



QUOTATION

for

European Sealing Association (ESA)

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Sponsor	European Sealing Association Attn. Mr. Mark Neal 152, Route des Cottet 74430 Le Biot Haute Savoie FRANCE
Subject	Socio-economic assessment for a restriction of PFAS substances in sealants
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Provided by	DUCARES B.V. trading as TRISKELION Reactorweg 47-A 3542 AD Utrecht The Netherlands



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1. INTRODUCTION

Based on your request, it is our pleasure to provide you with this proposal for the performance of a Socio-economic analysis (SEA) for a restriction of PFAS in sealants.

A number of EU member states are preparing a restriction proposal for PFAS substances. Under the present definitions used by the member states, fluoroplastics and fluoro-elastomers, in this proposal together further to be called fluoropolymers, are considered PFAS substances. Fluoropolymers are important substances in sealants used in various applications. A restriction on the use of such fluoropolymers may therefore have a large impact on manufacturers and users of sealants. The European Sealing Association (ESA) has therefore requested the performance of a Socio-economic analysis (SEA) to assess the socio-economic impact of such a restriction. This document presents a proposal for this SEA.

We look forward to a fruitful cooperation.

For any questions regarding this quotation, please feel free to contact me.

With kind regards,
DUCARES B.V. | trading as TRISKELION

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2. PROJECT OUTLINE

Sealants and supply chains

The ESA represents companies that manufacture sealants. There are five major types of sealants manufactured by these companies: packings, flange gaskets, mechanical seals, elastomeric and polymeric seals and expansion joints. These sealants can contain different fluoropolymers, including FEP, FEPM, FFKM, FKM, PCTFE, PFA, PTFE and PVDF. A large number of products is made, including valve packings, yarns, valve and pump shaft/stem seals, packing rings, gaskets and O-rings, and these products are used in a wide variety of industries, including the chemical and petrochemical industry, aerospace industry, automotive industry, water and wastewater industry, pharmaceutical industry and food & beverage industry.

The companies that manufacture the sealants may supply directly to the user industries, but there is also a substantial supply via distributors and whole-sale companies.

The manufacture of the sealants involves the actual use of fluoropolymers in the creation of articles (the sealants). The actual use of the articles is in closed systems, generally in industrial settings, because their purpose is to ensure that systems are sealed. The sealants play an important role in the reduction of emission of other substances from processes.

Restriction proposal

Four EU member states and Norway are together working on the PFAS restriction proposal. The ultimate aim of the proposal is reported to be: "a ban on the use of these substances."¹ It was the intention to submit the dossier at ECHA this year, which might lead to the actual restriction decision to be taken in 2025. Some uses of PFAS may be exempted of the restriction because of a derogation, because they are considered essential.

Proposal for the SEA

The SEA to be prepared is intended to assist in the argumentation that the uses in sealants should be exempted based on fact and figures of the industry. We propose the following approach.

Focus of the SEA

A SEA for a restriction needs to have a clear focus. Because of the different types of sealants manufactured, the different fluoropolymers and user industries involved and the complex supply chains, it is not possible to study the impact of the restriction on all relevant supply chains in detail. Our proposal is to create a broad, general overview of the supply chains involved and focus on a number of specific supply chains. Because there are five different types of sealants involved, we propose to study five different specific supply chains: one for each type of sealant. As far as possible, we will chose uses in different industry sectors to ensure a broad coverage of supply chains. The example supply chains will be chosen in cooperation with experts from the ESA. Criteria for choosing may include the following:

- Potential risk related to the use
- Information on availability of alternative solutions
- Relative importance of the supply chain
- Expected chances of support by stakeholders in the supply chain

¹ [PFAS restriction proposal | RIVM](#)



Part of the focus will also be on the potential alternatives for fluoropolymer sealants. An attempt will be made to describe potential alternatives for the uses in the focus (mentioned above), including aspects of their technical feasibility as alternatives.

Impacts to be assessed

According to the guidance on SEA for restrictions by ECHA, the following impacts need to be assessed:

- Human health impacts
- Environmental impacts
- Economic impacts
- Social impacts
- Wider economic impacts

Human health impacts

Human health impacts will not be a focus in this SEA. The assessment of human health impacts of the fluoropolymers themselves is not really possible, because of a lack of information on absorption and limit values. Assessment of the upstream impact (on PFAS manufacturers) caused by non-polymeric PFAS substances used in the manufacture of fluoropolymers is not logical in this SEA, because those manufacturers are themselves impacted by the PFAS restriction and probably doing their own assessment. Potential human health impacts of e.g. alternative solutions for present fluoropolymer sealants will only qualitatively be discussed.

Environmental impacts

The main reason for a restriction on PFAS substances is the fact that they are extremely persistent. Of course, this persistence or stability is one of the major reasons for their use as well. Environmental limit values for fluoropolymers are unknown to us. Therefore, the environmental impacts will focus on environmental emissions of fluoropolymers only. Furthermore, other environmental issues caused by potential alternatives will be (at least qualitatively) assessed.

In the assessment of the possible environmental emissions, the life cycle from production of sealants to end-of-life and including waste handling or recycling will be taken into account. Where possible, impacts of the restriction on emissions will be quantified.

Economic impacts

The economic impacts of the restriction will be assessed. This will include the impacts on the manufacturers of the sealants, the downstream supply chain and the end users. As far as possible, these will be quantified or semi-quantified. The economic impacts further downstream of the industry using the sealants will also be discussed, but probably only qualitatively.

Social impacts

The social impacts generally follow from the economic impacts, because they relate to e.g. employment, which could be changed due to the economic impacts. Therefore, the social impacts will be assessed mainly as the result of the economic impacts.

Wider economic impacts

Wider economic impacts, e.g. on the payment balance between countries or blocks or on general economic development, are not the focus of this SEA. They are generally very difficult and uncertain to estimate and will only be briefly qualitatively discussed.



Project steps

The following steps are proposed in this project:

1. Description of baseline scenario and data gathering in supply chains
 - Supply chains
 - Processes
 - Substances
 - Choice of example supply chains/uses
2. Evaluation of potential alternatives to fluoropolymer sealants
 - Broad general view
 - Focus on example supply chains/uses
 - Technical feasibility
 - Availability
3. Emission of PFAS substances during the lifecycle in the baseline scenario
 - Starting at manufacture of sealants
 - Installation, maintenance and in-use situation
 - End-of-life, recycling, waste stage
4. Impact of restriction on emissions
 - Qualitative description of impacts of restriction
 - Estimation of impact on emissions of PFAS
 - Qualitative assessment of other emissions modified due to the restriction
 - Economic and social effects of the restriction
 - Qualitative description of effects on supply chain, users and further downstream of the users
 - Estimation of economic impact on supply chain

Methods

We propose to use the following methods in the 5 project steps mentioned above:

1. [Description of baseline scenario and data gathering in supply chains:](#)

We will use documents already available from the fluoropolymer industry, the sealants manufactures and the authorities as a starting point for describing the elements of the baseline scenario. With help from the ESA, we will contact a few experts with broad knowledge of the supply chains to obtain further information on processes and substances in general. Based on the information gathered so far, we will propose five example supply chains for more detailed analysis. These will be discussed and agreed with a monitoring team of ESA. Structured interviews will be held with two or three experts/stakeholders in each of the example supply chains to obtain more detailed description of the baseline scenario in these example supply chains.
2. [Evaluation of potential alternatives to fluoropolymer sealants](#)

The starting point for evaluating potential alternatives will be the documentation already gathered in step 1 (see above). If needed, an additional literature search will be performed as well to find information on potential alternatives. Furthermore, the contacts with experts and stakeholders as mentioned in step 1 and the structured interviews, specifically with experts from companies using the sealants, will also be used to gather information on potential alternatives. The focus will be on:

 - What potential alternatives exist for which use?



- What are pros and cons of these alternatives (technically, financially, related to health and safety)?
- What research and developments exist to create possible alternatives?

In this scope, alternatives may be sealants from different materials (non-PFAS), sealants with a lower PFAS content or created with less use of non-polymer PFAS substances as well as totally different technologies to obtain the same or a similar result. Assessment of totally different technologies will at most be qualitative and very generic.

3. [Emission of PFAS substances during the lifecycle in the baseline scenario](#)

A qualitative assessment of emission sources of PFAS substances during the lifecycle will be made, based on the available documentation and other information gathered in the previous steps and based on our general knowledge and experience related to emission from processes, products and articles. Information from emission scenario documents and descriptions of best available techniques will be taken into account where relevant. The experts from the example supply chains will be asked to provide any quantitative information on emissions of PFAS substances from their supply chain, if available. If all these actions will not give sufficient insight in the emissions of PFAS, an additional literature study will also be performed to obtain qualitative or quantitative information on emissions.

In this step, the lifecycle accounted for starts with the manufacture of sealants and ends with end-of-life handling, waste handling and recycling (if relevant).

A qualitative description of the (potential) emissions through the lifecycle will be made and, where possible, supported by quantitative data or estimates. If possible, trends from the past and extrapolations to the future will be described too.

4. [Impact of restriction on emissions](#)

The description of the baseline scenario, the assessment of the potential alternatives and of the emissions in the baseline scenario form the starting point for the assessment of the impact of a restriction on the emissions. First, a qualitative restriction scenario description will be made, which describes the changes caused by the restriction. These can be different for the different example supply chains, e.g. depending on whether there are reasonable alternatives available or in development or whether the use can be considered essential and therefore may be exempted from the restriction.

Where sufficient information on the emissions and the alternatives is available a (semi-)quantitative assessment of the impact on the emissions will be made. If this is not possible, a qualitative assessment will be made.

Furthermore a qualitative assessment of impact of the restriction on emissions of other substances, due to the use of alternative techniques will be made. Where possible this will be evaluated in bands (e.g. low, medium, high).

The impacts will be assessed for companies in the supply chain and (only qualitatively) further downstream. We expect that data are too limited to quantitatively extrapolate to the whole of Europe, but an indication of the size of the impact will be provided.

5. [Economic and social effects of the restriction](#)

The information gathered and estimated on the baseline scenario, the alternatives, the emissions and the impacts will be used as starting point to assess the economic and social effects of the restriction. Furthermore in the structured interviews with experts from the example supply chains, specific questions will be asked on the economic impacts and the expected



reaction of the companies on the restriction (e.g. increase cost-prices, move production elsewhere, close factories, etc.). The social effects of the restriction will follow largely from the impacts and economic effects and will be described, mainly in a qualitative way.

Interviews and/or questionnaires

In the descriptions above, the use of structured interviews is described as a main method to gather information from the experts of the example supply chains. For some aspects, we generally use questionnaires to (large) numbers of companies in a part of a supply chain. If it appears from contact with the experts that for some aspects, such as emissions or costs of alternatives, the use of questionnaires to multiple companies would be relevant, we will discuss with ESA whether such an additional activity should be performed. For the moment, the use of questionnaires is not part of this quotation.

Reporting

The assessments created in the previous steps will be reported in a report. We will use the structure suggested in the guidance document on SEA for restrictions by ECHA as a starting template for the report. The reporting will be more detailed on the aspects on which the focus of this project is and more general on other aspects. Where (semi-)quantitative assessments were made, the report will use tables and graphs to present the message.

While we focus on a number of example supply chains, we will describe in the report what the results imply for the full sectors involved. This will not be a full quantitative extrapolation, because quite some aspects will probably not be quantifiable.

The uncertainties in the results will be discussed as well as any important gaps in the information and evaluation.

We will deliver a draft report and ask for written feedback before discussing the draft report in a meeting with ESA and their experts. After that discussion we will prepare the final draft for one more round of feedback in writing. Then the final report will be prepared and delivered.

For any questions regarding this project, please feel free to contact our project manager:

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3. PRICING AND CONDITIONS

Pricing

The total costs for the performance of the project are estimated to be in the range of 134,000 to 167,000 Euros. The actual amount depends on the number of interviews that will be held, and the quality of information received (i.e. the need of doing additional literature searches to get sufficient information to draw conclusions). A break-down of the estimated costs is given in the pricing table below:

Project activity	Estimated minimum budget	Estimated maximum budget
Description of baseline scenario, and data gathering	€ 39,000	€ 50,000
Evaluation of potential alternatives to fluoropolymer sealants	€ 17,000	€ 25,000
Emission of PFAS substances during the lifecycle in the baseline scenario	€ 17,000	€ 23,000
Impact of restriction on emissions	€ 21,000	€ 23,000
Economic and social effects of the restriction	€ 15,000	€ 17,000
Reporting	€ 13,000	€ 15,000
Meetings and project management	€ 12,000	€ 14,000
Totals	€ 134,000	€ 167,000

The estimated number of man-days and costs as presented above are based on the performance of the complete project scope described in this proposal, and on the following assumptions:

- The lower amount includes a maximum of 15 interviews, gaining sufficient information to describe the baseline scenario, as well as potential alternatives, without further literature search.
- The higher amount includes a maximum of 20 interviews, as well as the performance of additional literature searches to gather sufficient information.
- There are 3 (lower amount) to 4 (higher amount) meetings planned, being mainly conference calls or face-to-face meetings at TRISKELION (Utrecht, the Netherlands).

Because of the uncertainties, especially with regard to the number of interviews, and the need to perform literature searches, our proposal is to work with the cost estimate above as basis, but to invoice on the basis of actual costs, on the basis of actually spent hours. The budgets specified above will not be exceeded without prior approval from the sponsor.

The daily rates for 2023 are € 1,395 for a junior scientist, € 1,751 for a medior scientist / project manager and € 1,978 for a senior scientist, respectively.

The project manager will keep the sponsor's contact person and monitoring group updated on the development of the project and the costs, and will report any foreseeable deviations from the estimated costs. For this purpose a time sheet and a progress report will be delivered on a bi-monthly basis.



VAT

Prices are quoted exclusive of any taxes, duties, interest rates, valuations and charges of any kind levied by or payable to any governmental agency outside the Netherlands.

Price level

The stated prices are valid for the year 2023.

Adjustments

Changes to the contents of this quotation are considered an adjustment and may influence the price and planning. This will be discussed with the sponsor.

Invoice schedule

- 25% of the minimum budget, upon signing of the quotation
- Bi-monthly invoices on the basis of actually spent hours

Conditions

The General Terms and Conditions for Commissions to TRISKELION - version 3.0, January 2020, apply to all our quotations, agreements or services of any kind under Dutch law. Applicability of the general terms and conditions provided by your company by means of a company Purchase Order is therefore expressly excluded, unless otherwise agreed in a mutually agreed contract..

Postponement or cancellation

If a project is postponed or cancelled after your agreement to the enclosed quotation, the actual costs incurred by TRISKELION will be charged.

Period of validity

The offer is valid until 2022-12-16 (Year – Month – Day).



4. PLANNING

Starting date of work

The project can start immediately after the receipt of a signed version of this quotation.

Delivery of results

On the basis of our experience, we expect that the project can be performed within a period of approximately 7 to 9 months. However, this greatly depends on the time it will take to make appointments to hold the interviews, and to perform literature searches in case insufficient information can be gathered by means of the interviews.

TRISKELION will need:

- 1 month for the start of the project and for gathering names of persons to interview;
- 2 - 3 months for making appointments, holding the actual interviews, and gathering the additional information (if needed);
- 1 - 2 months for the performance of the Steps 1, 2 and 3;
- 1 - 2 months for the performance of the Steps 4 and 5;
- 1 month for drafting the report.

The final report will be delivered within 2 weeks after the receipt of ESA's written and univocal comments.



5. APPROVAL

If you wish to place an order based on this quotation, please sign this quotation for approval and return it to us.

Please state the correct invoice address, your VAT number and Purchase Order number (if applicable).

Signature of Sponsor representative

Name _____

Position _____

Place _____

Date _____

PO number _____ (if applicable)

VAT number _____ (if applicable)

Invoicing address (if different from quotation address)

Company _____

Department _____

Contact _____

Address _____

E-mail _____

Please note that the general conditions of TRISKELION apply when signing the quotation.

Bank details DUCARES B.V. | trading as TRISKELION
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