Hesse Lignal
inspiring you

White paper: sustainable lacquers

Seeing through greenwashing tricks: how the degree of sustainability of lacquers and coatings can be reliably assessed

In this edition

Seeing through greenwashing tricks

Introduction

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The increasingly perceptible consequences of climate change and growing global awareness of social inequalities are bringing the issue of sustainability into ever sharper economic relief. Sectors involved in the processing of coatings have also recognised the significance of a sustainable corporate policy and have identified that responsible treatment of people, nature and the environment is a critical success factor. More and more companies are therefore deciding that they need to provide their customers with products that have been produced in a sustainable manner. Surface protection and refinement play an important part in the production of many goods, so affected companies are now increasingly searching for alternatives to environmentally damaging lacquers and coatings. Yet they are often thwarted by non-transparent product labels or a confusing array of certifications and eco-labels. It is ultimately not always clear which product is really sustainable and which is not.

Hesse Lignal has produced the following white paper to help companies resolve this challenge. It aims to show interested stakeholders from the coating trades how a product's sustainability can be measured and the significance that different labels can have.

In doing so we are firstly able to rely on our extensive know-how in the field of lacquer and stain production and secondly to draw on knowledge from our wealth of experience in the field of sustainability. Sustainable behaviour has after all been firmly anchored in our corporate philosophy since the formation of Hesse Lignal. From the very beginning, as a family business based in Hamm, we focused on the responsible use of resources, the consistent implementation of eco-friendly measures, high standards with regard to occupational health, safety and environmental protection, as well as a wide range of social commitments. We also established a certified environmental and energy management system more than ten years ago. This sustainability strategy that was initiated at an early stage has played a large part in the fact that Hesse Lignal has already successfully held its own in the market for more than 110 years.

Now we would like to share our wealth of experience with you and give you an overview of the most important information on the topic of sustainability. This should ensure that companies wanting to pursue sustainable policies can attain their objective more quickly.

Properly reading and assessing product descriptions

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2.1.
2.1 How can the term sustainability be defined?

The identification of sustainable products requires closer examination of the term sustainability. The word is used in various contexts in everyday conversation, yet a clear definition is often difficult to provide. The 17 United Nations (UN) sustainable development goals (SDGs), which came into force in 2016, provide a point of reference (Para. 1). These include peace, climate action, ending poverty, gender equality, affordable and clean energy as well as others.

Para. 1: *17 UN sustainable development goals*

These goals indicate that sustainability plays a role in many areas of life. Companies therefore have to decide whether their sustainability strategies should be fully comprehensive or whether they only want to cover certain areas.

2.2.
How can companies become more sustainable?

Companies producing lacquers have several possibilities to act more sustainably. **These include the following options as examples:**

Using plant-based raw materials

The use of plant-based raw materials in the production of lacquers and coatings has the advantage that the consumption of fossil raw materials is reduced or completely avoided. Although care should be taken to ensure that the land needed to grow the plant materials does not compete with land needed for food production. The creation of new planting areas by clearing natural areas should also be considered as negative. It should also be borne in mind that the tracking of supply chains is proving to be extremely difficult in the face of globalization. Albeit appropriate certificates substantiating sustainable cultivation can help to establish the origin of raw materials.

Improving your CO_2 balance sheet via sustainability offsetting

It is for instance possible to improve your CO_2 balance sheet via the use of green electricity within production processes or in other corporate activities. Planting trees to offset CO_2 emissions is also becoming increasingly popular.

Using technological transformation to protect the environment

Traditional manufacturing processes in many sectors can already be replaced by more sustainable technologies. Companies can, for example, switch from solvent-based lacquers to water-based lacquers that are less harmful to the environment.

Material reduction through application methods and recycling

Reuse, recycling or recovery processes can result in conservation of resources. One interesting approach among others is the use of recycled products in the extraction of carbon compounds for raw material production. This involves carbon compounds from waste from the food industry or agriculture being converted into chemical precursors. Use of these renewable raw materials reduces the consumption of fossil and carbon fuels. This is reported by individual raw material using the mass balance approach, since carbons from various sources are used in the production of the precursors for lacquer binders. This solution is familiar from the electricity industry, where the green electricity that comes from the socket may well physically come from a coal-fired power plant, but is offset elsewhere by electricity from wind energy, for example. The choice of application technique also has a major influence on material efficiency. Switching from spray application to roller application can result in a material reduction of 90%. Avoiding the use of materials and waste is certainly one of the most important approaches in sustainable management.

Using vegan materials

Those wishing to act sustainably in terms of animal wellbeing should only use vegan materials in their production. Lacquers and coatings can ultimately also contain animal substances. This applies for instance to shellac from lac bugs.

Production of high-quality furniture, doors and parquet with a long service life.

Many companies can also have an impact when they resist the ongoing fast-furniture trend. Valuable resources such as wood are consumed in large quantities for so-called cheap furniture that is only used for a short time before its owners have to dispose of and replace it. High-quality pieces of furniture that are designed for long-term use may in contrast remain in use for several generations without having to be replaced with new items. Special coatings can also extend the lifetime of these pieces of furniture.

2.3.
How can sustainability be measured?

The multifaceted nature of sustainability also poses problems for companies in relation to the selection of coating materials. A product's degree of sustainability can after all be interpreted in different ways. Which means that different results can be obtained depending on the sustainability goals that have been considered. It may for instance be the case when comparing two products that you have to decide whether a worse carbon footprint or the toxicity is more relevant to the classification.

This difficulty can be illustrated by a specific example: If you are comparing glass bottles with plastic bottles, it is unclear which of these is more sustainable. The result ultimately depends on your perspective: while the glass bottle can be filled more frequently, the PET returnable bottle enables more sustainable transport due to its lower weight.

The environmental cost indicator (ECI) was developed in the Netherlands to solve this problem. It can be used to calculate the environmental costs that a product would hypothetically generate. This involves the emission values from the various parameters in a life cycle assessment being weighted and shown with euro amounts. The end result is a total amount that can be used to compare and assess products based on this value. The EU is working on similar procedures to simplify the comparability of products.
Certificates or seals of approval can also be useful. In many cases, these provide information on a product's degree of sustainability and therefore offer guidance.

2.4.
Which certificates and seals of approval are available for determining a product's degree of sustainability?

A variety of certificates and seals of quality are available in relation to the labelling of sustainable products and companies. Yet these labels often only cover partial aspects of the sustainability topics mentioned above. Many seals for instance assess the health of the home and take into account emissions or environmental hazards caused by the finished product. This applies above all to the Blue Angel (Blauer Engel) and the EMICODE. These seals do not however take social aspects, sustainability issues and the carbon footprint into account.
There are conversely certification systems in the construction sector that include social criteria within the assessment in addition to environmental issues. These include Green Building certification, BREEAM, LEED and DGNB. In these cases, the entire building is classified into a sustainability category, taking all factors into account.
Such a labelling system can thus provide indications as to whether a product is sustainable. There is however a problem that arises when we are confronted with multiple certificates and seals when selecting a product: it is impossible to compare products with different seals, since the criteria used for assessment are not uniform. The evaluation procedures are simply too different.

2.5. What is the significance of the environmental product declaration - EPD?

So-called EPDs can provide meaningful information on the degree of sustainability. An environmental product declaration examines the environmental impacts that emanate from a product. They consider a complete product life cycle, starting with the procurement of raw materials for production and ending with disposal.

Life cycle assessment according to ISO 14044

One component in an EPD is the life cycle assessment (LCA) conducted according to ISO 14044. This closely inspects raw material extraction, production, transport to the point of use, useful life, disposal stage and reuse, recycling and recovery potential. The analysis includes, among other things, the environmental impact on climate change or the ozone layer, the use of resources, the disposal options and many other aspects. Depending on the product, however, not all stages or parameters are taken into account.
An LCA therefore provides the opportunity to compare the environmental impact in relation to different products. Although the analysis does not cover all the sustainability goals: social aspects are not taken into account, for example, and therefore cannot be compared. Each of the above criteria is moreover considered individually; their interaction does not play a part. There is also the issue that reliable data cannot be collected for every product.
The LCA does however contain a data section that is used for an environmental product declaration.

Environmental product declaration (EPD)

An environmental product declaration (EPD) according to ISO 14025 does not merely contain the LCA data, but also describes the respective product in more detail, explains the calculation principles and lists test certificates as well as literature references.
The preparation of an EPD is, like the preparation of an LCA, extremely complex and should be performed by renowned institutes. The more complex the supply chains and manufacturing processes, the more difficult the evaluation. EPDs are therefore frequently produced by industry associations within the respective sector. These can then be incorporated as sector-specific expertise. This does however mean that the analysis is not always exclusively related to the individual product and manufacturer, but also contains general industry data. An environmental product declaration does nevertheless provide a good starting point for the objective assessment of sustainability.

2.6.
How significant are the details regarding renewable raw materials in lacquers?

The proportion of renewable raw materials is generally regarded as an important indicator of a product's sustainability. These are also known as bio-renewable carbon (BRC) in specialist circles. Compared to fossil substances, these materials are significantly more environmentally friendly and conserve resources. Yet there is often disregard for the fact that the substances are not always presented transparently in manufacturers' product descriptions. One and the same product can after all be viewed in different ways (see Fig. 2 on page 11).

This can be illustrated by considering a sample product that declares a 20 per cent content of renewable raw materials. It also contains other substances, such as petroleum-based binders, inorganic filling materials, volatile solvents and water at 20 per cent each.

Although this ingredient overview can also be presented in other ways:

- If we only consider the organic substances in our assessment, our example product would suddenly have a BRC content of 50 per cent.

- If we assume the renewable proportion in a solid state - i.e. the dried lacquer film - the BRC content would be 33 per cent.

- It is also possible to use different wording to identify other product substances as natural, and thus also sustainable. So we could include in the assessment all the components and materials that are available in nature in almost unlimited quantities (such as water). Then we could claim a 60 per cent content of natural raw materials.

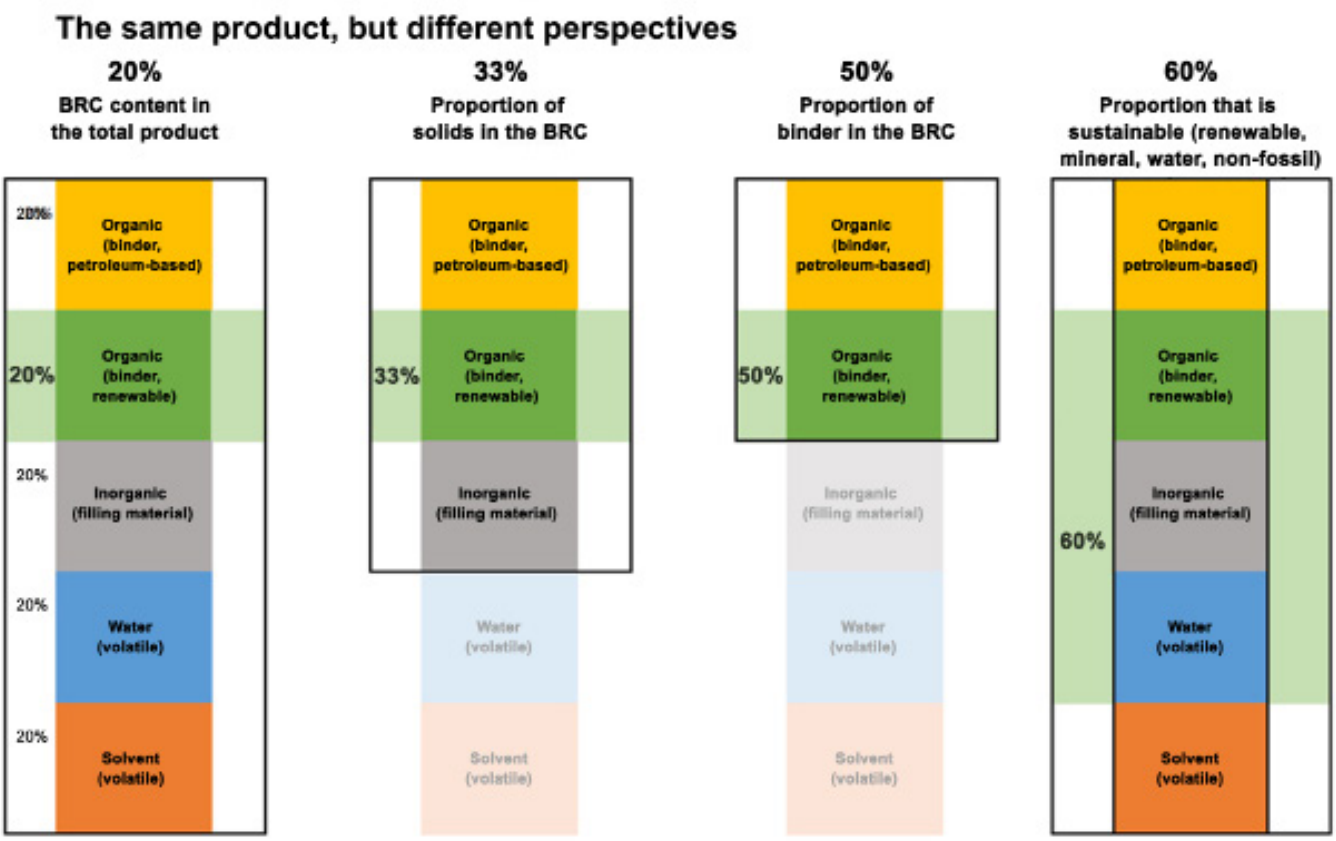


Fig. 2: Different approaches regarding the BRC content in relation to a product.

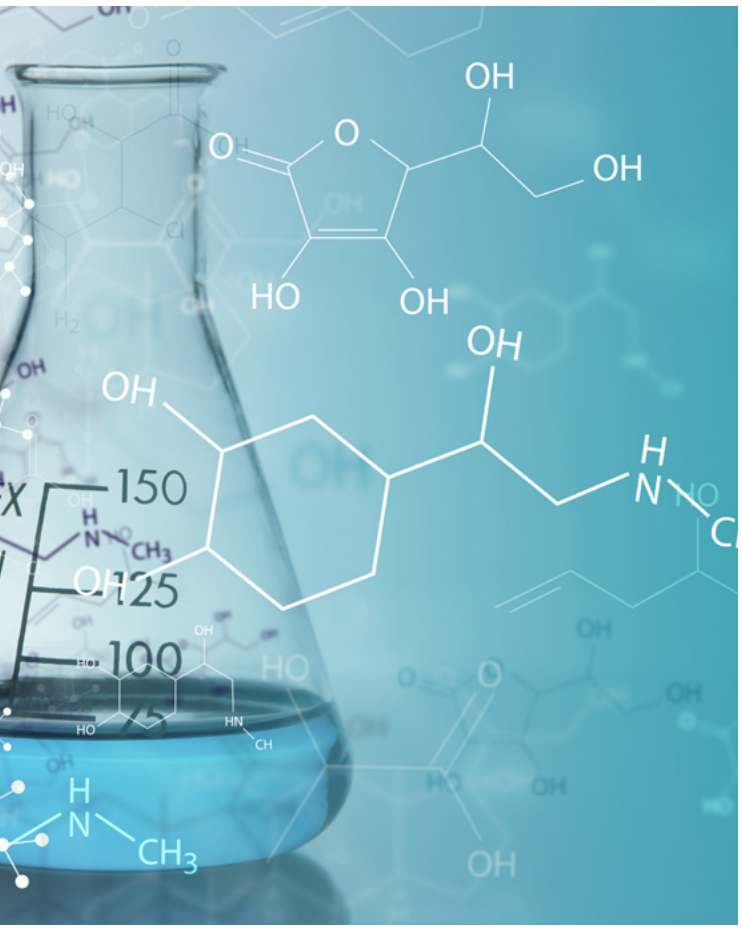
We therefore need to look carefully at the declaration of substances. Customers should ask themselves which of these values is being declared in the product description. BRC contents can ultimately be interpreted in different ways depending on product type and formulation. This can create a distorted image, especially in product advertising. It makes it more difficult to make a meaningful product comparison.

But which value from our example is actually correct? 20, 33, 50 or 60 per cent? All of these values are ultimately correct. There are unfortunately no binding specifications on how the proportion of renewable raw materials must be declared.

Hesse Lignal has recently started using its technical information to create transparency by showing the content of renewable raw materials in the entire product. This enables us to communicate the actual extent of the BRC content in a transparent and uniform manner. It also facilitates a better comparison among different Hesse Lignal products.

We are also continuously endeavoring to find new ways to produce our products even more sustainably. Hesse Lignal has conducted numerous studies and investigations into aspects of sustainability in order to achieve this objective.

Scientific findings on determining a product's degree of sustainability



3.1. Findings from selected Hesse Lignal studies

Hesse Lignal has already been conducting research over many years to further increase the degree of sustainability in its portfolio. Scientific studies are intended to show which factors play a role in determining sustainability and which measures are effective in this context.

A comparison of lacquer systems

Between 2018 and 2020, the Hesse Lignal team investigated the extent to which different lacquer systems are sustainable. This involved establishing an environmental cost indicator (ECI) that included all the factors which cause environmental pollution. It revealed that radiation-hardening systems have clear sustainability advantages over traditional systems. The investigation was conducted jointly with the renowned Ecochain institute.

The drying process as a key factor

The processing of lacquers in industrial equipment was analysed in the context of a further investigation: the "Life Cycle Assessment Study on Wood Coatings" published in January 2021, which Hesse Lignal conducted in cooperation with polymer material supplier Covestro, investigated the influences of different polyurethane wood coating systems on the environment. Its objective was to identify the steps within the product life cycle with the greatest environmental impact.

The study leads came to the finding that drying processes have the most significant impact on the degree of sustainability: The energy involved in evaporating the solvents and water are decisive in this. Fast-drying systems like HYDRO-UV lacquers achieve a significantly lower carbon footprint than 1C and 2C Hydro lacquers or PU lacquers. UV lacquers for roller coating with a solid content of 100 per cent performed particularly well. These products firstly do not involve the drying of solvents and water, and secondly the high efficiency of UV lacquers is much more sustainable due to roller application rather than spray coating. Among the traditional procedures, however, the water-based 2C system in combination with a fast-drying hardener delivers the lowest carbon footprint. By contrast, solvent-based systems that have a very high photochemical ozone creation potential (POCP) were found to be less sustainable due to their high emissions of volatile organic compounds.

The study also revealed that the use of green electricity has a major impact on the life cycle assessment. Renewable energies reduce the impact of drying in relation to the carbon footprint to a value of almost 0.

Raw material selection proved to be another significant aspect. The use of renewable raw materials can significantly reduce the negative impact on the environment. Processing methods, such as spraying or sanding, conversely had less impact on sustainability.

A focus on renewable raw materials

Hesse Lignal does not however merely concentrate on its established products. Our company is continuously exploring new approaches to enable development of ever more sustainable solutions.

These have included Hesse Lignal collaborating with Pilot Pflanzenöltechnologie Magdeburg (PPM) e. V. in a project funded by the Federal Ministry for Economic Affairs and Energy (BMWi) to develop new radiation-hardening lacquers based on renewable raw materials. This also included investigation of the advantages and disadvantages of certain materials. Particularly good results were achieved using oil made from Iberian dragon's head (Lallemantia iberica). "Oil from this plant creates an excellent binder. It's more reactive than linseed oil and cross-links better, which enables us to use it to produce very resistant lacquers", explains project manager Dr Sven A. Thomsen, Head of Research & Development at Hesse Lignal. "Both its chemical resistances and fast processing in traditional coating systems proved to be very impressive."

Although it does have one drawback: the oil investigated in the project is not yet available in sufficient quantities. The plant from which the oil is extracted disappeared almost completely from Central Europe about 100 years ago, so the quantities needed for industrial use are not currently available. The plant grows in sunny, dry areas, now especially in the Caucasus and the Middle East. "Only when dragon's head oil is available in sufficient quantities can we switch our formulations to this sustainable source of raw material", Thomsen states.

Groundbreaking study findings

The study findings reveal that, in assessing sustainability, there are many aspects that play a part and which need to be critically examined. The more pollutant-rich solvent-based lacquer systems proved to be fundamentally less sustainable in comparison with water-based products. But the type of energy used in production and the drying process also had a major impact on the respective product's carbon footprint. Renewable raw materials equally have a positive impact on the life cycle assessment in comparison with fossil materials. Although these raw materials must also be available in large quantities near the production site. Long transport routes would increase the carbon footprint again and diminish the advantages.

3.2. Portfolio expansion, transparency and green energy: these are the lessons drawn by Hesse Lignal from the study findings

Hesse Lignal has used these study findings to make its product range more sustainable. This has included incorporating within the portfolio new solutions that have a more positive impact on the life cycle assessment than solvent-based versions. This also involves lacquers that contain a higher proportion of renewable raw materials, oils that have a natural base, water-dilutable products, solutions with a high solids content, particularly durable products – which are therefore long-lasting – and low-emission finishing procedures. We also provide solutions for efficient coating processes, such as UV Roller coatings. Moreover, we rely entirely on green electricity for our production of these products.

Our team also attaches particular importance to transparency. That is why our products have been provided with clear, meaningful and comparable labels. Our coatings enable door, furniture and parquet manufacturers to certify their end products.

Outlook

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It can be assumed that the topic of sustainability will continue to gain importance in many areas of life. The drivers behind this are the various political currents, the increasingly noticeable impacts of climate change, social inequalities in many parts of the world and any resulting conflicts. Projects like the Green Deal presented by the EU or the "Fridays for Future" movement also raise awareness of the importance of sustainability.

This development in society as a whole also influences the sectors that process coatings. The demand for sustainable products is ultimately growing. In the future, however, it will not just be a matter of adapting production and substances to the new requirements. The duration of use of the lacquers and coatings will also play a role: the trend towards ever shorter use cycles must be discontinued to ensure a sustainable world. The longer that items can be used, the less waste and CO_2 is produced. A longer service life can be achieved with products that create durable surfaces. Surfaces that can be easily repaired will attract additional attention.

At the same time, people are becoming increasingly aware of sustainability issues such as the eradication of hunger, poverty, child labour and social injustice. Yet these aspects are often underrepresented in the analysis of individual coating products. The sector should therefore pay more attention to these issues.

The factor of transparency will moreover become increasingly significant. General marketing statements on sustainability should always be viewed critically and greenwashing should be avoided.

Hesse Lignal will continue to progress many projects relating to sustainability and to lead by example by further optimising its sustainability strategy: plans include the development of new, more sustainable lacquers and oils as well as further improvements in relation to resource conservation and waste avoidance. This is how we ultimately want to make our contribution to a more sustainable world.

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Collection of links on the topic

- **sdgs.un.org/goals**
- Environmental Cost Indicator (ECI) **- Overview - Ecochain**
- Biomass balance approach **(basf.com)**
- Life cycle assessment_DIN_EN_ISO_14040.pdf **(ressource-deutschland.de)**
- Life cycle assessment (LCA) – Definition | Institut für Umweltinformatik **(ifu.com)**
- EPD Programme | IBU - Institut Bauen und Umwelt e.V. **(ibu-epd.com)**
- The EPD | EPD International **(environdec.com)**
- Improved CO2 balance due to fast drying **(covestro.com)**
- Scanned document **(hesse-lignal.de)**
- Hesse - Better than linseed oil **(hesse-lignal.de)**
- CoE_VdL_2020.pdf **(wirsindfarbe.de)**
- Verband der deutschen Lack- und Druckfarbenindustrie e.V. | Goals for sustainable development **(wirsindfarbe.de)**

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Any other questions?

If you would like to learn more about **sustainable products or the Hesse Lignal sustainability strategy,** we would be happy to provide you with the requested information. Our **product manager Ralf Untiedt** will gladly answer any questions you may have on the topic of **sustainability relating to coatings.**

Simply contact him by phone on **+49 2381 963 828** or send an email to **r.untiedt@hesse-lignal.de.**