Technical and Economic Feasibility of Substitution: Biocidal Products containing Creosote

Assessment Report

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1. Background

In accordance with Annex 1 of Commission Directive 2011/71/EU amending Directive 98/8/EC to include creosote as an active substance in Annex I of the Directive 98/8/EC (BPD), "Biocidal products containing creosote may only be authorised for uses where the authorising Member State, based on an analysis regarding the technical and economic feasibility of substitution which it shall request from the applicant, as well as on any other information available to it, concludes that no appropriate alternatives are available".

In line with the UK Competent Authority for Biocides (HSE) wishing to authorise such products for use within its territory, this report is submitted in fulfilment of the requirement noted above for such Member States to provide a report to the European Commission justifying their conclusion that there are no appropriate alternatives and indicating how the development of alternatives is promoted[1].

The report covers the following use classes for which product authorisation is being sought in the UK:

- UC 3: pressure impregnation: Preventive treatment of wood to be used as railway sleepers, agricultural fencing, equestrian fencing, industrial and highways fencing, cladding for non-residential buildings, Use class (UC) 3 according to EN Standard 335.

[1] It should be noted that the provisions of Directive 2011/71 are assumed to apply for uses of biocidal product containing creosote which are the subject of the authorisation process under Regulation 2012/528 as at 31st July 2016. Although such products may not have in fact been authorized in a member state by this date under Regulation 2012/528, the European Commission has clarified that a report in accordance with Annex 1 of Directive 2011/71/EU should be submitted as soon as products are authorised under Regulation 2012/528. As such it is unclear on which date the assessment of technical and economic feasibility of alternatives is assumed to apply (especially since applicants may submit their analysis at any point prior to or subsequent to the deadline stated in Annex 1 of Directive 2011/71. The UK CA's assessment of the technical and economic feasibility is thus subject to a potential lack of inclusion of the latest contemporary data up to the date of submission.

- UC 4: pressure impregnation: Preventive treatment of wood to be used as wood poles for overhead electricity and telecommunication, agricultural fencing, equestrian fencing, Use class (UC) 4 according to EN Standard 335.
- UC 5: pressure impregnation: Preventive treatment of wood to be used for marine installations. Use class (UC) 5 according to EN standard 335.
- Surface treatment (UC 3 and UC 4): Treatment of creosote impregnated wood (UC 3 and UC 4) after modifications such as sawing, cutting, shaping and machining. Preventive treatment.
- UC 3: Whole wood - Pressure impregnation: Preventive treatment of wood to be used as railway sleepers, agricultural fencing, equestrian fencing, industrial and highways fencing, cladding for non-residential buildings, Protection of wood corresponding to UC 3.
- UC 4: Whole wood - Pressure impregnation: Preventive treatment of whole wood to be used as wood poles for overhead electricity and telecommunication, agricultural fencing, equestrian fencing, Protection of wood corresponding to UC 4.
- UC 4: Whole wood - Hot and cold impregnation: Preventive treatment of wood to be used as tree support posts, posts/stakes for agricultural fencing, posts/stakes for equestrian fencing, Protection of wood corresponding to UC 4.

The report focuses on the general use area covered under these specific use classes for those products seeking approval for use in the UK, as well as their potential alternatives applicable to use in the UK. Nevertheless, the report, where appropriate and where such information is available, addresses specifically the following use areas covered within the above use classes: Railway sleepers; Transmission Poles (electric power transmission and telecommunications); Fencing; Wooden Poles/Stakes/Supports for use in the agricultural sector; Wood in Marine applications; Surface treatment of creosote impregnated wood after modifications.

As noted above, the inclusion directive for creosote includes a specific provision stating that products containing creosote may only be authorised for uses where the authorising Member State concludes that no appropriate alternatives are available, based on an analysis regarding the technical and economic feasibility of substitution which it shall request from the applicant, as well as on any other information available to it. Since no guidance have been developed under the biocidal products directive 98/8/EC (BPD) in order to facilitate for applicants or authorising Member States how to comply with this provision[2,3], the UK Competent Authority follows the approach taken under the REACH regulation

[2] So for example, it is not clear whether the burden of proof required to justify that there are no appropriate alternatives should rely on information demonstrating that possible alternatives are not technically or economically feasible, or on the lack of information demonstrating that there are alternatives that are technically and economically feasible. For the purpose of this report, whilst the assessment is primarily based on consideration of the former (strong) approach, the conclusions are ultimately determined on the basis of the latter (weak) approach.

[3] It is also not clear how to interpret the term “economic feasibility” in the context of an applicant’s application for authorisation of a biocidal product. It should be noted that the term “economic feasibility” has no technical (from the perspective of economic science) or legal definition, thus rendering it open to multiple interpretations.

(1907/2006). Specifically, the technical and economic feasibility of alternatives is considered under the Authorisation provisions of Title VII. In line with these provisions, there is a requirement to show that there are no suitable alternatives when granting an authorisation to use a substance included in Annex XIV. An assessment of the fulfilment of this requirement is carried out in accordance with: 1) How the Committee for Socio-Economic Analysis will evaluate economic feasibility in applications for authorisation (https://echa.europa.eu/documents/10162/13580/ seac_authorisations_economic_feasibility_evaluation_en.pdf); and 2) the 'Template for the opinion on authorisation applications' (https://echa.europa.eu/documents/10162/13555/afa_note_rac_seac_opinions_en.pdf). This report takes the same general approach relating to the analysis of economic feasibility as well as to the reporting requirements related to the alternatives component of the ECHA template in setting out the justification for the conclusions in this report.

The following information which was submitted to the UK CA by applicants in support of an application for mutual recognition of a national authorisation for biocidal products containing Creosote has been considered as necessary in developing this report:

- A socio-economic analysis of creosoted tree stakes applications. This document presents the findings of a socio-economic study of creosote as a preservative for tree stakes applications.
- A socio-economic analysis of creosoted fencing applications. This document presents the findings of a socio-economic study of creosote as a preservative for fencing applications.
- An analysis of the technical feasibility of substitution of creosote for the treatment of wood for poles, sleepers, fencing, agricultural uses (including tree stakes), fresh and sea water uses and professional use. This report is mainly based on information on and experience of wood uses in the UK.
- A socio-economic analysis. This document presents the early findings of a socio-economic study of creosote as a preservative for wood poles for power and telecommunication networks.
- Several lifecycle analyses
- Information received during various public consultations regarding the availability of possible alternatives to creosote as well as experience from end users.

The following sections provide the justification of the UK Competent Authorities conclusions regarding the technical and economic feasibility of substitution, along with an indication of how the development of alternatives is being promoted. The conclusions reached are based on the information available to the UK Competent Authority at the time of writing.

1. <u>Justification of the Appropriateness of Alternatives to Biocidal Products Containing Creosote</u>

1.1 To what extent is the technical and economic feasibility of alternatives to biocidal products containing creosote described and compared in those uses seeking approval.

The applicants have submitted a package of documents in support of the analysis of technical and economic feasibility of alternatives. Within the various documents submitted, the main function of biocidal products containing creosote is set out in the context of the general uses being considered for authorisation. This is as a preservative treatment to protect wood in situations where it can become and remain wet or where wood destroying fungi and insects are present. Wood treated with creosote is frequently used in safety-critical and economically important situations where confidence in performance and long-service life are key functional requirements. Indeed, the service life expectation for wood treated with creosote is the fundamental characteristic associated with the continued demand for such biocidal products for most of the use classes concerned.

The applicants' package of documents describes to varying degrees across the different use classes concerned, the technical and economic feasibility of a number of alternatives to biocidal products containing creosote. The alternatives considered are thought to represent the main alternatives which have been identified, through desk-based literature review, stakeholder questionnaires (e.g. on user experiences) and expert public consultation, as potential alternatives for the uses concerned. The alternatives also reflect the ongoing search for alternatives as a result of existing public and legislative pressures to substitute creosote. As such they can be considered to encompass a wide range and breadth of known substitution possibilities, including options that were available in the past.

Although a large number of potential alternatives exist across all uses, the analysis focuses on a more limited number of options, which are based on either making the function performed by wood impregnated with creosote redundant (i.e., by eliminating the need for wood impregnated with creosote, e.g., by using an alternative material), or finding an alternative substance/biocidal product that can perform the same function (i.e., preservation of wood) as creosote. This selection of alternatives has to some extent been based on formal screening criteria identified for some of the different use classes (e.g. tree stakes and fencing). In the case of other use classes, the selection of alternatives is clearly based on substitution possibilities previously identified in the literature and knowledge base, and which have proven some degree of feasibility as possible substitutes and/or have already been the subject of previous R&D work on substitution in the use areas concerned.

The selected alternatives were taken forward for more detailed evaluation across the different use classes. The extent that the technical and economic feasibility of each of these alternatives were assessed and presented across the different use classes was rather ad-hoc across the use classes and did not follow a systematic procedure. The descriptions and analysis related to technical feasibility were concerned with the ability of the alternatives to meet certain technical properties and requirements. These properties are essentially aspects of the performance and length of service life requirements of each use class. The descriptions and analysis related to economic feasibility concern the costs of switching to the alternatives, including as relevant to each use class, indications of the raw material substitution costs, process, transportation and installation costs, as well as lifetime investment costs (ie related to length of service life of the alternative). In addition, the applicants have included a number of life-cycle analyses related to some of the use classes, which compare the alternatives across a number of additional criteria (environmental and other technical).

The descriptions, assessment and discussion of technical and economic feasibility are somewhat brief, lacking in comprehensiveness and depth, and not systematically carried out across the use classes. Moreover, it is often difficult to discern between information based on assertion and that based on a sound evidential footing. This has made the evaluation of the evidence difficult, such that the confidence attached to the conclusions about the lack of suitability of the alternatives is affected. It should also be noted that the technical feasibility considerations often relate to standards and guidelines governing material specifications, and for which it is not entirely clear whether these standards are essentially a form of type approval/certification (and hence possibly a customer requirement rather than a pure technical constraint). Irrespective, the arguments related to technical feasibility can often be classed as economic feasibility considerations, since they ultimately concern the cost implications of switching to alternatives. In this respect, the analysis is for some of the use classes relatively more quantitative (for example, including specific estimates of the additional costs of the alternatives), whilst in other cases it is based on more qualitative argumentation. These provide an indication of the likely direction of the economic impacts of substitution, though the description and/or derivation of its magnitude are often lacking and too brief for detailed scrutiny.

Evidence from various public consultation exercises has also been included and whilst this consists of largely supportive policy position statements, substantive technical evidence either in support of or disputing the technical and economic feasibility analysis was rather limited.

In sum, the UK CA finds the descriptions and comparison of alternatives considered by the applicant to be barely acceptable at a general level, though there are deficiencies in the depth of the analysis such that questions remain about some of the specific constraints for some of the use classes. Moreover the veracity of some of the claims in terms of technical and economic feasibility of alternatives is difficult to fully scrutinise and confirm.

1.2 Are the alternatives technically and economically feasible ?

☐ YES
☒ NO

Wood preservatives chemically protect wood from natural biodegradation that occurs when wood is attacked by bacteria, fungi, insects, or marine borers. The resulting protection depends on the type of preservative used and the achievement of proper penetration and retention of the chemicals. The wood preservative industry includes both industrial (primarily transportation and communications sectors) and consumer markets (retail consumers). Creosote is one of the three major wood preservatives used in the industrial market. Advantages of creosote are its toxicity to wood-destroying organisms, relative insolubility in water and low volatility that makes it fairly permanent under widely varying conditions, ease of application, ease of determining penetration depth, relative low cost, and record of satisfactory use.

Within the package of documents submitted for analysis by the applicants, possible alternatives that can be considered as substitutes for biocidal products containing creosote in the uses of concern are described and discussed. Alternatives to creosote-treated wood vary by use. Alternative materials and products involve tradeoffs in structural qualities/technical characteristics, cost, and effectiveness. The information provided sets out evidence that supports the applicants' position that although in principle there may be alternatives available to replace the use of biocidal products containing creosote, these are not technically and economically feasible at the time of writing.

The UK CA concurs with this position for the use classes indicated based on its assessment of the information, though it has to be stated that the evidence supporting this conclusion is often rather weak and relies on the veracity of some of the information submitted (particularly related to user experience). There is nevertheless a lack of good evidence demonstrating that other alternatives are indeed suitable and available in practice under all circumstances. The assessment below considers the applicants analysis of the technical and economic feasibility of alternatives in each of the main use class areas, following which the overall conclusions of the assessment are presented.

Railway sleepers

The main reason for the use of wooden railway sleepers is their light weight and corresponding ease of maintenance. Another benefit is the dynamic interaction between the rolling stock and a track with wooden sleepers. Wood sleepers have traditionally been used because they have a lower mass and greater resiliency, which results in a more resilient track with improved impact loading, and reduced amplification of these impacts. This improves track component life and improves ride quality. Wood sleepers also reduce noise and vibration, as well as having electrical isolation properties, which minimizes electrical leakage into sleepers that can disrupt signal systems.

With respect to sleepers, decay fungi and termites are usually the organisms of concern. When properly treated with a preservative such as creosote, deterioration due to these organisms is essentially eliminated. There are also physical agents, such as ultraviolet light, heat abrasion, and exposure to alternating climatic conditions that affect the wood structure. These effects can be minimized by the use of preservatives such as creosote.

The applicants consider both the use of alternative materials (concrete, plastic, etc) as well as alternative wood preservatives as potential substitutes for the use of railway sleepers treated with biocidal products containing creosote. The life of a treated sleeper depends on the weight, speed of traffic, axle loads, track condition, climate factors, and its quality, treatment, and track maintenance. The average service life of untreated sleepers is stated to be approximately five and a half years. Treatment with creosote extends service life to an estimated average life of over thirty years.

The railway sleeper use class is a safety critical application, with exacting performance specifications related to the scope of usage across rail network applications and service life requirements. As such, there may be rail infrastructure type approval/certification requirements related to the use class, within which technical feasibility must be considered.

According to the applicants, other wood preservatives are not as effective at treating wood used for sleepers, such that alternatives to treated wood appear to be the most technically feasible alternatives. In principle, concrete sleepers can be considered to be the most technically feasible given their extensive use across the UK rail network. However, wooden sleepers are still necessary for a variety of technical reasons in specialist applications. Wooden sleepers are said to have, for example, greater flexibility in terms of where they can be used (e.g. inaccessible areas, switching points, tunnels, bridges, small radius curves, etc) since they can be custom cut to individual circumstances and do not require heavy/mechanised equipment (concrete can be 3 times as heavy as wood). According to the applicants it is also not possible to mix concrete and wooden sleepers in track maintenance uses due to the different ballast requirements to ensure equal profile tracks – whilst it would be possible to replace all wooden sleepers to avoid such mixing, this would be economically infeasible (see below) since it would, according to one industry estimate (WPA 2011), require a 3 fold increase in the number of sleepers requiring replacement per year.

In terms of their economic feasibility, although the price of concrete and wooden individual sleeper units are comparable, it is claimed that there are significant extra costs to using concrete sleepers associated with the need for extra ballast and bedding, as well as the need for specialist equipment due to their heavier weight. At the same time, the service life of concrete sleepers is apparently longer[4] and hence there may be some circumstances in which they are economically feasible. However, the evidence submitted by the applicants is insufficient to allow a detailed assessment in this respect, and in any case the technical feasibility constraints noted above are not overcome. Tuned Concrete Sleepers (TCS) are a variant with wood characteristics, which have been developed in order to serve as replacements for wooden sleepers. These appear to be a promising alternative, though the costs are apparently very high and it is not clear to what extent the various technical feasibility constraints are overcome[5].

There are also a number of other non-wood material based alternatives to wooden sleepers (e.g. Steel, Aluminium, Plastic, other composites) that have been considered by the applicants. However uncertainties exist as to their technical and economic feasibility at the present time. Even though some of these alternatives appear to be usable across the variety of rail track applications, the available evidence suggests that man-made materials, such as plastic, have not demonstrated the same combination of desirable technical factors (damping, strength, etc) and that the alternatives differ in

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[4] Though, according to the applicants, it is not clear to what extent this is always the case since Network Rail, which owns and operates the UK rail infrastructure, has specifications (L2/TRK/4001/B03) that call up treatment with creosote for a 60 year service life. Moreover, there is apparently evidence that concrete sleepers chip, crack and crumble prematurely, thus lasting less than the 50-60 years that manufacturers claim.

[5] In this respect, testing and evaluation is ongoing (e.g. by some transport administrations in EU members states).

both material cost and installation cost. Nevertheless, testing and performance evaluation of some of these alternatives is underway or will be carried out in the future by some member state transport authorities, though for the time being their approval by UK rail infrastructure bodies across all the various rail track applications is not confirmed.

A final category of alternatives concerns other chemical wood preservatives, non-treated wood and wood modification. According to users these are largely problematic in terms of the associated service life of the sleepers and hence on their economic feasibility, though details are somewhat lacking, particularly in terms of relative costs. In any case, there is no evidence that these have been approved for use by rail infrastructure bodies in this particular use class in the UK, though of course this may be due to deficiencies related to length of service life.

In summary, according to the information submitted by end users and assessed herein, it is accepted by the UK CA that there currently appear to be technical and economic feasibility constraints, particularly within the context of the safety critical rail infrastructure approval system in the UK, which justifies the conclusion that at the present time there are no established alternatives to replace creosote-treated wooden sleepers. Although the evidence and arguments presented are not entirely convincing, in the context of a safety critical use application it has to be accepted that good evidence that established alternatives are suitable and currently available across the entire spectrum of applications within this use class has not been established. Therefore the UK CA concludes that for railway sleepers, there are no appropriate alternatives to creosote available.

Transmission Poles (electric power transmission and telecommunications)

Wood poles have been the traditional material for telecommunications and electrical transmission distribution structures for many years, having a number of advantages and disadvantages with respect to other materials. Their properties are familiar to transmission and maintenance engineers, whilst their supply is good and prices generally low and relatively stable compared to other materials. The manufacturing processes of alternate materials tend to be much slower. Wood poles have solid cross-sections unlike concrete, steel, and composite materials, which eliminates the possibility of buckling and provides very good compressive strength. Wood also has an inherent flexibility that allows it to deflect and absorb dynamic loads, and transfer loads to other poles in the line. Alternative pole materials when stressed to the bending point end up requiring replacement. Wood poles are generally climbable with climbing spurs, compared to alternative materials that may or may not have steps built into them. However, as is the case with all transmission assets, these structures require ongoing maintenance and refurbishment/replacement, the latter being driven principally by the lifespan of the asset. In this respect, the main disadvantage of wood poles is that they require preservative treatment if their service lives are to be extended. As such the substitution of creosote requires consideration of possible effects on lifespan/service life, and hence the consequential effect on the refurbishment periods associated with such transmission networks. Confidence in the performance of transmission poles is crucial given also the safety critical nature of maintenance of the transmission lines (e.g. due to the need for engineers to access the assets for maintenance, etc, and whose safety depends on the structural integrity of the poles).

The applicants have considered three principal options for the substitution of the use of biocidal products containing creosote to treat wood transmission poles. These include the substitution of creosote with an alternative biocidal product, such as copper based actives. Alternatively creosote treated poles may be replaced by poles manufactured from other materials, such as concrete, steel etc. Finally, it is possible to move away from overhead transmission lines completely and instead adopt underground cable based solutions.

Regarding the use of alternative biocidal preservatives, the applicants note that there is experience with copper organic type preservatives already within the UK, where such treatment has been used for a limited number of poles, for example at playgrounds (in order to avoid contact with creosote). These alternatives can thus, in principle, be considered as technically feasible. Although these preservatives have been extensively tested in the lab and field trials, the evidence from their use and performance is apparently rather limited[6]. According to industry bodies this evidence suggests that the service life of poles treated with copper organic preservative is around half of those treated with creosote. Moreover it is reported that a significant proportion of copper treated poles (>5%) have shown evidence of advanced decay in as little as 7 years of service. Consequently, confidence in this alternative as a more widespread alternative is affected, according to the applicants. The effect of the reduced lifespan is to increase the number of poles required annually, with an associated increase in annual refurbishment costs (see later for quantitative estimates), leading to the conclusion that, except for some minor use circumstances, this alternative is economically infeasible.

The second substitution option proposed by the applicants concerning the replacement of creosote treated wooden poles by steel, concrete or other material poles is considered to be technically feasible. Certainly, in terms of steel and concrete the technology has been in use for many years and is widespread in the sector. Indeed such poles offer certain advantages over wood poles (e.g. rigidity, invariant physical characteristics, fire retardancy). Other materials, such as fibreglass and composite are according to the applicants largely insufficiently tested, have service life or other technical concerns, or are more expensive when compared to wood poles.

With respect to steel and concrete poles, the key problem (amongst others) with their use as an alternative appears to relate to the increased costs associated with their installation, maintenance and replacement as a result of their higher physical weight compared to wooden poles. The additional weight necessitates the use of specialised lifting and installation equipment, for which additional capital expenditure would have to be made by the sector, depending on the existing levels of mechanisation. The applicants describe the various installation and operational practices associated with transmission poles and outline the necessary changes and impacts associated with the

[6] It should also be noted that UK utility companies require service lives in excess of 30 years for poles, though the case of economic feasibility seems to rest on arguments for longer service lives. Traditional standards make reference to 40 years desired service lives, with some specifications referring to 60 year service lives. Certainly, as far as alternative preservatives are concerned, there is only limited evidence of performance in excess of 20 years, though further testing is currently ongoing.

use of concrete and steel poles. The increased cost (some estimates suggest over 200% more expensive) associated with both the purchase, installation and maintenance of such poles is again considered to be economically infeasible compared to wooden poles. However, this does not take into account the fact that concrete poles have a longer life expectancy. The evidence is thus somewhat unclear as to the extent of economic infeasibility of these poles.

Fibreglass and other composite material poles are increasingly being developed and proposed for use in this sector. Initial technical findings suggest that there are issues with strength properties or with inferior service life in some cases. Information on the economic feasibility of these alternative is somewhat mixed, with some individual composite materials performing better than others. However, evidence of the general suitability and availability of these alternatives as a currently viable substitute across the board in this sector is lacking. Furthermore, the use of such materials would potentially require the re-specification and/or redesign or ancillary equipment and fittings in order to be compatible with the material, thereby necessitating further transitional investment costs.

The final category of alternative is the adoption of an underground network of transmission cables. Given the common presence of such cables in urban and city environments, this is clearly technically feasible at a general level, though this option becomes more technically challenging according to the natural terrain across which the network must traverse. The costs of installation have been found in the literature to be up to 15 times higher than equivalent overhead lines, though the gap has narrowed more recently such that for level and stable ground conditions, costs are thought to be in the region of 2 to 3 times greater. Where terrain is inaccessible or otherwise environmentally challenging, costs will increase, for example as a result of lines having to be diverted, etc. Moreover, cable fault rectification may be more difficult and costly. In sum, given that the installation costs are considered to be prohibitive, whilst the management of such cable networks is more technically challenging, this option is unlikely to be suitable beyond some specific and narrow circumstances.

Some specific quantitative economic feasibility information is available for the UK (WPA 2011). This suggests that based on wooden poles forming the main construction material of the overhead line transmission network (264,800 km) there are approximately 4.1 million poles, with an associated annual refurbishment cost of £115m (based on 60 year lifespan). If instead alternative preservatives (with a typically shorter lifespan are used, this would lead to an annual increase in expenditure of around £233m. Moreover, copper based preservatives can according to user experience lead to accelerated corrosion of metal fittings leading to premature failure and power outages. The use of poles made from alternative materials such as concrete which are heavier, would require the replacement of installation equipment and machinery at the cost of over £100m. Such poles are 2 – 4 times more expensive to purchase and are also 25% more expensive to install. It is thus estimated that refurbishment cost would double to £230m annually. Moreover, re-routing of isolated lines which could not be reached by heavier installation machinery would cost £20m per annum. In the telecommunications sector, the overhead line distribution network consists of around 7 million poles. It is estimated that the increase in annual refurbishment cost would increase by £64m. An additional £5m per annum would be required to monitor poles treated with alternative preservatives. Another estimate of costs suggests a figure of around £20 million + additional capital costs. Unfortunately it has not been possible to fully scrutinise and verify the calculation of these estimates. Moreover, it is unclear whether those estimates related to capital investments are in present value terms, or whether appropriate discounting and annualisation procedures have been used.

In summary, although there does appear to be some constrained scope for the use of alternatives in the transmission poles use class, the arguments against their general use in this sector appear to revolve around concerns over economic feasibility. The UK CA accepts those concerns, but again finds the evidence and arguments presented somewhat lacking, particularly in terms of cost accounting detail and transparency, such that it is difficult to fully verify the claims. Nevertheless, in the context of the safety critical nature and strategic economic importance of this use class, there is a lack of good evidence that alternatives are technically and economically feasible at the time of writing under all use conditions currently experienced in the UK. Therefore the UK CA concludes that for transmission poles, there are unlikely to be appropriate alternatives to creosote available.

Fencing Applications

Creosote treated wood is used extensively in a variety of fencing applications. Although there are examples of alternative preservation treatments and materials being used and accepted in some fencing applications (e.g. some domestic/agricultural fencing which has a service life of 15 years or less), there are, according to the applicants, a number of applications in which a longer service life is required alongside some other characteristics of creosoted wood, which makes the suitability of alternatives problematic. These include: agricultural fencing in which safety-critical separation of dangerous livestock from the public is needed; highway and industrial fencing where safety-critical exclusion of the public from danger is again needed; and equine fencing where containment and safety of horses is needed alongside the need to prevent ‘cribbing’. The key function of creosote in these applications is to ensure the preservation of wood over relatively long service lives and variable environmental conditions, thus ensuring confidence that there is no critical failure of the fence as a physical barrier in these safety-critical uses. Creosote treatment of wood in these applications allows for service lives of at least 30 years.

The applicants have undertaken a specially commissioned socioeconomic analysis of this use class, which includes a systematic analysis of alternatives. In total 13 alternatives, ranging from alternative wood preservatives, wood modification techniques, types of wood, and alternative materials to wood, were screened for their suitability as potential alternatives. Seven of the alternatives were subsequently taken forward for more detailed assessment of their technical and economic feasibility.

Regarding those alternatives which involve alternative wood preservative treatments the applicants assess two copper based wood preservatives already available on the domestic market. Both of these alternatives suffer from reduced performance in terms of the associated service life of the treated wood, with a reduction by a third of the 30 year service life of creosote treated wood. This reduction whilst related to a technical factor, impacts this use in so far as it increases the lifetime costs to end users and hence ultimately concerns the economic feasibility of the alternatives. The increase in costs taking account of the reduced service life is estimated at 50% and 225% across the two alternatives, with the applicants thus concluding that neither are suitable alternatives. One estimate from industry suggests that ongoing maintenance costs in the UK would increase by around £6.25 million per annum if such alternative preservatives are used. Moreover, these costs do not take into account the alternatives inability to prevent cribbing, which would necessitate additional expenditures in the context of equine fencing. However, it should be noted that there is contradictory evidence from some stakeholders suggesting that copper organic preservatives with a desired service life specification of 30 years are available and indeed widely in use.

The applicants further assessed 3 alternative materials to wooden fencing, including concrete, metal and plastic. For all three types of materials, lifetime costs are considered to be higher than for creosote treated wood fencing, thus making these alternative unsuitable according to the applicant. These (unspecified) higher costs arise due to the apparent higher unit costs of the material in each case, along with higher installation costs, and in the case of concrete and metal higher transportation costs (due to the higher weight). However, it is unclear how the service life (>25 years) of these materials compares with creosoted wood fencing and whether this has been adequately taken into account in the economic feasibility assessment. Prevention of cribbing is again a problem with all three materials, thus necessitating additional costs for equine fencing.

The final set of alternatives in this use class includes wood modification techniques and alternative (naturally durable hardwood) types of wood. Regarding the use of the latter, these involve higher material costs and possibly installation costs depending on the length of service life (which depends on the quality of hardwood). Cribbing is again a problem, whilst there is also uncertainty as to whether there is availability of the wood in sufficient quantities. The use of alternative modification techniques such as the use of heartwood, incising, heat treatment and actylation are all considered to be unsuitable primarily for reasons of supply restriction or higher costs.

To summarise, the applicants' analysis of alternatives for fencing is on the face of it more systematic and comprehensive than for the other use classes. Nevertheless, it suffers from some of the lack of specific detail on technical and economic feasibility for some of the alternatives considered. There is apparently a lack of confidence amongst some users regarding the service life for the wood preservative alternative (even though there is evidence that copper organic preservatives are widely used for agricultural fencing), whilst the non-wood material fencing raises issues around up front costs to users. The alternative modification techniques are potentially feasible as niche products, but are also unlikely to be able to service any significant demand in this sector. Given again the context of safety-critical fencing applications, the UK CA finds that despite misgivings about the quality of supporting evidence, there are likely to be some cases of agricultural fencing applications for which it is possible to justify the conclusion that no alternatives can adequately substitute for creosote treated wooden fencing. In particular, those cases related to equine fencing, where creosote can prevent horses from cribbing, are likely to face some problems regarding appropriate alternatives. For other types of agricultural fencing, the evidence on economic infeasibility (on which the case for support rests) is not unequivocal given the contradictory information regarding service life performance and hence on the associated costs.

Wooden Poles/Stakes/Supports for use primarily in the agricultural sector

The UK agriculture sector relies heavily on the use of creosote treated wood in the following tree stake applications: fruit stakes and supports; vineyard stakes; stakes/posts for hop growing; and hail protection stakes. The stakes are used by agricultural produce growers in order to enable production of large volumes of produce. The critical failure of tree stakes can result in significant damage and production losses. Given that the lifetime of an orchard is typically around 25 years, the stakes are expected to operate for at least as long without failure (since this necessitates costly and impractical replacement, in addition to the associated costly production losses). The key function of creosote in these applications is once again to ensure the preservation of wood stakes over the long service life (>25 years) associated with their use in orchards.

As was the case of fencing, the applicants have undertaken a specially commissioned socioeconomic analysis of this use class, in which they perform a systematic analysis of alternatives. A total of 14 alternatives across the same 3 types of alternatives that were considered for fencing are screened in this case, with 7 alternatives being taken forward for further investigation of their technical and economic feasibility.

For those alternatives which involve alternative wood preservative treatments (copper based), the same reduction in service life as for fencing apparently (given the noted contradictory information from other sources) applies, such that whilst the unit purchase, transport and installation costs are comparable to creosote treated wood, the lifetime costs are higher due to the accelerated replacement of the tree stakes. According to one estimate from industry, the use of products treated with alternative preservatives would increase routine maintenance costs by £8 million, though it is unclear how this was derived and whether this is an annual cost or not.

Alternative materials in the form of concrete, metal and plastic were also assessed in the context of this use class. Both concrete and metal (galvanised steel) stakes are already on the market and are considered to be the most relevant of all of the alternatives. Galvanised steel stakes are extensively used in vineyards since they are suitable for uses which only require short tree stakes. However, they are less suitable for those application requiring long stakes, due to the added thickness of the metal required, which makes the stakes heavier and consequently more costly to purchase, transport and install. Although concrete stakes are also currently used, they are more expensive to purchase and install. Concrete stakes are also not available at heights above 4.8m and hence are not available for hop and hail protection uses. Moreover, whilst in theory concrete stakes have a long service life, user experience indicates that this is not the case in practice, making them even less economically feasible. Plastic stakes are not considered suitable due to their higher unit costs, though the evidence here is based on only a limited consultation exercise.

Wood modification techniques and alternative (naturally durable hardwood) types of wood suffer the same deficiencies in this use class context as was the case in the fencing use class.

Once again, the applicants analysis concludes that there are no technically and economically feasible alternatives in this use class. The UK CA finds that although the analysis is again more systematic than in other use classes, the evidence is not entirely convincing and leaves some uncertainty about the unsuitability of the alternatives examined. Creosote treated wood stakes are apparently the market leader and whilst there are other alternatives currently in use in some areas, it is said that these do not enjoy the same confidence amongst users regarding their service life and premature failure. Costs are considered to be higher for the alternatives, though again the evidence is not always straightforward to interpret and verify. Again, the UK CA accepts that there may be a continued need to use creosote treated wooden stakes in some agricultural uses, at least in the medium term and until such a time that there is more confidence in the service life of the alternatives and their ability to be used across the spectrum of tree stake applications. Therefore the UK CA concludes that for wooden poles/stakes/supports for use primarily in agriculture, there are likely to be no appropriate alternatives to creosote available in some applications (ie those with service life requirements greater than 20 years).

Wood in Marine applications

Wood treated with creosote has been used as a material in marine applications, for example in river embankment, wharfing structures, bridgework and other pilings, as well as other marina installations. The applicants have not submitted any substantive information on alternatives in this use class, other than to state that copper organic preservatives are not effective against certain marine organisms (shipworm and gribble), and that none of the suppliers of copper organic preservatives claim effectiveness for seawater uses. The UK CA has little information on the extent of use of creosote treated wood in practice in this use class. Whilst alternative material (concrete, metal) structures are commonly used in this use class, it is thought that there may nevertheless be some niche circumstances in which creosote treated wood may still be required in the UK context. For example, for reasons related to cultural heritage associated with historic marine structures, there may be a continuing need to allow use of biocidal products containing creosote in this use class. In this respect, , the UK CA considers there may be grounds upon which to suggest that there are no suitable alternatives in some circumstances, though at the time of writing no evidence has been submitted to confirm any such grounds.

Surface treatment of creosote impregnated wood after modifications.

The final use class considered relates to the surface treatment of creosote impregnated wood after modification. Essentially this use relates to the need to re-treat wood in its final form following any modifications, such as cutting, etc, in order to ensure protection is maintained around the area of modification. Preservatives for this purpose will usually be applied by brush to the wood. Given that the preservative applied must be compatible with the original treatment, then for those use classes for which creosote is authorised, it will be necessary to re-treat the modified wood also with creosote. So long as there are no technically and economically feasible alternatives in the use class for which surface treatment of wood is required, then clearly the same justification could also apply for the use of creosote as a surface treatment in that use class. The UK CA thus in principle supports the conclusion that there may be no suitable alternatives for surface treatment of creosoted wood following any modification that takes place to the wood used in a use class for which creosote has been authorised, though this conclusion is not able to be confirmed at the time of writing with reference to any evidence submitted by the applicants.

To conclude, the UK CA accepts that whilst there may in principle be suitable and available alternatives to replace the use of biocidal products containing creosote across some specific circumstances, these cannot be deemed to be technically and economically feasible in general across all the use classes considered in this report. In particular, there appear to be technical and economic impediments in the case of railway sleepers, transmission poles, and possibly some agricultural fencing/stakes applications. In the other cases, the evidence is either more equivocal or has not been made in support of the case. It should be noted that the material presented by the applicant sometimes lacks detailed and objective evidence, but is to some extent supported by subjective user experience. As such it is not easy to fully scrutinise and challenge some of the claims made, resulting in some degree of uncertainty regarding the robustness of the conclusions. However, given the safety-critical and strategic economic importance of many of the applications, as well as the lack of good evidence demonstrating that alternatives are indeed technically and economically feasible (particularly in terms of service life length and capital expenditures required), the deficiencies in the analysis are not severe enough to challenge the general conclusions regarding technical and economic infeasibility of alternatives.

2. How is the development of alternatives to biocidal products containing creosote in those uses authorised or seeking authorisation being promoted?

The UK CA is aware that development programmes are in place to identify preservatives that may be suitable as direct replacements for creosote treated wood, particularly in relation to railway sleepers and pole treatment. Evidence of industry’s commitment to the development of new preservatives can be seen in their response to previous regulatory controls, for example with respect to chromated copper arsenate and the subsequent introduction of copper organic preservatives. According to industry sources, the development programmes are still in their early stages, such that it is difficult to forecast when they might deliver results to the market. A particular issue relates to safety critical uses and the need to ensure confidence in longer term protection (>30 years). Development programmes would appear to be generating promising results but it is still too early to assess the longer term performance of the alternatives. Nevertheless there is evidence that users may be willing to participate in service testing of alternatives with a view to adapting maintenance and operating practices as necessary to underpin confidence in performance, safety and security. In the interim, creosote will continue to be required, but industry acknowledge that further review will be warranted in the medium term.