GMO regulation in the European Union

# Directive 2001/18 on the deliberate release into the environment of genetically modified organisms

This directive deals with the release of GMOs. It distinguishes 2 types of release - into the environment and placing on the market as a product. Its definition of GMOs is used by other directives and also was the basis for the judgment restricting the use of CRISPR for mutagenesis.

*Directive 2001/18* consists of parts A, B, C, D and a total of 8 Annexes, following text will further elaborate each part.

**Part A** establishes general terms, such as „genetically modified organism“, „deliberate release“, „placing on the market“ and „environmental risk assessment“. Establishing a common definition of these terms is crucial for proper policy harmonisation.

**Part B** contains guidelines for so-called non-commercial release (“any other purpose than placing on the market”). It demands safety evaluation in the form of a detailed technical dossier and a risk assessment. In case of non-commercial release, the approval of competent authority of the Member state in which the release is planned is sufficient. On the contrary, approval of all Member state’s competent authorities is required for commercial release (see Part C). This could be explained by the fact that if a certain GMO product would be approved for market purposes in only one Member state, it would be problematic to prevent its transboundary movement due to the existence of the Freedom of trade principle and the Schengen Agreement.

**Part C** introduces a regulation for „placing on the market of GMOs as or in products“ (commercial purpose). Similarly, as in non-commercial release, strict safety measures are required. However, the mechanism of approval is more robust and involves all Member states and the Commission, requiring a united consent. The application is submitted to the competent authority of the Member State in whose territory the GMO product will be placed for the first time. Article 23 describes „Safeguard clause“ which enables individual Member states to ban certain GMO products if some new information arises that implies reasonable risks that were previously unknown.

Both parts B and C engage the public into the approval process, as all relevant documents are available to the agencies and individuals; also they are permitted to make comments.

**Part D** contains final provisions. It requires Member states and Commission to share information about GMO products and enlist them into national and EU public registries. Amongst many provisions, it gives Member states an option to exclude their territory from the scope of the authorisation (*Article 26b(1)*). However, such an exception shall be „in conformity with Union law, reasoned, proportional and non-discriminatory and, in addition, are based on compelling grounds“ (*Article 26b(3)*).

The Annexes further specify definitions of GMO, techniques of genetic modification and principles for environmental risk assessment.

In *Article 32*, the implementation of the *Cartagena Protocol on biosafety* (adopted by EU in 2000, came into force in 2004) is required. This protocol establishes a legal framework for transboundary movement of GMOs and is further elaborated in *Regulation 1946/2003 on transboundary movements of genetically modified organisms.*

When applying for authorisation of GMO food products, the effects of *2001/18/* are overlapping with *Regulation 1829/2003 on genetically modified food and feed*. Therefore, the „one door one key“ principle was introduced to enable notification to be submitted and processed under just one of those directives.

## Definition of Terms

**Organism:** A biological entity capable of reproducing or transferring genetic material.

**Genetically modified organism:** An organism, other than human beings, whose genetic material[[1]](#footnote-0) has been altered[[2]](#footnote-1) in a way that cannot be achieved naturally by mating or natural recombination".

**Techniques leading to genetic modification (non-exhaustive list):**

1. recombinant nucleic acid techniques involving the formation of new combinations of genetic material by the insertion of nucleic acid molecules produced by whatever means outside an organism, into any virus, bacterial plasmid or other vector system and their incorporation into a host organism in which they do not naturally occur but in which they are capable of continued propagation;

2. techniques that involve the direct introduction of genetic material prepared outside the organism into the organism and include microinjection, macroinjection and microencapsulation;

3. cell fusion (including protoplast fusion) or hybridisation techniques in which the fusion of two or more cells produces living cells with new combinations of inherited genetic material through pathways that do not occur naturally.

**Techniques not leading to genetic modification:**

(1) in vitro fertilisation,

(2) natural processes such as: conjugation, transduction, transformation,

(3) polyploidy induction.

**Release into the environment:** Any intentional introduction into the environment of a GMO or a combination of GMOs for which no specific containment measures are used to limit their contact with and to provide a high level of safety for the general population and the environment.

**Release to the market:** Making available to third parties, whether in return for payment or free of charge.

**Regulatory exemption:** Techniques/methods of genetic modification yielding organisms to be excluded from the Directive, on the condition that they do not involve the use of recombinant nucleic acid molecules or genetically modified organisms other than those produced by one or more of the techniques/methods listed below are:

(1) mutagenesis[[3]](#footnote-2),

(2) cell fusion (including protoplast fusion) of plant cells of organisms which can exchange genetic material through traditional breeding methods.

# DIRECTIVE 2009/41/EC on the contained use of genetically modified microorganisms

The biotechnology industry is flourishing and legislation needs to be updated to ensure safe biotechnology research and development. It is necessary to establish common measures to assess and reduce the potential risks arising from all operations involving the contained use of genetically modified microorganisms (GMMs) and to set appropriate conditions for their use. The regulations in this Directive are mainly of a preventive nature in order to maintain and protect the environment and human health. The document is divided into 23 very concise Articles and 7 Annexes, where the different categories of contained use of GMMs are described in detail.

At the beginning of the Directive, important terms are established, such as ‘micro-organism’, ‘genetically modified microorganism’, ‘contained use’ or ‘accident’, to name a few. It is also stated, where this Directive may not be applied - for example where genetic modification is obtained through usage of some specific techniques or methods to which it refers.

Article 4 is very important. According to this Article, every institution handling GMMs must prepare a risk assessment of contained use for human health and the environment. Annex III of this Directive is used for the risk analysis. The assessment results in the classification of the contained use into **four safety classes**:

Class 1: activities of no or negligible risk

Class 2: activities of low risk

Class 3: activities of moderate risk

Class 4: activities of high risk

Where it is not possible to decide clearly which class to assign an GMM to, the measures of the more restrictive class shall be applied. The purpose of these measures is to ensure a high level of safety when working with hazardous or potentially hazardous microorganisms.

The Directive also draws attention to the need to draw up emergency plans, which are essential in the case of unexpected events. Safety in the disposal of waste and waste liquids is also mentioned.

Part B of Annex II includes the procedure to be followed for the correct and safe hazard identification of GMM types. These are various criteria that must not be overlooked in the characterisation of a bacterial strain, for example, emphasis is placed on the established proof of safety, genetic stability, non-pathogenicity or non-toxigenicity of the GMM.

One of the most important parts of the document is Annex IV consisting of tables that summarise the protective measures required for each level of containment. They are divided individually for laboratory activities, glasshouses or animal units. Equipment, working system, waste disposal and other measures are specified for each class individually. This makes it very clear and easy to find out whether it is necessary to have a microbiological safety post in the building to work with *Streptococcus pneumoniae*, for example.

## Definition of Terms

**Microorganism**: Any microbiological entity, cellular or non-cellular, capable of replication or of transferring genetic material, including viruses, viroids, and animal and plant cells in culture

**Genetically modified microorganism (GMM*)***: A micro-organism in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination.

**Techniques leading to genetic modification (non-exhaustive list):**

1. Recombinant nucleic acid techniques involving the formation of new combinations of genetic material by the insertion of nucleic acid molecules produced by whatever means outside an organism, into any virus, bacterial plasmid or other vector system and their incorporation into a host organism in which they do not naturally occur but in which they are capable of continued propagation.
2. Techniques involving the direct introduction into a micro-organism of heritable material prepared outside the micro-organism, including micro-injection, macro-injection and micro-encapsulation.
3. Cell fusion or hybridisation techniques where live cells with new combinations of heritable genetic material are formed through the fusion of two or more cells by means of methods that do not occur naturally.

**Techniques not leading to genetic modification**:

1. in vitro fertilisation;
2. natural processes such as: conjugation, transduction, transformation;
3. polyploidy induction.

**Regulatory exemption:** Techniques or methods of genetic modification yielding microorganisms to be excluded from this Directive on condition that they do not involve the use of recombinant nucleic acid molecules or GMMs other than those produced by one or more of the techniques/methods listed below:

1. Mutagenesis.
2. Cell fusion (including protoplast fusion) of prokaryotic species that exchange genetic material by known physiological processes.
3. Cell fusion (including protoplast fusion) of cells of any eukaryotic species, including production of hybridomas and plant cell fusions.
4. Self-cloning consisting in the removal of nucleic acid sequences from a cell of an organism which may or may not be followed by reinsertion of all or part of that nucleic acid (or a synthetic equivalent), with or without prior enzymic or mechanical steps, into cells of the same species or into cells of phylogenetically closely related species which can exchange genetic material by natural physiological processes where the resulting micro-organism is unlikely to cause disease to humans, animals or plants. Self-cloning may include the use of recombinant vectors with an extended history of safe use in the particular microorganisms.

**Contained use**: Any activity in which micro-organisms are genetically modified or in which such GMMs are cultured, stored, transported, destroyed, disposed of or used in any other way, and for which specific containment measures are used to limit their contact with, and to provide a high level of safety for, the general population and the environment.

**Accident**: Any incident involving a significant and unintended release of GMMs in the course of their contained use which could present an immediate or delayed hazard to human health or the environment.

**User**: Any natural or legal person responsible for the contained use of GMMs.

**Notification**: Presentation of the requisite information to the competent authorities of a Member State.

# Regulation 1829/2003 on genetically modified food and feed

This regulation serves as the main source of information specifying under what conditions may GMO food and feed be placed on market, consisting of 4 chapters and an Annex.

**I. Chapter** provides definition of terms, such as „genetically modified food/feed“, „produced from GMOs“ or „conventional counterpart“.

**II.Chapter** is called *Genetically modified food* and is divided into two sections.

The first section deals with the legal approval procedure applicable to GMO foods. It describes the submission of an application form, which must be submitted to a local authority and subsequently to the EFSA. The application form must include a detailed description of the method and production process which was used to obtain the GMO food, an analysis indicating that the GMO food in question does not differ from its conventional counterpart and that it does not raise any ethical, moral or religious questions.

Second section regulates GMO food labelling, which applies only to food that consists of at least 0,9% GMO. Food containing less than 0,9% GMO does not have to be labelled as a GMO (any presence must be technically unavoidable). This labelling requirement applies only to food that is to be distributed to the final customer, such as in restaurants or supermarkets.

**III. CHAPTER** is called *Genetically modified feed,* and by its structure and demands is almost identical to CHAPTER II, including the 0,9% threshold.

**IV. CHAPTER**  contains *Common provisions*. In the fourth chapter, readers can find out more requirements such as what is done with confidential data (like DNA sequence information or breeding patterns and strategies). When applying for a product intended for both food and feed use, the applicant needs to file only one application, but the product must undergo testing for both food and feed regulations.

ANNEX states the *Duties and tasks of the community reference laboratory* which are:

1. *The reception, preparation, storage, maintenance and distribution to the members of the European network of GMO laboratories of the appropriate positive and negative control samples, subject to assurance given by such members of the respect of the confidential nature of the data received where applicable,*

## Definition of Terms

**Operator**: The natural or legal person responsible for ensuring that the requirements of this Regulation are met within the food businesses or feed businesses under its control;

**Genetically modified food**: Food containing, consisting of or produced from GMOs.

**Genetically modified feed**: Feed containing, consisting of or produced from GMOs.

**Genetically modified organism for food use**: a GMO that may be used as food or as a source material for the production of food.

**Genetically modified organism for feed use**: a GMO that may be used as feed or as a source material for the production of feed.

**Produced from GMOs**: Derived, in whole or in part, from GMOs, but not containing or consisting of GMOs.

**Control sample**: GMO or its genetic material (positive sample) and the parental organism or its genetic material that has been used for the purpose of the genetic modification (negative sample).

**Conventional counterpart**: Similar food or feed produced without the help of genetic modification and for which there is a well-established history of safe use.

**Placing on the market**: The holding of food or feed for the purpose of sale, including offering for sale, or any other form of transfer, whether free of charge or not, and the sale, distribution and other forms of transfer themselves.

**Pre-packaged food**: Any single item for presentation as such consisting of a food and the packaging into which it was put before being offered for sale, whether such packaging encloses the food completely or only partially, provided that the contents cannot be altered without opening or changing the packaging.

# REGULATION 1830/2003 concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms

This Directive provides guidance on the traceability and labelling of GMO products, which harmonise and facilitate traceability between Member States. The regulation applies to products, food or feed containing GMOs.

As the EU leaves the inspection and other control measures to the individual Member States, the Directive further obliges the national competent authority to establish an accessible register containing all available information for sequencing and referencing material for GMOs.

**A: Traceability**

The operator must ensure that the receiving party receives the following information with the product, which applies for all subsequent stages of the placing on the market:

* 1. information that the product contains/consists of GMO
	2. unique identifier assigned

This information must be kept for five years following the transaction.

**B: Labelling**

Operators must ensure that labelling of pre-packaged products containing/consisting of GMOs include the words „This product contains genetically modified organisms“ or „This product contains genetically modified [name of organism(s)]“. Same labelling is also obligatory for non-pre-packaged products offered to the final consumer.

**C: Exemptions**

Previous regulations do not apply to traces of GMOs in all kinds of products in a proportion no higher than the threshold 0.9 % established in accordance with Regulation 1829/2003 (only if these traces of GMOs are adventitious or technically unavoidable).

**Definition of Terms**
**Genetically modified organism’ or ‘GMO’**: Genetically modified organism as defined in Article 2(2) of Directive 2001/18/EC, excluding organisms obtained through the techniques of genetic modification listed in Annex IB to Directive 2001/18/EC.

**Produced from GMOs**: Derived, in whole or in part, from GMOs, but not containing or consisting of GMOs.

**Traceability**: Ability to trace GMOs and products produced from GMOs at all stages of their placing on the market through the production and distribution chains.

**Unique identifier**: Simple numeric or alphanumeric code which serves to identify a GMO on the basis of the authorised transformation event from which it was developed and providing the means to retrieve specific information pertinent to that GMO.

**Operator**: A natural or legal person who places a product on the market or who receives a product that has been placed on the market in the Community, either from a Member State or from a third country, at any stage of the production and distribution chain, which does not include the final consumer.

**Final consumer**: The ultimate consumer who will not use the product as part of any business operation or activity.

**Food**: Food as defined in Article 2 of Regulation (EC) No 178/2002 (1)

**Ingredient**: Ingredient as referred to in Article 6(4) of Directive 2000/13/EC (2)

**Feed**: Feed as defined in Article 3(4) of Regulation (EC) No 178/2002

**Placing on the market**: Placing on the market as defined in the specific Community legislation under which the relevant product has been authorised; in other cases, it is defined as in Article 2(4) of Directive 2001/18/EC

**The first stage of the placing on the market of a product**: The initial transaction in the production and distribution chains, where a product is made available to a third party

**Pre-packaged product**: Any single item offered for sale consisting of a product and the packaging into which it was put before being offered for sale, whether such packaging encloses the product completely or only partially, provided that the contents cannot be altered without opening or changing the packaging.

# REGULATION 1946/2003 on transboundary movements of genetically modified organisms

**Introduction:**

The regulation No. 1946/2003 has been adopted in order to establish the legal guidelines regarding transboundary movements of genetically modified organisms and ensure the correct implementation of the Cartagena Protocol. The document is divided into 4 main chapters and the annexes provide additional information on GMO transport on an international level.

**Chapter I: OBJECTIVES, SCOPE AND DEFINITIONS**

As formulated in the objectives section, this regulation aims to establish an universal scheme of notifications and information exchange about transboundary movements of GMOs in accordance with the provisions of the Cartagena protocol. Such preventative measures are implemented to safeguard sustainable biological diversity as well as to prevent potential risks posed to human health. This regulation does not deal with pharmaceuticals for human use. Furthermore, several important definitions are established in this chapter such as notification, import, export, transboundary movement and competent authority to name a few.

For instance, notification is defined as the submission of the required information from the exporter to the competent authority of a party to the Cartagena Protocol or to the authority of a non-party. Transboundary movement means the intentional or unintentional mobility of a GMO between one party or non-party and another party or non-party, except the intentional movements between parties inside the community. The term party refers to any country or regional economic alliance which is a party to the protocol. Likewise, non-party means any country or regional economic organisation not a party to the protocol. The term protocol refers to the Cartagena Protocol on Biosafety to the Convention on Biological Diversity. Competent authority means an authority appointed by a party to the protocol, or the corresponding body of a non-party, which is in charge of carrying out the administrative functions stipulated by the protocol.

**Chapter II: EXPORTS OF GMOs TO THIRD COUNTRIES**

In the case of GMOs for deliberate release into the environment, the following procedures apply:

The exporter must notify the competent authority of the party or non-party of import before the first intentional transboundary mobility of a GMO for deliberate release into the environment. The notification needs to contain the accurate information specified in Annex I. Transboundary movement must not be made without written permission of the party or non-party of import. If the importer fails to communicate its decision within 270 days from the date of receiving the notification, the exporter needs to send a reminder with a deadline for response of 60 days from its receipt. The exporter needs to keep record of the notification and the related documents for a period of at least five years.

In the case of GMOs intended for direct use as food or feed, or for processing, the Biosafety Clearing-House needs to be informed by the commission within 15 days of the adoption of the decision. The required information to be sent is specified in the annex II. Further provisions are specified in the Cartagena Protocol.

GMOs intended for contained use shall be subjected to risk assessment prior to decisions on import and standards shall be set for their contained use.

Moreover, the exporters need to ensure that in the document accompanying the package with the GMO, the fact that it contains GMOs is stated and its unique identification code is also provided. For GMOs intended for direct use as food or feed, or for processing, it needs to be clearly indicated that they are not intended for deliberate release into the environment. For GMOs intended for contained use a document from the exporter needs to describe requirements for the safe handling, storage, transport and use of these GMOs and a contact point for further information. In the case of GMOs intended for deliberate release into the environment, information about relevant traits and characteristics, requirements for the safe handling, storage, transport and a contact point for further information needs to be provided. In the case of transit, the exporter must notify the parties who wish to regulate the transit of GMOs through their territory.

**Chapter III: UNINTENTIONAL TRANSBOUNDARY MOVEMENT OF GMOs**

All member states need to make appropriate arrangements in order to avoid unintentional transboundary movements of GMOs. After a member state becomes aware of unintentional release of GMOs into its environment which may result in transboundary movements, it immediately needs to inform the public, the commission, all other member states, affected or potentially affected states and the Biosafety Clearing-House. In order to minimize severe consequences, it must consult this fact with the affected or potentially affected states to enable them to determine appropriate responsive action. The required information is specified in Annex III.

**Chapter IV: COMMON PROVISIONS**

The member states need to inform the Biosafety Clearing-House and the Commission about:

1. any national legislation relevant to the implementation of the Cartagena Protocol
2. contact points for notification in case of unintentional transboundary movements
3. any bilateral or regional consensus regarding intentional transboundary movements of GMOs
4. information about unintentional or illegal transboundary movements of GMOs
5. final decisions taken by the member state on the use of GMOs, such as on contained use of risk class 3 or 4 of GMOs which are likely to be subject to transboundary movements
6. any collection of risk assessments of GMOs generated by the community's regulatory process
7. any review of national arrangements concerning intentional transboundary movement

The Commission needs to inform the Biosafety Clearing-House about:

1. pertinent legislation for the implementation of the Cartagena Protocol
2. bilateral or regional agreements concerning intentional transboundary movements of GMOs
3. decisions regarding the use of GMOs inside the community, as well as decisions on release on the market or the importation of GMOs
4. any collection of risk assessments or environmental review about novel GMOs
5. any review of decisions regarding intentional transboundary movement of GMOs
6. any legislation applied in place of the measures of the Cartagena Protocol for intentional movements of GMOs within the community and imports of GMOs
7. reports submitted, including those about the employment of the advanced informed agreement procedure

The sharing of confidential information received or exchanged with third parties is prohibited.

In addition, the exporter may indicate the information in the notification which is to be handled as confidential. However, the following information must not be kept as confidential upon submission: the name and address of the exporter and importer, general description of the GMO or GMOs, the risk assessment of the effects on conservation and sustainable biological diversity also considering risks to human health and any methods and plans for action in case of emergency. In the event of the exporter’s withdrawal of the notification, the member states and the commission shall respect the confidentiality of commercial information, as well as research and development information.

The commission needs to designate a focal point and identify any competent authority.  Correspondingly, each member state needs to appoint one institution as a focal point, as well as one or more as competent authority.

The member states should determine rules on penalties relating to breaches of the provisions of the regulation and need to take all measures in order to ensure their implementation.

Finally, the member states are obliged to submit a report to the commission about the implementation of the regulations above regularly every three years. The commission shall write a report based on the information provided by the member states and present it at the meeting of the parties to the Cartagena Protocol.

## Definition of Terms

**Notification**: Submission of the information required from the exporter under this Regulation to the competent authority of a Party to the Protocol or to the competent authority of a non-Party.

**The Biosafety Clearing-House’ or ‘the BCH’**: Biosafety Clearing-House established under Article 20 of the Protocol.

**Export**:

(a) the permanent or temporary leaving of the customs territory of the Community of GMOs meeting the conditions of Article 23(2) of the Treaty.

(b) the re-export of GMOs not meeting the conditions referred to in (a) which are placed under a customs procedure other than transit procedure.

**Import**: Placing under a customs procedure, other than transit procedure, of GMOs introduced into the customs territory of a Party or non-Party outside the Community from a Party within the Community.

**Exporter**: Any natural or legal person by whom or on whose behalf a notification is made, that is to say the person who, at the time when the notification is sent, holds the contract with the consignee in the third country and has the power to determine that the GMO is to be sent out of the customs territory of the Community. If no export contract has been concluded or if the holder of the contract does not act on its own behalf, the power to determine that the GMO is to be sent out of the customs territory of the Community shall be decisive.

**Importer**: Any natural or legal person, under the jurisdiction of the Party or non-Party of Import, who arranges for a GMO to be imported.

**Transboundary movement**: Intentional or unintentional movement of a GMO between one Party or non-Party and another Party or non-Party, excluding intentional movements between Parties within the Community.

**Party**: Any country or regional economic integration organisation being a Party to the Protocol.

**non-Party**: Any country or regional economic integration organisation not being a Party to the Protocol.

**the Protocol**: The Cartagena Protocol on Biosafety to the Convention on Biological Diversity (the Convention).

**Biological diversity**: Variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

**Competent authority**: A competent authority designated by a Party to the Protocol, or the relevant equivalent body of a non-Party, which is responsible for performing the administrative functions required by the Protocol, or equivalent functions in the case of a non-Party, and is authorised to act on its behalf with respect to those functions.

**Focal point**: Entity designated by a Party to be responsible on its behalf for liaising with the Secretariat.

**Secretariat**: Secretariat to the Protocol.

1. It is not certain whether the term "genetic material" also includes RNA, according to [EU Commission’s study](https://ec.europa.eu/food/plants/genetically-modified-organisms/new-techniques-biotechnology/ec-study-new-genomic-techniques_en) (p. 54). [↑](#footnote-ref-0)
2. The term “alternation” also encompasses epigenetic changes, according to [EU Commission’s study](https://ec.europa.eu/food/plants/genetically-modified-organisms/new-techniques-biotechnology/ec-study-new-genomic-techniques_en) (p. 21). [↑](#footnote-ref-1)
3. According to the CJEU judgment C-528/16, the term “mutagenesis“ [does not include techniques developed mainly after 2001](https://www.wilmerhale.com/en/insights/client-alerts/20180806-judgment-of-the-court-of-justice-of-the-european-union-of-july-25-2018-in-case-c52816-conf%C3%A9d%C3%A9ration-paysanne-and-others). [↑](#footnote-ref-2)