

NGTs promote resource efficiency and waste reduction, aligning with the **EU Circular Economy Action Plan**. Enhanced plant traits can extend shelf life, improve durability and optimise the use of agricultural by-products, supporting circularity across food and industrial value chains. However, farmer and public awareness campaigns are necessary to inform about these environmental and economic benefits of NGT-derived products.

NGTs contribute further, to the **EU Zero Pollution Action Plan**, by minimising pollution from agriculture and industry. NGT-bred crops may require fewer synthetic inputs, reducing soil, water, and air contamination. As with other policies, gaining consumer confidence is crucial.

NGTs can drive progress in the **EU Bioeconomy Strategy**, facilitating the development of bio-based materials, sustainable biofuels, and innovative bioproducts. By improving microbial strains and plant-based resources, NGTs boost resource efficiency, reduce fossil fuel dependency, and contribute to a more sustainable bioeconomy. Ensuring market acceptance of bio-based innovations through regulatory clarity is essential for the European bioeconomy.

NGTs can also provide solutions in the context of the EU biotechnology and biomanufacturing initiative. Innovation in biotechnology can be an important building block in the efforts to reduce the overall environmental footprint of agri-food production systems making them more resilient and supportive to reach the EU's climate neutrality goal and to provide more sustainable and some healthier foodstuffs[2].

Overall, NGTs align with EU sustainability goals by fostering innovation, reducing environmental footprints, and supporting resilient and resource-efficient systems across agriculture, industry, and the bioeconomy. To unlock their full potential, transparent communication, trust, and regulatory clarity will be essential for their successful integration into the European agricultural, industrial and bioeconomy strategies.

2 Nature-based solutions - European Commission (europa.eu) COM(2024) 137 Building the future with nature: Boosting Biotechnology and Biomanufacturing in the EU

About GeneBEcon

GeneBEcon: Advancing Sustainable Agriculture & Bioeconomy with NGTs

The **GeneBEcon project** (2023-2025), funded by the Horizon Europe Research & Innovation Programme under the Clean Environment Zero Pollution Initiative, focuses on **sustainable, bio-based solutions** for agriculture and industry. The GeneBEcon consortium is multidisciplinary bringing together experts from agricultural research, biotechnology, economy, food law, policy, social sciences and representatives of the whole agro-food value chain.

The Challenge and Solutions:
NGTs have great innovation potential, but their success depends on balanced regulations, economic support, and public trust. GeneBEcon tackled this by:

- ✅ **Developing virus-resistant potatoes** to improve starch quality and reduce chemical processing.
- ✅ **Enhancing microalgae-based production** of valuable compounds while repurposing biomass as animal feed.
- ✅ **Using precise gene-editing techniques** to create targeted modifications with minimal unintended effects.
- ✅ **Advancing molecular analytical tools** to support risk assessment and regulation.
- ✅ **Collaborating with businesses** to bridge research and real-world implementation, promoting **low-input, energy-efficient agriculture** and streamlined industrial processing.

Evaluating Regulatory & Economic Impact:
GeneBEcon **evaluated different regulatory options** to assess their impact on European agriculture, the economy, and biosafety. The project demonstrated how s**cientific knowledge can inform better policies** by comparing NGT plants with conventional varieties in terms of biosafety requirements.
To understand the **economic and social impact of NGTs**, the project:

- 📊 **Used an investment evaluation method** to assess the economic impact of regulating NGTs on the investment decisions of plant breeders in the EU.
- 📊 **Applied a socio-economic model** to calculate the global cost of delaying the adoption of NGTs.
- 🛒 **Surveyed 5,000 consumers**, finding that once people understood the benefits of NGTs, they were more willing to purchase NGT-based products.

An indirect but significant impact of the GeneBEcon project lies in its potential to enhance consumer trust. When consumers are presented with NGT products that demonstrably offer improvements over conventional alternatives, their willingness to consider and adopt such products is likely to increase.

Responsible Research & Public Engagement
GeneBEcon applied **Responsible Research and Innovation (RRI)** by prioritising **ethics, inclusivity, and transparency**. Through six stakeholder workshops, the project:

- 🤝 Fostered open discussions and **built trust** in science and innovation.
- 📢 Gave a voice to **underrepresented stakeholders** in research and policy debates.
- 🔍 Ensured that research remains **socially relevant, sustainable, and aligned with public values.**

With its pioneering work in potatoes and microalgae, GeneBEcon has demonstrated how **precision breeding can drive sustainable agriculture and bio-based industries**, shaping a resilient and forward-thinking European bioeconomy.

Why do we need a TAP in EU?

The introduction and acceptance of New Genomic Techniques (NGTs) in the European Union requires a comprehensive and coordinated **Transition Action Plan (TAP)** to guide and align the diverse range of stakeholders, including consumers, farmers, breeders, the food industry, NGOs, and policymakers. Such a plan is essential to bridge the gap between scientific advancements and societal expectations, ensuring that innovation supports the EU's sustainability goals while maintaining public trust and regulatory coherence. TAP goals are:

Consumer Guidance and Trust Building
Public acceptance is pivotal for the success of NGTs. Many consumers do not have a clear attitude to biotechnology due to concerns around safety, ethics, and potential environmental impacts. A Transition Action Plan would facilitate transparent communication and provide science-based information. Educational campaigns and dialogue with citizens are crucial to building trust and demonstrating how NGTs align with health, sustainability, and climate resilience goals.

Farmer and Breeder Support
Farmers and breeders need clear frameworks for NGTs to enhance productivity, reduce input costs, and support climate adaptation. The Transition Action Plan can offer access to tailored training, financial incentives, and knowledge-sharing platforms to ensure that these stakeholders will have the necessary tools and confidence to adopt NGTs responsibly and effectively.

Engaging the Agri-Food Value Chain
The agri-food industry plays a key role in the NGT transition by incorporating NGT-derived ingredients and products into the supply chain. The Transition Action Plan would outline strategies to foster cooperation between producers and retailers, ensuring that NGT products meet quality, safety, and sustainability standards, while addressing evolving consumer preferences and ethical concerns.

Addressing NGO Concerns
Environmental and consumer protection NGOs often express caution or opposition towards NGTs. A structured Transition Action Plan would promote ongoing dialogue, transparency in risk assessment, and independent scientific evaluations to address concerns related to biodiversity, ecosystem health, and corporate control over genetic resources.

Policy Coordination, Regulatory Clarity and Legal Certainty
Policymakers need a coherent framework and legal certainty to align NGT adoption with EU agri-food strategies. A Transition Action Plan would streamline regulatory processes, ensure alignment with sustainability targets, and foster harmonized policies across Member States, balancing innovation with precautionary principles.

In sum, a well-structured Transition Action Plan is key to create a shared vision for NGT acceptance across all sectors, ensuring that innovation serves public good, environmental sustainability, and economic resilience while fostering trust and transparency in the EU's food and agricultural systems.

Methodology for developing the NGTs Transition Action Plans

Every innovation to succeed requires an effective change management approach and a clear transition plan to address stakeholder's values and interests. As part of of Responsible Research and Innovation (RRI), the GeneBEcon project developed the NGTs Transition Action Plan (TAP), enabling agri-food and feed stakeholders to navigate the changes brought by NGTs. This structured, participatory approach was led by XPRO Consulting Limited, applying its proprietary RRI Roadmap©™ methodology.

Developing the NGTs Transition Action Plans: A Phase-Oriented, Inclusive Approach

The GeneBEcon project followed a structured, multi-stakeholder approach to develop actionable NGTs Transition Action Plans, ensuring broad engagement across policymakers, industry, food and feed producers/traders, and consumer groups. This process unfolded in four key phases, each refining strategies for responsible NGT adoption.

Phase 1 and 2: Understanding the NGT Landscape – 1st RRI Workshop (Nov 2023)

After an internal workshop, the first stakeholder workshop mapped the state of NGTs in Europe and examined key challenges and opportunities in the agri-food sector. Stakeholders conducted a SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) to assess regulatory, technological, and societal factors impacting NGT adoption.

Key Outcomes:

✅ Identified six key stakeholder groups: 1) policymakers, 2) consumer associations, 3) the food industry, 4) breeder associations, 5) farmer associations, and 6) NGOs, along with their specific needs and concerns.

✅ Recognized misinformation and regulatory uncertainty as two major barriers to public acceptance.

✅ Brainstormed potential transition pathways, laying the foundation for the next phase.

Methodology for developing the NGTs Transition Action Plans

Phase 3: Co-Developing SMART Actions – 2nd RRI Workshop (Mar 2024)
Building on insights from the first workshop, this session took a solution-oriented approach, using the I-SMART framework (Impactful, Specific, Measurable, Attainable, Realistic, Time-bound) to design targeted actions addressing barriers to NGT adoption.
Key Outcomes:
✅ Defined stakeholder-specific transition pathways tailored to policymakers, industry, farmers, breeders, NGOs and consumers.
✅ Prioritized empowerment actions, such as targeted awareness campaigns, regulatory alignment strategies, and investment in detection technologies.
✅ Established an initial Stakeholder NGT Transition Action Plan, outlining concrete actions for transitioning towards responsible NGT adoption.

Phase 4: Finalising the Transition Action Plans – 3rd RRI Workshop (Oct 2024) until May 2025
The third workshop validated and refined the proposed Transition Action Plans, ensuring their feasibility, alignment with EU policy goals, and concrete implementation steps. A major focus was on building trust and multi-stakeholder collaboration. To strengthen the credibility and applicability of the plans, they were reviewed by external stakeholder groups, including regulatory bodies, industry representatives and consumer organizations.

Key Outcomes:
✅ Finalized six distinct Transition Action Plans, one for each stakeholder group, with I-SMART actions to address regulatory, social, and economic challenges.
✅ Developed strategies for dissemination and policy integration, ensuring that the results contribute to shaping future EU regulatory frameworks on NGTs.

Conclusion: A Responsible and Inclusive Transition
By applying a phase-oriented, co-creative approach, the GeneBEcon project ensured that the NGTs Transition Action Plans were stakeholder-driven, scientifically grounded, and policy-relevant. The iterative engagement process across the three RRI workshops allowed for the progressive refinement of strategies, resulting to a set of actionable and widely supported pathways for the responsible adoption of NGTs in the European agri-food sector.

Core Actions

The core actions serve as the foundation of the NGT Transition Action Plan, outlining initiatives to be carried out by NGT specialists that are relevant across all NGTs Transition Action Plans. These actions provide the essential foundation for the commencement and execution of the six NGTs Transition Action Plans.

The three actions shall be implemented in parallel!

Train scientists to be able to respond to media inquiries about NGTs

S

Step: Develop and deliver a tailored training program for scientists, focusing on science communication, handling media interviews, and crafting clear, non-technical messages about NGTs.
Objective: Equip scientists with the skills and confidence to effectively engage with journalists and the public.

M

Step: Conduct four training workshops for 30 scientists within six months, with at least 10 participants per session.
Objective: Achieve an 85% satisfaction rate based on post-training feedback and ensure 75% of participants demonstrate improved media communication skills in a simulated interview assessment.

A

Step: Partner with experienced media trainers and science communicators to deliver the training sessions.
Objective: Certify at least 30 scientists as "Media-Ready Experts on NGTs" by the end of the training program.

R

Step: Focus the training on **addressing common public misconceptions, emphasizing the societal benefits of NGTs** (e.g., sustainable agriculture, food security, climate resilience).
Objective: Ensure that 50% of trained scientists participate in media interviews, public forums, or outreach events within six months of completing the program.

T

Step: Launch the training program within two months and complete all workshops within six months.
Objective: Publish a directory of "Media-Ready Scientists" by the end of Q4 to facilitate media engagement and promote public understanding of NGTs.

SMART (Specific, Measurable, Achievable, Relevant, Time-Bound) is defined and explained in the next section under the paragraph “How to use the Pathway”.

Create an NGTs Knowledge Hub to raise awareness and minimise misinformation/disinformation.

S **Step: Develop an online NGTs Knowledge Hub** that serves as a centralized platform offering accurate, up-to-date information on NGTs, including scientific studies, international and EU policy briefs, EU-funded projects, FAQs, videos, and infographics.
Objective: Provide a reliable resource for policymakers, farmer, breeder and consumer associations, NGOs and the food industry to access verified information and counter misinformation about NGTs.

M **Step: Populate the hub** with at least 50 high-quality content pieces (e.g., scientific studies, international and EU policy briefs, EU-funded projects, FAQs, videos, and infographics) within six months of launch.
Objective: Achieve 10,000 unique visitors and a 20% increase in time spent on the site within six months, with 80% of users reporting the content as "helpful" or "very helpful" in post-visit surveys.

A **Step: Collaborate with experts, research institutions, and communication professionals** to curate and create content.
Objective: Ensure that 90% of the hub's content is peer-reviewed or verified by subject-matter experts before publication.

R **Step: Align the hub's content with current debates, societal concerns, and EU priorities** such as food security, climate change, bio-economy strategy paper and sustainability.
Objective: Ensure the Knowledge Hub is cited in at least five key policy discussions, media articles, or scientific forums within six months of launch.

T **Step: Launch the NGTs Knowledge Hub within four months**, with ongoing updates and content additions every two weeks.
Objective: Evaluate the hub's impact through analytics and user feedback, producing a report on its effectiveness in countering misinformation by the end of the first year.

Conduct EU-wide surveys targeting the public to assess their NGTs' perception.

S **Step: Design and execute a survey that targets the public** across all 27 EU member states to evaluate their awareness, understanding, and opinions about NGTs.
Objective: Collect data on the public's knowledge, perceived benefits, concerns, and trust in NGT-related applications.

M **Step: Gather responses from at least 10,000 people across the EU**, ensuring a representative sample by including a diverse range of demographics such as age, gender, education, and geographic location.
Objective: Achieve a minimum 80% completion rate for the survey and analyze data by the end of the campaign.

A **Step: Collaborate with professional survey organizations and local partners** to translate and distribute the survey in all official EU languages.
Objective: Launch the survey within two months and ensure at least 90% of EU member states meet their target response quota within four months.

R **Step: Include questions that align with the EU's current debates on NGTs**, such as sustainability, food safety, and ethical concerns, to gather insights that can inform policy and communication strategies.
Objective: Use survey results to create a report with actionable insights to be presented to stakeholders (e.g., policymakers, industry leaders) within two months of survey completion.

T **Step: Roll out the survey within three months** and collect all responses within six months.
Objective: Deliver a comprehensive analysis and publish findings by the end of Q3, ensuring the data is timely for ongoing legislative discussions on NGTs.

GeneBEcon

Section II: Specific Action Pathways for National Policy Makers

Transitioning Policies towards NGTs

National Policy Makers (e.g. Ministries of Agriculture, Health, Environment, Food Safety Authorities) play a vital role in shaping public perception and ensuring accurate, accessible information on New Genomic Techniques (NGTs). They also have an ethical responsibility to avoid spreading misinformation or disinformation to consumers.

Humans have been selecting genetic traits for millennia by breeding plants, with the aim to either enhance crop yields or improve food quality. The findings made in modern biology have allowed to refine this process by using New Genomic Techniques (NGTs). NGTs is part of the bioeconomy, which aims to enable Europe to achieve food and nutrition security, natural resources sustainability, mitigate and adapt to climate change, achieve circularity, and strengthen economy and social fairness. To achieve these strategic goals, all Europeans must be involved to transition towards these innovations. In this respect, National Policy Makers play a crucial role for informing and guiding consumers to make informed decisions and choices.

The GeneBEcon project has worked throughout its duration with consumer associations and studied consumer trends. During this work, the project has identified two major issues that impair transitioning A) due to misinformation and B) due to regulatory uncertainty. The goal of this document is to enable Policy Makers to consider specific actions to help consumers in better understanding NGTs, what they mean for our wellbeing, quality of life and for our sustainability.

Finally, this NGTs Transition Pathway has been developed through active stakeholder engagement, including input from National Policy Makers, as part of GeneBEcon's Responsible Research and Innovation activities.

How to use the Pathway

Who implements the Pathway?

National Policy Makers (Agriculture, Health, Environment, Food Safety)

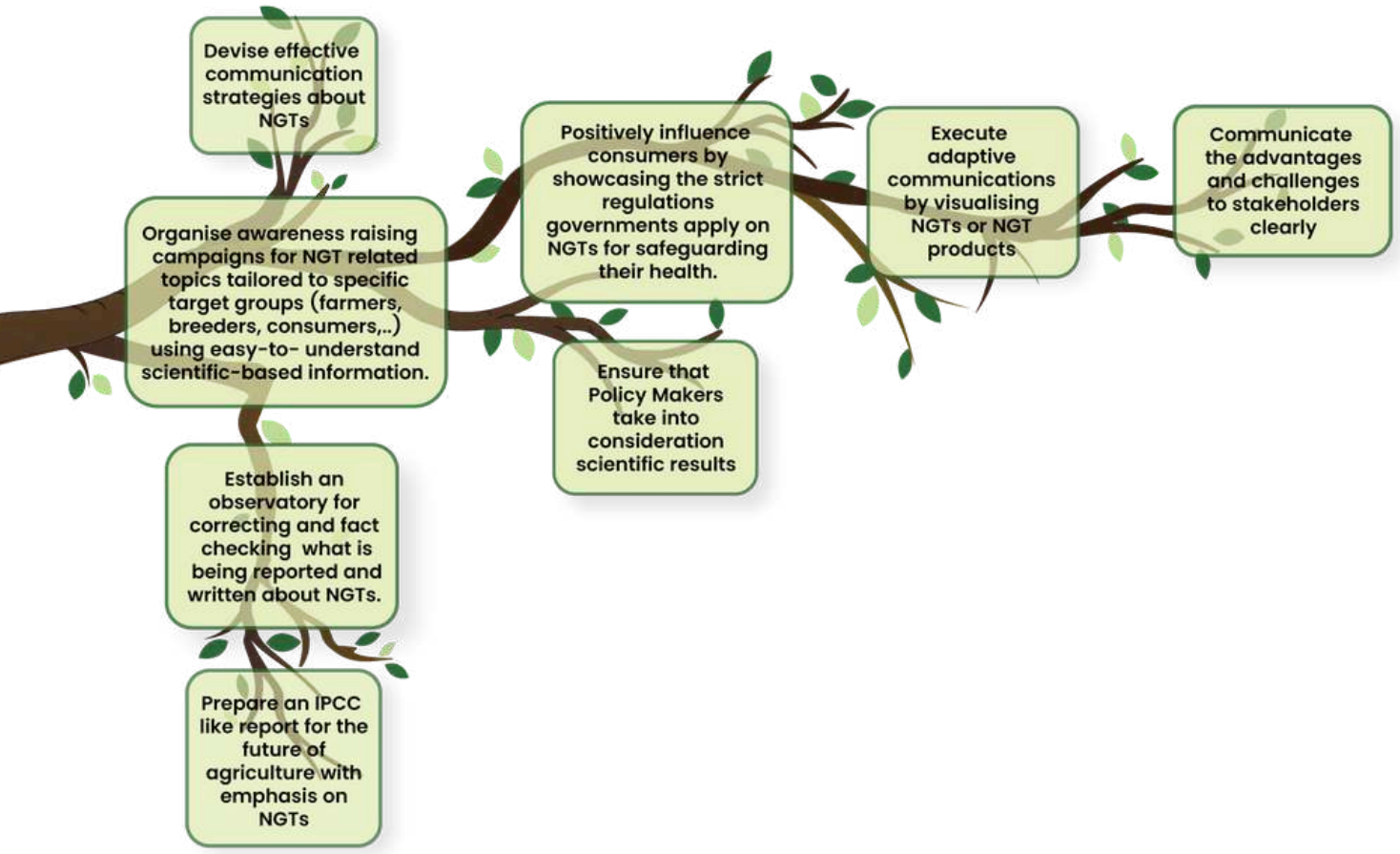
This pathway is organised into two linked phases, Phase 1 and Phase 2. Each phase consists of a series of interlinked actions. The pathway shows the logical sequence that these actions should be implemented. Actions that are illustrated in the same vertical line (top of each other) show that they are equally interdependent to each other and that they can be executed in parallel. The interdependence of the actions has been specified through a specialised algorithm and checked by stakeholders and representative National Policy Makers.

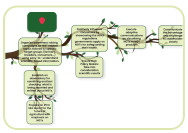
Each action is defined based on the I-SMART principle with steps and objectives to make each action impactful.

S pecific:	Clearly outlines what is to be achieved, who is involved, and why it is important.
M easurable:	Includes criteria to track progress and determine success.
A chievable:	Realistic and feasible given the resources, constraints, and context.
R elevant:	Aligned with broader goals or priorities, ensuring it contributes meaningfully to the overarching objective of a consumer association.
T ime-bound:	Includes a deadline or timeline to create urgency and accountability.

The pathway is ready for implementation, and it is up to the National Policy Makers to adjust the objectives of each step to better fit their goals, for example the metrics and time frames mentioned in the step by step explanations. National policymakers should identify a sponsor and champion for the implementation of the actions.The pathway is a guidance document, and the implementation and subsequent results are the sole responsibility of the National Policy Makers and its actors.

Phase 1





Devise effective communication strategies about NGTs.

S

Step: Develop a national communication framework ensuring clear, science-based messaging about NGTs tailored to different audiences (consumers, farmers, industry, and NGOs).
Objective: Create the necessary tools and resources to effectively communicate the benefits, risks, and regulatory aspects of NGTs.

M

Step: Organize at least five national workshops within 12 months, engaging 200+ policymakers to discuss and refine communication strategies.
Objective: Assess effectiveness through pre- and post-workshop surveys, aiming for a 70% increase in policymakers' confidence in communicating about NGTs.

A

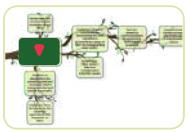
Step: Collaborate with scientific experts, communication professionals, and regulatory bodies to create a set of standardized, evidence-based key messages.
Objective: Develop and distribute a communication toolkit to at least 500 policymakers across national governments within six months.

R

Step: Address key communication challenges, such as public skepticism, misinformation, regulatory concerns, and ethical considerations around NGTs.
Objective: Ensure that at least 80% of participating policymakers find the strategies applicable to their national context, as measured by follow-up engagement.

T

Step: Launch a pilot public awareness campaign within 18 months, testing communication strategies and gathering feedback on public perceptions.
Objective: Evaluate campaign success based on public sentiment analysis, media coverage, and engagement metrics, refining strategies accordingly.



Organise awareness raising campaigns for NGT related topics tailored to specific target groups (farmers, breeders, consumers,..) using easy-to- understand scientific-based information.

S

Step: Develop and execute tailored awareness campaigns for farmers, breeders, and consumers, using clear, science-based content adapted to each group's concerns and knowledge level.
Objective: Ensure that each group receives relevant, accessible, and evidence-based information about NGTs, including their benefits, risks, and regulatory aspects.

M

Step: Launch three distinct campaigns (one per target group) across at least five EU countries within 12 months, reaching at least 500,000 people through digital and offline channels.
Objective: Measure success through engagement metrics (website visits, social media shares, event attendance) and pre/post-campaign surveys, aiming for a 50% increase in awareness and understanding.

A

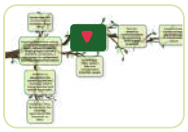
Step: Partner with agricultural organizations, consumer associations, and research institutions to create credible, easy-to-understand educational materials (videos, infographics, articles, Q&A sessions).
Objective: Secure collaboration with at least five key stakeholder groups within six months to co-develop and distribute campaign content.

R

Step: Address group-specific concerns—for example, focusing on yield improvement and sustainability for farmers, innovation for breeders, and safety for consumers.
Objective: Ensure that at least 70% of participants in surveys find the campaign content relevant, trustworthy, and applicable to their needs.

T

Step: Roll out campaigns in phases over 18 months, with a mid-term assessment at 9 months to refine messaging and strategies based on feedback and effectiveness.
Objective: Publish a final impact report within two years, evaluating knowledge gains, behavior shifts, and policy influence resulting from the campaigns.



Positively influence consumers by showcasing the strict regulations governments apply on NGTs for safeguarding their health.

S

Step: Develop a consumer-focused information campaign highlighting the strict regulatory processes NGTs undergo to ensure safety, with clear, fact-based messaging.
Objective: Increase consumer confidence in NGTs by transparently communicating safety assessments, approval procedures, and monitoring measures enforced by regulatory authorities.

M

Step: Launch the campaign within 12 months, reaching 200,000 consumers through social media, websites, print materials, and public events.
Objective: Measure consumer trust and understanding through pre- and post-campaign surveys, aiming for a 30% increase in confidence regarding NGT safety regulations.

A

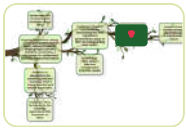
Step: Collaborate with food safety agencies, scientists, policymakers, and consumer associations to ensure credibility and accurate representation of NGT regulations.
Objective: Secure partnerships with at least five national or EU regulatory bodies within six months to co-develop educational content.

R

Step: Address common consumer concerns, such as health risks, labeling, long-term safety, and transparency, using Q&A sessions, expert interviews, and myth-busting infographics.
Objective: Ensure at least 70% of consumers surveyed find the campaign content useful and reassuring regarding government safeguards on NGTs.

T

Step: Conduct a mid-term evaluation after nine months to assess campaign effectiveness and refine strategies. Publish a final impact report within 18 months.
Objective: Provide policy recommendations and insights to regulatory bodies based on consumer feedback and engagement data.



Execute adaptive communications by visualising NGTs or NGT products

S

Step: Develop interactive and visual communication tools (infographics, videos, virtual reality experiences, product labeling demonstrations) to explain NGTs and their benefits to the public.
Objective: Ensure policymakers can effectively communicate NGT concepts using clear, science-based, and engaging visual materials tailored to different audiences.

M

Step: Implement at least three pilot visual communication initiatives (e.g., exhibitions, digital campaigns, interactive websites) within 12 months.
Objective: Track engagement metrics (social media interactions, event attendance, website visits) and aim for at least 500,000 views or interactions.

A

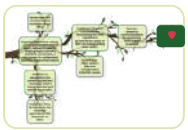
Step: Partner with scientific institutions, media professionals, and industry experts to ensure visual content is accurate, engaging, and accessible.
Objective: Secure at least five expert collaborations within six months to develop and validate communication materials.

R

Step: Tailor visuals to key stakeholders (consumers, farmers, industry, breeders, NGOs), addressing common misconceptions, safety concerns, and sustainability benefits.
Objective: Ensure at least 80% of surveyed participants find the visual materials useful and informative, based on post-campaign feedback.

T

Step: Conduct a mid-term review after nine months to assess effectiveness and refine communication strategies. **Publish a final impact report within 18 months.**
Objective: Provide recommendations for scaling up successful visual communication strategies at the EU policy level.



Communicate the advantages and challenges to stakeholders clearly

S

Step: Develop a multi-stakeholder (consumers, farmers, retailers) friendly communication strategy that clearly explains the advantages and challenges of NGTs.
Objective: Ensure that policy messages are accessible, science-based, and tailored to the stakeholders' concerns and interests.

M

Step: Launch at least three nationwide public awareness campaigns within 12 months, using digital media, print, and public events.
Objective: Track engagement through surveys, website visits, social media interactions, and event attendance, aiming for a 50% increase in public awareness.

A

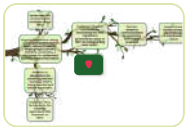
Step: Collaborate with scientists, consumer and famrer organizations, and regulatory agencies to ensure accuracy and trustworthiness in messaging.
Objective: Secure partnerships with at least five key stakeholders within six months to co-develop communication materials.

R

Step: Address key concerns (e.g., safety, transparency, labeling, environmental impact) through clear, evidence-based messaging.
Objective: Ensure that at least 70% of surveyed stakeholders find the communication materials useful and informative based on post-campaign feedback.

T

Step: Conduct a mid-term evaluation after nine months to assess effectiveness and refine strategies based on public feedback. **Publish a final impact report within 18 months.**
Objective: Provide other policymakers with recommendations for improving outreach based on data-driven insights.



Ensure that Policy Makers take into consideration scientific results

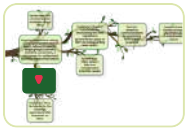
S **Step: Establish a structured science-policy advisory network** to provide policymakers with peer-reviewed research, expert opinions, and evidence-based recommendations on NGTs.
Objective: Ensure that all policy discussions and decisions on NGTs are informed by the latest scientific findings.

M **Step: Organize at least five science-policy roundtable discussions per year at national and EU levels**, engaging policymakers, scientists, and regulatory bodies.
Objective: Track the number of policy proposals influenced by scientific evidence, aiming for at least three policy adjustments per year based on expert recommendations.

A **Step: Develop a centralized online knowledge hub** with accessible scientific summaries, policy briefs, and expert Q&A sessions for policymakers.
Objective: Ensure that at least 70% of policymakers access and utilize these resources within one year.

R **Step: Tailor scientific findings into clear, non-technical language**, emphasizing the impact of NGTs on food security, sustainability, and public health.
Objective: Ensure that at least 80% of participating policymakers report improved understanding and use of scientific data in decision-making.

T **Step: Conduct a policy impact assessment every 12 months** to measure how scientific data has influenced legislation and regulatory decisions.
Objective: Publish an annual policy-science alignment report, tracking progress, challenges, and areas for improvement.



Establish an observatory for correcting and fact checking what is being reported and written about NGTs.

S **Step: Create an independent NGT Fact-Checking Observatory** to monitor, verify, and correct misinformation in media, policy discussions, and public discourse.
Objective: Ensure that NGT-related information in the public domain is accurate, science-based, and free from misinformation.

M **Step: Develop a real-time monitoring system** to track and assess at least 100 media articles, reports, and social media posts per month for accuracy.
Objective: Aim to correct or clarify at least 70% of identified misleading claims through published responses, expert interviews, or direct media engagement.

A **Step: Assemble a multidisciplinary team of scientists, communication experts, journalists, and policy analysts** to review and fact-check NGT-related claims.
Objective: Recruit at least 10 experts and publish a minimum of one fact-checking report per quarter within the first year.

R **Step: Develop a user-friendly online platform** where consumers, policymakers, and journalists can submit NGT-related claims for fact-checking and access verified information.
Objective: Ensure at least 50,000 users engage with the platform in the first 12 months, increasing public trust in NGT communication.

T **Step: Conduct a biannual review of the observatory's impact**, measuring engagement, misinformation correction rates, and public perception changes.
Objective: Publish an annual transparency report, detailing the number of claims reviewed, corrections issued, and improvements in media accuracy.

Prepare an IPCC like report for the future of agriculture with emphasis on NGTs

S

Step: Establish a multidisciplinary working group of scientists, policymakers, industry experts, and environmental organizations to draft a comprehensive, science-based assessment report on the role of NGTs in future agriculture.
Objective: Provide authoritative, evidence-based insights into how NGTs can contribute to sustainable agriculture, climate resilience, and food security.

M

Step: Conduct at least five expert workshops and consult a minimum of 100 international experts to gather data and insights on NGT applications in agriculture.
Objective: Publish a peer-reviewed, multi-chapter report within three years, with quantifiable projections on NGT impact in areas such as yield improvement, environmental sustainability, and economic benefits.

A

Step: Secure funding and institutional backing from international organizations, research institutions, and national governments to ensure the report's credibility and reach.
Objective: Obtain commitments from at least five major funding bodies (e.g., EU, FAO, national science agencies) within 12 months to support the initiative.

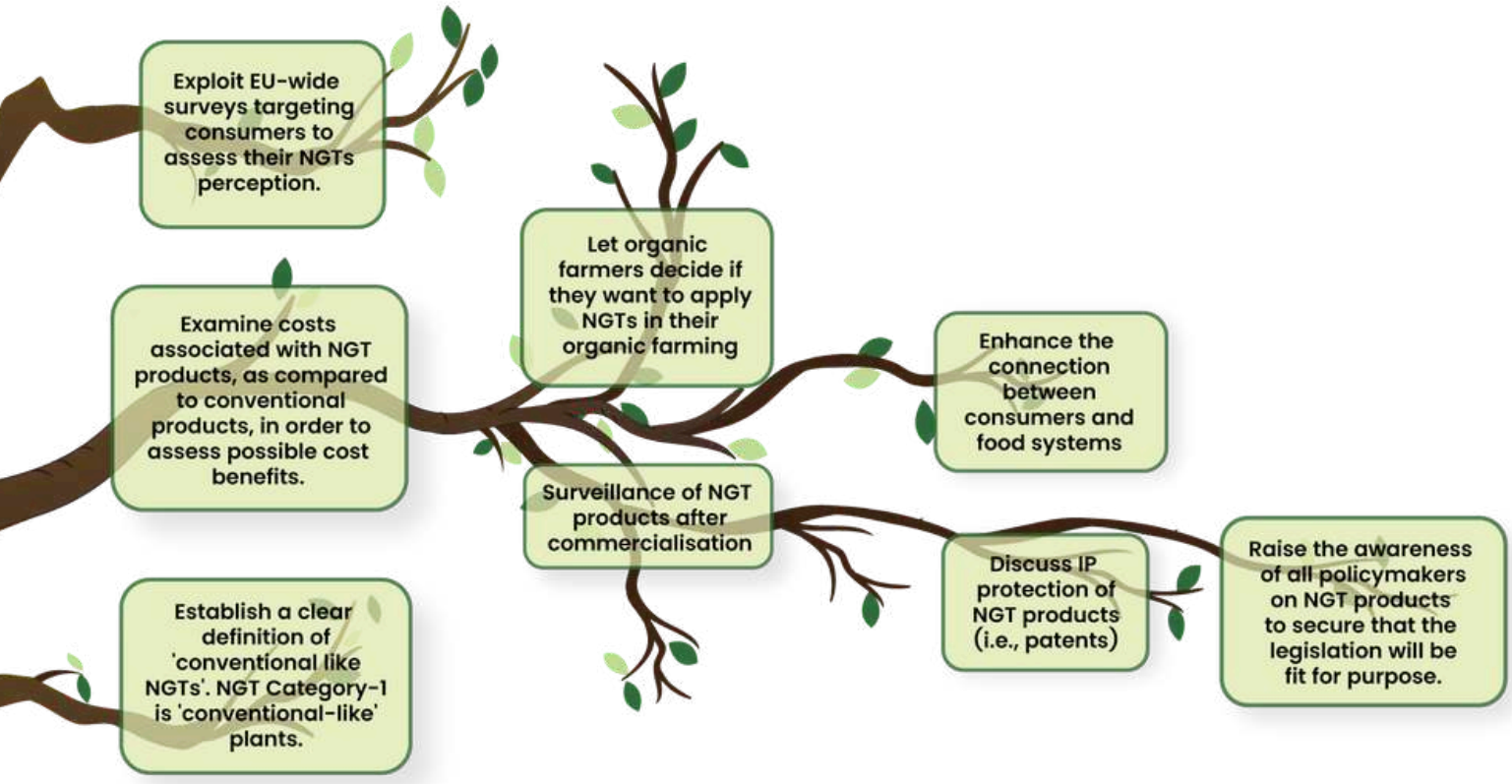
R

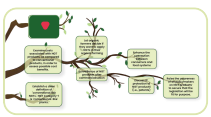
Step: Align the report with global sustainability goals (e.g., UN SDGs, EU Green Deal, Farm-to-Fork Strategy) to ensure its relevance to policymakers, regulators, and industry leaders.
Objective: Ensure that at least 70% of policy recommendations in the report are adopted or referenced in national or EU agricultural strategies within five years.

T

Step: Release a preliminary findings summary within 18 months and the full report within 36 months, followed by annual updates based on emerging research.
Objective: Present the final report at a major global forum (e.g., COP, FAO, EU Commission) to influence international agricultural policies and drive adoption of NGTs.

Phase 2





Exploit EU-wide surveys targeting consumers to assess their NGTs perception.

S

Step: Analyze existing EU-wide consumer surveys on NGTs and identify knowledge gaps, misconceptions, and key trends in public perception.
Objective: Use survey data to shape evidence-based policies and targeted communication strategies for consumer engagement.

M

Step: Utilize survey data to create at least three policy briefs per year summarizing key consumer concerns and recommendations for improving NGT communication.
Objective: Ensure that at least 80% of national policymakers receive and review these briefs to inform decision-making.

A

Step: Establish a working group within national policy bodies to collaborate with research institutions and EU agencies in interpreting and applying survey findings.
Objective: Hold at least two expert-policy roundtables per year to discuss consumer perception trends and develop targeted outreach initiatives.

R

Step: Use survey insights to design nation-specific communication strategies, addressing public concerns on safety, transparency, and labeling of NGTs.
Objective: Ensure that at least 50% of national communication campaigns on NGTs are informed by consumer perception data within two years.

T

Step: Conduct an annual review of policy adjustments and public engagement efforts influenced by survey findings.
Objective: Publish a progress report within 18 months detailing how consumer insights have shaped NGT-related policies and communication strategies.

Examine costs associated with NGT products, as compared to conventional products, in order to assess possible cost benefits.

S

Step: Conduct a comprehensive cost-benefit analysis comparing NGT products and conventional products, considering production costs, market prices, regulatory compliance, and long-term sustainability factors.
Objective: Provide data-driven insights on the economic impact of NGT adoption.

M

Step: Compile a comparative report with cost breakdowns across at least five major agricultural sectors where NGTs can be applied.
Objective: Ensure the report includes quantifiable savings, yield improvements, and environmental benefits, influencing at least three national policy discussions within two years.

A

Step: Collaborate with universities, industry stakeholders, and economic research institutions to ensure access to reliable market data and real-world case studies.
Objective: Partner with at least three national or EU research organizations to validate findings and improve credibility.

R

Step: Use the findings to propose incentives or regulatory adjustments that support cost-effective NGT adoption while ensuring consumer affordability and market competitiveness.
Objective: Ensure that at least one legislative proposal within three years incorporates cost-benefit findings into national agricultural policy.

T

Step: Publish an interim report within 12 months and a final assessment within 24 months, followed by annual updates as new data becomes available.
Objective: Present findings to other national policymakers, industry representatives, and consumer advocacy groups to drive informed decision-making.

Establish a clear definition of 'conventional like NGTs'. NGT Category-1 is 'conventional-like' plants.

S

Step: Develop a scientifically and legally sound definition of "conventional-like NGTs" based on genetic similarity, breeding techniques, and regulatory principles.
Objective: Ensure the definition clearly distinguishes NGT Category-1 plants from GMOs while aligning with existing EU regulatory frameworks.

M

Step: Conduct a comparative analysis of at least five regulatory models (e.g., EU, US, Japan) to establish consensus on defining "conventional-like" NGTs.
Objective: Publish a position paper within 18 months outlining key criteria, supported by at least 10 peer-reviewed scientific studies.

A

Step: Engage with plant scientists, policymakers, legal experts, and industry stakeholders to build consensus on the definition.
Objective: Organize at least three stakeholder workshops within two years to refine and validate the proposed definition.

R

Step: Align the definition with existing EU and international legislation to ensure its adoption into regulatory frameworks and public acceptance.
Objective: Secure endorsement from at least two major EU regulatory bodies (e.g., EFSA, European Commission) within three years.

T

Step: Submit the final definition proposal to EU regulatory bodies and national policymakers for consideration within three years.
Objective: Ensure its integration into EU legislative frameworks within five years, providing clarity for researchers, breeders, and consumers.

Let organic farmers decide if they want to apply NGTs in their organic farming

S

Step: Initiate dialogues with organic farming associations, policymakers, and scientists to explore the potential inclusion of NGTs in organic farming under specific conditions.
Objective: Develop a policy framework that allows organic farmers to make an informed choice about using NGTs while maintaining consumer trust and certification integrity.

M

Step: Conduct at least three stakeholder consultations (farmers, certifying bodies, consumers) to assess their views on integrating NGTs into organic farming.
Objective: Publish a white paper within 24 months summarizing feedback, potential regulatory changes, and market implications.

A

Step: Work with organic certification bodies and regulators to evaluate whether certain NGT applications align with organic farming principles (e.g., sustainability, natural processes).
Objective: Define at least two possible regulatory pathways for NGTs in organic farming within three years.

R

Step: Ensure that NGT inclusion aligns with EU organic regulations and consumer expectations, maintaining market transparency and label integrity.
Objective: Develop clear labeling and traceability guidelines within four years to ensure informed consumer choice.

T

Step: Propose pilot projects with organic farmers to test NGT applications in organic systems, with results published within five years.
Objective: Provide scientific and economic data to support policy decisions, allowing organic farmers the option to integrate NGTs responsibly.

Surveillance of NGT products after commercialisation

S

Step: Develop and implement robust detection and identification methods for identifying NGT-derived products in the market, distinguishing them from conventional and GMO products.
Objective: Ensure regulatory compliance, transparency, and traceability in food and agricultural supply chains.

M

Step: Establish at least three validated detection and identification protocols for NGTs, considering different genomic modifications and crop types.
Objective: Have at least one EU-accredited laboratory capable of detecting and identifying NGTs within two years.

A

Step: Collaborate with scientific institutions, biotech companies, and regulatory bodies to develop effective and cost-efficient NGT detection and identification techniques.
Objective: Ensure that at least 80% of tested NGT products can be reliably detected and identified using validated methods.

R

Step: Align detection and identification efforts with EU and international regulatory frameworks to facilitate market surveillance and risk assessment.
Objective: Ensure NGT traceability requirements are incorporated into EU food safety regulations within three years.

T

Step: Conduct an annual review of detection and identification technologies, updating methods as new NGTs emerge.
Objective: Publish an official EU report every two years summarizing NGT detection and identification capabilities, limitations, and future research needs.

Enhance the connection between consumers and food systems

S **Step: Develop interactive educational campaigns** that inform consumers about food production, supply chains, and the role of NGTs in sustainable agriculture.
Objective: Increase consumer awareness and trust by providing transparent, science-based information on modern food systems.

M **Step: Organize at least 10 public engagement events** (e.g., farm visits, food fairs, workshops) per year across different EU regions.
Objective: Reach at least 50,000 consumers annually through physical events, online webinars, and social media initiatives.

A **Step: Collaborate with farmers, food producers, retailers, and consumer advocacy groups** to create multimedia content (videos, infographics, and interactive platforms) explaining food systems.
Objective: Develop at least three digital tools (e.g., an interactive app, short documentaries, or a virtual farm tour) within two years to increase consumer engagement.

R **Step: Align messaging with EU sustainability goals and food security strategies**, ensuring that consumers understand how NGTs contribute to climate resilience and sustainable food production.
Objective: Integrate consumer-friendly food system information into at least five national or EU-wide sustainability initiatives within three years.

T **Step: Launch a pilot program to test consumer engagement strategies** before scaling up to a broader audience.
Objective: Evaluate program effectiveness within 18 months and expand successful strategies across all EU member states within five years.

Discuss IP protection of NGT products (i.e., patents)

S **Step: Organize roundtable discussions with policymakers, biotech companies, plant breeders, and farmers** to assess the impact of IP protection on NGT innovation and accessibility.
Objective: Identify key concerns and possible regulatory pathways for balancing innovation incentives and fair access to NGTs.

M **Step: Conduct at least two expert workshops per year on NGT patenting**, involving 50+ stakeholders from academia, industry, and agriculture.
Objective: Publish a white paper within 24 months summarizing legal perspectives, case studies, and recommendations on NGT IP protection.

A **Step: Collaborate with legal experts and patent offices** to clarify how existing IP frameworks apply to NGT-derived plants and whether modifications are needed.
Objective: Develop at least three policy scenarios within three years that outline potential approaches to NGT patenting (e.g., open-source models, limited patent duration).

R **Step: Ensure discussions align with EU agricultural policies and international trade agreements** to avoid legal conflicts and promote innovation-friendly regulations.
Objective: Engage EU policymakers and patent offices to ensure NGT patent discussions are considered in upcoming legislative reviews.

T **Step: Establish a working group on NGT IP protection within one year**, bringing together key stakeholders for continuous dialogue.
Objective: Deliver a final policy recommendation report within five years to guide future EU and national regulations on NGT patents.

Raise the awareness of all policymakers on NGT products to secure that the legislation will be fit for purpose.

S **Step: Organize targeted briefings, roundtable discussions, and expert panels for Members of the European Parliament (MEPs), Council and national policymakers** to clarify the science, benefits, and regulatory needs of NGTs.
Objective: Ensure that policymakers have access to factual, science-based information on NGTs before legislative votes.

M **Step: Host at least five high-level events in the European Parliament within the next 18 months**, featuring scientists, industry experts, and farmers.
Objective: Engage at least 50 MEPs and their advisors in fact-based discussions on NGTs.

A **Step: Develop concise policy briefs, infographics, and video explainers** summarizing NGT science, safety, and economic benefits.
Objective: Distribute at least 500 information materials to MEPs and policymakers within one year.

R **Step: Align awareness efforts with ongoing EU Green Deal, Farm to Fork Strategy, and climate resilience policies**, demonstrating how NGTs fit into sustainable agriculture goals.
Objective: Ensure that NGTs are actively considered in legislative debates on food security and sustainability.

T **Step: Establish a proactive engagement plan** with MEPs and Council ahead of key parliamentary votes, ensuring continuous dialogue through meetings, Q&A sessions, and fact-checking support.
Objective: Track legislative milestones over the next two years, ensuring that accurate information reaches decision-makers before final voting on NGT legislation.

MY NOTES

MY NOTES

MY NOTES

To access all Transition Action Plans,
please visit the link or scan the QR code

Consumer Associations

Breeder Associations

National Policymakers

The Food Industry

Farmer Associations

NGO Associations

https://genebecon.eu/transition-action-plans-taps/

GeneBEcon

GeneBEcon

For any questions related to the **Transition Action Plans**, please contact:
Xenia Schneider - XPRO CONSULTING | *xenia-schneider@xpro-conuslting.com*

Visit Us

www.genebecon.eu

GeneBEcon EU project

@GeneBEcon

Contact Us

Dennis Eriksson
Project Coordinator
dennis.eriksson@slu.se
www.slu.se

XPRO CONSULTING

Funded by the
European Union