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an initiative of the Circular Construction working group of the **Big Buyers for Climate & Environment**

NOVEMBER 2022

# Public Procurement within circular construction

## *Lessons learnt from the Big Buyers for Climate & Environment working group on Circular Construction*

## Acknowledgements

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## About the working group on Circular Construction

The working group on Circular Construction was one of four working groups established under the European Commission's Big Buyers for Climate and Environment initiative, coordinated jointly by ICLEI and Eurocities.

The initiative aimed to promote innovation by linking public buyers with market actors and identifying where joint actions, dialogue and international cooperation among public buyers across Europe can successfully trigger a positive impact on the market.

The working group (WG) on Circular Construction included three categories of members: Buyers (Brussels Mobility, Haarlem, Rotterdam, Vienna, Zurich), Followers (Andalusian Housing Agency, Barcelona, Bordeaux Metropole, Bpost, Danish Building & Properties Agency, Lisbon, Madrid, Nantes, Neukölln Berlin, Porto, Province of Zeeland, Sete, SPW - Wallonia, Department of Sustainable Development, Toulouse Metropole, Valladolid) and Multipliers (Conference of the European Directors of Roads CEDR, Motiva Oy/KEINO, OVAM/Circular Flanders and Rijkswaterstaat).

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## 1. Circular construction - introduction

Circularity in construction encompasses the whole value chain, from dismantling existing built components to designing and constructing anew. The objective to increase the use of circular materials is linked with, e.g. the targets set out by the European Commission in the ambitious European Green Deal, which emphasises the need to significantly reduce greenhouse gas emissions as part of the EU's intensified efforts to address climate change. The New Circular Economy Action Plan published in 2020 also underlined that the EU needs to accelerate the transition towards a regenerative growth model that aims to reduce resource consumption.[2]

Therefore, the working group set out to develop an understanding of the necessary pre-conditions for successful circular infrastructure procurement. These could include identifying barriers from the contractor side, legal conditions, national context hindering international cooperation, and successful operating conditions. Those issues would be tackled by exchanging market intelligence and procurement strategies to bring all working group participants up to speed with state-of-the-art.

Through market engagement sessions, the working group explored innovative solutions, including materials and methods, to improve circularity and lower the carbon impact of road and infrastructure construction. This included sharing experiences and comparing the implementation of pilot projects based on best practice examples from several European countries.

The group focused on adding value by profiling the potential benefits of a circular economy in the construction sector and indicating knowledge and capacity gaps varying across the Member States. The members cooperated to build a knowledge base of circular infrastructure experiences in the EU.

## 2. Circular asphalt

**Choosing the focus**

Since the topic of circular construction is broad, the WG members decided to focus on circular asphalt. Participants representing different Member States compared local practices and met market actors. During the cooperation, it became apparent that the varying local conditions in terms of access to the raw material, the regulatory context and market maturity levels make circular asphalt a challenging topic.

The undertaken activities allowed the working group to improve their understanding of necessary pre-conditions for successfully procuring circular asphalt. The working group's work allowed members to compare procurement strategies and discuss the difficulty of ensuring sustainability through promoting circularity, which is not necessarily synonymous as it was established.

Attention was brought to new technologies, such as indirect heating, which the members saw in action during a study visit to an asphalt production facility in Rotterdam. The group's work allowed the members to understand the scope of the remaining investigation that may be carried out on the national and local levels.

To address the challenges resulting from the nature of asphalt production, the group decided to focus on discussing procurement strategies likely to be applicable in many Member States. Therefore, the group discussed the benefits and practicalities of using performance-based selection criteria that allow bidders more flexibility to offer innovative solutions. Circular asphalt proved to be a challenging topic for joint cross-border action; therefore, no joint tenders were launched.

**Asphalt: the basics**

Asphalt consists of aggregate and binding agents. It is made of large aggregates, sand, fines and bitumen (a by-product of the oil industry), and its composition determines the mixture type [3]. The most significant environmental impact of road surfacing is in the extraction of raw materials and production of asphalt.[4] Bitumen is most commonly used as a binder, although nowadays, a series of bio-based binders are also under development, intending to minimise environmental impact.[5]

Asphalt is mixed in an asphalt mixing plant where the ingredients are heated to 165°C and combined into high-shear mixes for 10 to 30 seconds before getting loaded in trucks and transported to the construction sites.[6]

Therefore, its production depends on the materials available near the plant as importing them increases production costs. Therefore, producers may need to adapt the production process to the local conditions. Regarding using reclaimed material in the production process, this is also dependent on local regulations, e.g., on the access to asphalt reclaimed from road reconstruction and whether it is categorised as waste.

These variables, such as the location of asphalt production plants and the distances from the construction areas, affect the carbon footprint and the costs of asphalt production. As a result, they also affect the interest in pursuing innovative methods of asphalt production, including alternative materials, provided the local or national regulations allow it. For example, each of the nine regions in Austria has a different

regulation and producers need to adapt their processes to meet the diverse requirements.

**Circular asphalt**

Asphalt can be easily repaired and reclaimed for reuse in constructing and maintaining new roads. This makes asphalt one of the few fully reusable and recyclable construction materials. [7]

Since traditional bitumen is a by-product of the oil industry, it has a large carbon footprint.  binder materials, such as vegetable oils, lignin and algae, can be used to tackle this issue. Therefore, discussing circularity in asphalt requires understanding the differences between reclaiming, reusing and recycling asphalt[8].

- Reclaimed asphalt (RA): the processed site-won asphalt is suitable and ready to be used as a constituent material for asphalt after being tested, assessed and classified according to this standard.

- Asphalt reuse is the operation by which reclaimed asphalt (RA) is reincorporated into the pavement, with the aggregates and the aged bituminous binder performing the same function as in their original application.

- Asphalt recycling is the operation by which reclaimed asphalt (RA) is used as the foundation, fill or road material, with the recovered aggregate and bitumen performing a lesser (or alternative engineering) function than in the original application.

- Site-won asphalt: the material to be recycled, in the form of milled asphalt road layers or as slabs ripped up from asphalt pavements, or being asphalt from reject, surplus or failing production.

The term ‘primary materials’ refers to natural aggregates and bituminous binders in their original state (i.e. before first use). Asphalt aggregate, on the other hand, is a recycled construction material and must be considered a secondary resource. [9]

Reusing asphalt has great ecological potential, especially as resources are limited. There are other benefits too, e.g. since it is increasingly difficult to find new disposal sites. The legislation regulating the production and use of circular asphalt has been described by the European Asphalt Pavement Association (EAPA) in *Recommendations for Road Authorities to achieve circular economy goals through the reuse and recycling of asphalt*.

**Recycling asphalt**

Asphalt aggregates can be reused to manufacture new mixtures by adding hot or cold asphalt aggregates during manufacturing.[10] Old asphalt is milled from the road and transported to the asphalt production site, where it is heated. As a result, the bitumen becomes soft again, and the recycled material is mixed with virgin material to achieve a mixture that meets the required parameters. There are specific challenges to the process, such as, e.g. during service life, bitumen becomes harder and reusing it needs mixing it with a softer binder or a rejuvenator[11].

For asphalt mixes to be used as a constituent in the manufacture of new bituminous mixes, these must first go through several processing steps to obtain a secondary resource that can be reused. These have been described in detail, for example, in *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices* (see endnote for reference).

**Warm mixes**

The use of warm-mix asphalt allows for energy savings and a reduction of $CO_2$ emissions. A warm mix is produced and placed below the usual temperatures for hot mixes (usually requiring reducing the temperatures by at least 30°C). This is possible thanks to specific manufacturing methods and the use of additives. [12] A warm manufacturing technology also makes it possible to compact the asphalt at lower temperatures. In many cases, this also makes it possible to reopen the road sooner. Lower manufacturing and laying temperatures of the asphalt mixes reduce the ageing of the bitumen during these stages.[13] This way, it is possible to reduce the use of raw materials and tackle the problems resulting from the need for disposal and recycling. During the market dialogues, the working group observed that indirect drum heating is likely to replace the currently used technologies as it is more energy-efficient and reduces ageing and exhaust gases while heating reclaimed asphalt.

The several types of asphalt mixing plants have been described in detail in *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices,* prepared as part of a project sponsored by the Swiss cantons of Aargau, Basel, Bern, Friborg, Geneva, Lucerne, Ticino, Vaud, Valais, Zug and Zurich, and the bridges and roads of the city of Zurich (TAZ). As three-quarters of waste in Switzerland comes from the construction sector, the project aimed to trigger increasing recycling rates, emphasising that Swiss producers need to identify innovative solutions due to limited bitumen and its unstable prices. The project included taking stock of the facilities that can produce asphalt with the highest percentage of reclaimed material (60-70%), while tests are ongoing for producing asphalt with 80-90% of reclaimed material. The comprehensive Guide collected good practices and proposed concrete

solutions that could enable increasing the amount of recycled asphalt without compromising the quality. Studies are also underway throughout Switzerland to analyse the recycling rate of asphalt aggregates and to identify the various existing recycling, disposal and treatment routes.


[14]

## 3. Opportunities and risks: overview and examples

Circular asphalt has a good potential to contribute to reducing road construction's carbon footprint and, therefore, allowing cities to reach their $CO_2$ emissions reduction targets. However, there are also limitations. Both have been described in detail, for example, in the *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices* (in the chapter "Factors hindering the development of recycled asphalt and warm asphalt") and in the *Recommendations for Road Authorities to achieve circular economy goals through the reuse and recycling of asphalt* by European Asphalt Pavement Association (EAPA).

**Circularity or sustainability?**

The working group members emphasised their objective to ensure sustainability and improve the understanding of the degree to which cities can accept risk factors affecting roads' longevity. The latter could result in more frequent maintenance

leading to increased financial and environmental costs, potentially impacting the cities' overall sustainability targets.

The closing of material cycles by increasing the content of asphalt mixes in manufacturing new bituminous mixes accounts for limiting the shortage of resources (raw materials). It also reduces the problems associated with disposal and recycling (deconstruction materials).[15]

The sustainability of asphalt production results from more than just the use of reclaimed or recycled material. It requires, among others, reducing transport distances, changing the type of fuel in the burners of the asphalt mixing plants, introducing new technologies, lowering temperatures of the asphalt mixing and layering etc.

**Life cycle assessment**

The discussion about asphalt's sustainability and circularity must include consideration for optimising the life cycle issues. The working group members underlined that extending the life cycle should be a priority. For example, high percentages of reclaimed asphalt may potentially lead to quality problems. However, the focus on life cycle assessment is not only linked to the quality but also to how cities approach urban planning. Improving urban planning aims at reducing the number of road reconstructions where it would not result from the need to exchange the layers but from other works, such as piping replacement. Whenever possible, this should be carried out before road construction.

The members of the working group discussed that a holistic look at environmental impact and performance is the best way to choose the optimal solutions and avoid trade-offs. For example, requiring minimum recycled content could have unintended negative environmental consequences if the secondary materials are not available nearby and have to be imported or if it would shorten the durability or lifespan of the construction.

Moreover, asphalt should not be treated as waste: i.e. every tonne of asphalt should remain a tonne of asphalt. If this is impossible, it should be used as an energy source. Only if this is impossible should it be disposed of, per the waste hierarchy established by Directive 2008/98/EC on waste.


[16]

**Contribution to $CO_2$ emission reduction targets**

Lifetime prolongation and recycling are essential in reducing the carbon footprint of road construction. The use of raw materials and the bitumen type significantly contribute to road construction's environmental impact. For example, in the next ten years, the Netherlands plans to move away from the kind of asphalt currently used as part of the country's actions to achieve a 49% reduction of $CO_2$ emissions by 2030. To reach this goal, the Netherlands has developed a national circular economy programme to reduce primary resource use by 50% by 2030. [17]

Other incentives for the transition are the country's limited room for storing waste and the need to import resources required to construct asphalt pavements. In reducing emissions from the road-pavement chain, the biggest challenge lies in reducing emissions during the extraction and production of raw materials and asphalt. [18] Therefore, it was recognised that the use of reclaimed asphalt in the top layer must significantly increase. In October 2020, the Netherlands published a *Roadmap towards circular roads*. It assumes that in the long-term, i.e., after 2030, asphalt will be increasingly based on bio-based binding agents instead of fossil material. This requires the industry to apply innovative solutions, and the Buyers need to develop an effective system to verify the performance and quality of the proposed solutions.

**Beware of conflicting goals**

Recycling can be a resource-demanding process. This may result in trade-offs on other environmental aspects. Buyers should avoid problem shifts and consider the correlation between increasing the share of recycled material, the roads' durability and other environmental aspects. Hence, Buyers should carefully investigate the impact of the percentage of recycled materials on asphalt's durability by performing

thorough quality checks. They should also prioritise quality assessment, paying attention to the quality of construction works that affect the roads' durability.

**Resource scarcity and rising energy costs**

The market dialogue showcased the need to analyse further how Public Buyers can address the challenges they face. For example, those resulting from the current and future energy crises and resource shortages. They want to reduce the risks of cancellation of ongoing and planned projects or unsatisfactory quality of the offered solutions that could result from producers' problems obtaining materials. The producers' current difficulties, if they cause them loss of liquidity, may lead to reduced competition (fewer bidders), which can impact the price and the quality offered to Public Buyers. Consequently, this may delay the progress towards cities' climate goals (since climate targets go hand in hand with circularity).

The Conference of the European Directors of Roads (CEDR) has been looking at what particular assistance it can provide while producers face a supply chain crisis. The Buyers also face difficulty in assessing the actual percentage of reclaimed asphalt in asphalt delivered to the construction site. Proposed solutions include stricter controls of the delivery notes and specifying the amount of reclaimed asphalt in the contracts.

**Health hazards**

Until the 1980s, tar was used as a binder. However, due to its harmfulness, it was replaced by bitumen. Roads built with products containing tar do not pose any danger to the environment and health as long as they are in good condition. The most significant risk occurs during exposure to concentrated polycyclic aromatic hydrocarbons (PAHs) emissions. The PAH content of asphalt aggregates is an essential parameter in determining their treatment route. This has been described in detail in the *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices*.[19]

## 4. Members' experience with procuring circular asphalt

Since the group began working, Rotterdam and Lisbon progressed towards pilot tenders using performance-based selection criteria to allow bidders more flexibility. Vienna is going to work on a new strategy for procurement rules and to reduce asphalt as part of lowering temperatures in the city (e.g. replacing asphalt with cobbled stones, planting more trees and increasing the amount of recycled asphalt to 40%). **Bordeaux metropole**, one of the members of the working group, has

declared that their goal is to recycle 70% of construction waste in all projects. **Haarlem,** for example, uses the environmental cost indicator to compare various scenarios and the 'CO2 prestatieladder' – a certification scheme for builders to lower their CO2 emissions. Examples from **Toulouse**, which also has a circular economy strategy, include plans to launch a 'Reuse platform' at the scale of the metropolitan area (supported by the French Environment Agency).

**Lisbon**

Lisbon includes in the tenders' technical requirements the use of recycled aggregates in pavement base layers and backfill of trenches. For example, during the rehabilitation of the Humberto Delgado Square public space, the construction and demolition waste (CDW) produced on site was, where possible, crushed on site and used to fill in the trenches of the new sewage collector and used for paving. This was successful thanks to the location, the scope of the works and the contractor's commitment. In the future, Lisbon plans that whenever possible, the CDW would come from the construction site itself and, in addition, foresee the use of recycled asphalt.

Innovation procurement has been a complex process for public authorities in Portugal due to a relatively complicated and, as a result, lengthy public procurement procedures and still underdeveloped market. Nevertheless, committed to improving the road infrastructure, the Municipality of Lisbon developed and implemented the 'Paving Lisbon' programme. Lisbon is preparing a pilot project to replace cement in selected streets. The city has established a partnership with an NGO that will accompany Lisbon's construction project to support the management of CDW. The city has also been working on award criteria, which will reward the bidders who propose the most sustainable solutions for demolition and construction waste, e.g. materials with the highest share of recycled materials. Lisbon has also conducted a local market dialogue in preparation for the pilot project. It has confirmed that the market can produce asphalt from recycled or reclaimed material, and it has observed that the interest of local producers has significantly increased due to the energy crisis.

**Rotterdam**

In 2022, Rotterdam carried out a tender for a 2-year framework contract (with an optional extension of 2 years) for asphalt maintenance. The award criteria included, e.g. the use of zero-emission mobile machines and the early contractor involvement procurement approach (ECI), leading to material savings and the use of low-impact mixtures. The contract's technical specifications included maximum environmental performance indicators (EPI) per ton of asphalt and minimum emission requirements for transport and mobile machines. Up to 50% of the contracted

volume within the framework agreement was to be procured based on a best-value-for-money approach and mini-competitions between selected contractors.

When supporting innovative solutions, Rotterdam lets the bidders propose designs. The City uses performance-based indicators (cost-value ratio) and Product Category Rules (PCR). This approach allows the contractors a certain level of flexibility in choosing the solutions to incentivise further development of innovative construction technologies. The framework contract will have a mixed approach. In the more prescriptive part, the City sets a threshold on the total environmental cost indicator. The limit is selected based on 80% of a national Life cycle assessment (LCA) average. Bidders have to calculate and share the LCA of the whole project for the asphalt they choose to use.

Some of the challenges Rotterdam has identified include capacity-building efforts needed to adopt the early contractor involvement procurement approach (both from the side of the purchasing body and the bidders). Applying ECI on the scale of an entire road construction project will need extra effort during contract management. Contractors need to confirm that the innovative structures are durable and comply with the quality standards required by the city.

**Vienna**

Vienna has also taken measures towards increasing sustainability and circularity within infrastructure construction. In 2020, the city used temperature-reduced mastic asphalts as an additional award criterion for the first time. As a result, only temperature-lowered mastic asphalts are currently used in Vienna, reducing the temperature by around 20-30 degrees during the production process, representing significant savings. Through relevant award criteria, Vienna also promotes shortening transport distances to reduce the carbon footprint of its construction projects, i.e. avoiding unnecessary truck journeys and $CO_2$ emissions in the inner city. For example, the bidders could specify the transport distance between the concrete mixing plant and the installation site, for which they could be awarded additional points.

Vienna requires a minimum of 20% of reclaimed material in the asphalt mix in all construction contracts. This approach has allowed the city to motivate many asphalt mixing plants to modernise and offer higher percentages of the reclaimed mix. To not restrict the competition when the market has not yet adapted, the city will not increase the required rate for the time being. In the future, however, a higher mass percentage of reclaimed asphalt will be an ‘environmentally relevant’ award criterion. Bidders could offer up to 40% of reclaimed asphalt to gain a competitive advantage.

**Zurich**

Zurich plans to include the required minimal and maximal percentages of recycled asphalt in every project's 'general provisions'. It intends to meet the allocation of reclaimed asphalt according to the standards published in the 2021 *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices*.

In Switzerland, recycled and warm mixes have already been used and implemented in road construction projects. However, warm manufacturing technology is less known than recycling asphalt aggregates. There are also projects where warm manufacturing and recycling technologies have been combined. Currently, references relating to recycled and warm asphalt are available at all levels (municipal, cantonal and national) and for all pavement layers (from the base layer to the surface layer). It is still difficult to find references regarding warm manufacturing technology as it is still little known in Switzerland and rarely used. Most examples available in Switzerland were carried out within the framework of the PLANET research project and in the canton of Vaud.[20]

[21] 

## 5. How to support innovation within circular asphalt?

Not all EU countries are at the same stage regarding asphalt reuse and recycling. EAPA recommends Public Buyers to stimulate the use of sustainable solutions by asking for higher reclaimed asphalt content in the asphalt material. At the same time, the industry's position is that Buyers should not push for a very high share of recycled material. The set limits on the percentage of reclaimed material resulting from strict regulations or specifications on the material itself can limit competition

and affect the range of innovative solutions. Therefore, according to the industry, Buyers should not specify the material's content but instead focus on defining the required performance over a defined period. This can be done by adopting a performance-based procurement approach.

**Performance-based contracting**

Performance-based contracting is an approach where the Buyers do not impose solutions. Instead, they evaluate how the performance will meet the requirements and standards. The approach assumes that for every product family (e.g. asphalt), there must be Product Category Rules (PCR). Those are specific rules, requirements and guidelines for developing environmental declarations for one or more product categories. Environmental Product Declarations (EPD) provide quantified environmental information for a construction product or service on a harmonised and scientific basis. They also provide information on health-related emissions to indoor air, soil and water during the use stage of the building. The purpose of an EPD in the construction sector is to provide the basis for identifying those offered solutions which cause less harm to the environment.[22]

The main reason to use this approach is to allow more innovative solutions. At the same time, producers need to be sustainable and prove it by presenting a declaration of impacts. However, there is some controversy about this approach, resulting from the challenges it may present for the bidders. Asphalt producers can declare what the production process looks like. When it leaves the asphalt mixing plant, they know the quality and composition of the asphalt they sell, the amount of energy used to manufacture it and the impact of transport. However, it may be challenging to prove what happened with the raw material before producers received it and what will happen at the end of its life cycle when other stakeholders could be involved.

Based on the initial experience with performance-based procurement, Rotterdam recommends that buyers carefully define the scope for alternative solutions (the technical performance criteria and the assessment method).

The lack of EU-level PCRs has led to some countries developing PCRs on a national level. Some successful examples include the Netherlands and Norway. In the latter, for example, the bidder with the lowest $CO_2$ emission score is selected as a baseline.

## 6. Significant challenges faced by Public Buyers

The working group members have identified several challenges Public Buyers face with innovation procurement within circular asphalt. For example, staff capacity, as buyers lack inhouse expertise and have a limited budget for external advisory. They also have suboptimal governance, i.e. long and complicated public procurement processes caused by decentralised departments struggling to cooperate. The Netherlands has addressed the issue of inhouse expertise by establishing a group that assesses new asphalt types to accelerate the process of ensuring innovative solutions are available on the market without compromising quality.

The Conference of European Directors of Roads (CEDR) sees the need to ensure that Public Buyers' procurement strategies respond to the risks asphalt producers face. This is mainly due to the current crisis resulting from the war in Ukraine, Europe's significant dependence on bitumen from Russia, and the increasing energy cost. Producers face the loss of liquidity and may disappear from the market. They are already committed to finding innovative solutions; however, this may not be enough. CEDR thinks that Public Buyers may support producers to survive the current crisis by adequately updating their procurement strategies (e.g. the norms, evaluation criteria, schedule of payments and prepayments, etc.)

**The challenge to achieve the economy of scale by an international consortium**

The members' takeaways vary depending on their initial level of expertise and the market's maturity in their countries. Those members where circular asphalt was much less developed saw value in learning from the more experienced members. The varying local conditions also impacted how universal the learnings from the market dialogues were to all members.

Because asphalt production is very local and producers target projects within a limited distance from the factories, it was unclear to the group how the market would welcome aggregated information on projects planned across the various countries. The group also tackled how differences in local conditions impact asphalt production processes, such as access to raw materials. Such differences require different asphalt mixes, limiting the possibility of achieving the economy of scale by aggregating demand and increasing production volume based on the same criteria. Nevertheless, the market dialogue has brought attention to the links between the current energy crises and material scarcity and the industry's interest in offering more innovative solutions using reclaimed, reused and recycled asphalt to remain profitable. The dialogues identified the need for further discussions on adjusting the Buyers' procurement approaches to promote innovative solutions while simultaneously minimising the risk of lower quality and longevity.

## 7. Major challenges described by the industry

In order to offer new high-quality, sustainable solutions while remaining competitive and profitable, the asphalt industry needs to plan investments in innovative technologies with a certain degree of confidence in the expected volume of contracts. Therefore, the scope, timeline and conditions applied in future tenders must be clear. Such conditions would refer to, among others, the requested minimum and maximum percentages of reclaimed material in asphalt, if applicable, and the methods of bids evaluation and contract awarding under the Public Buyers' procurement processes most commonly used in each member state.

The market needs regulations to respond to the need for more flexibility and innovation, especially now that the cost of asphalt production is significantly rising due to the sanctions on Russia that affect access to bitumen. Its limited access impacts the profitability of the production process.

**Consequences of the rising energy costs and access to raw material**

Since the asphalt industry is very energy-dependent, the rising energy costs, the current economic and supply chain crises, the scarcity of resources and the resulting increased production costs present a significant risk for the market and the undisrupted public road construction projects. Rising energy costs present a significant challenge for smaller producers.

However, the crisis also creates opportunities and an incentive for accelerating innovative solutions. In the long term, producers may seek more sustainable, less-energy-intensive production methods, as the production plants will not survive if they rely entirely on fossil gas. For example, in the Netherlands, a tendency can be observed to move towards colder asphalt mixes. This allows the producers to be more competitive when faced with increasing energy prices, as the technology may qualify to save a significant amount of energy. Currently, 90% of producers still use direct drum heating in production barrels; however, it is expected that this will shift towards indirect drum heating.

According to KWS[23] – part of Royal VolkerWessels and a leader in the Dutch market for road infrastructure which operates three own asphalt plants and participates in five others – asphalt producers could offer asphalt mixes with a higher share of reclaimed material than currently requested by public buyers. Therefore, they see value in continuing market dialogues with public buyers to show the buyers what they can offer.

**Cooperation between the contracting authorities and contractors**

The European Asphalt Pavement Association (EAPA) emphasises the need to improve how information on material flow is shared to optimise supply and demand management. The industry indicates that it needs current information from the Buyers to analyse better the demand, including where the asphalt will be reclaimed from; for example, as part of planned maintenance or reconstruction works. It is essential to trigger coordination to follow the available materials and when and how they can be redistributed. Cities have this information, but it is not always gathered in a centralised way for other entities to access easily. Such an information-sharing platform that allows the identification of material flows and streams is run, for example, by the German Asphalt Pavement Association.

On the EU level, EAPA recommends working on homogeneity in this regard: EAPA has worked on proposing a standard technical specification that would serve as a guidance document that countries can use as a basis for their own Product Category Rules.

The Conference of European Directors of Roads (CEDR) recommends various solutions to reduce the risk of asphalt production facilities closing due to the producers' struggle to cope with significantly growing energy costs and material shortages. Those could include various forms of grants and modifications of the procurement processes and contract provisions, e.g. quicker invoice payments or advance payments during challenging periods when the producers' are under pressure.

The members of the working group and the market actors have also suggested that there may be room to improve the level of trust and mutual understanding between Buyers and Producers. The industry needs to improve dialogue with the Buyers to create synergies and have a good waste framework directive or a reasonable regulation for treating this material.

## 8. Conclusions

The working group members recognised that innovation procurement is complex and market context varies across Europe. They agreed that the particular character of circular asphalt, which is significantly dependent on local conditions, limited the extent to which the group could provide a consolidated outlook of the foreseen demand.

Therefore, the group decided to produce a Joint Declaration of Intent to indicate the needs in the field of road construction, in particular, asphalt pavements. The group aimed to provide other Public Buyers and the market with a recommended investment direction. The document indicates the tendering approaches the members considered most interesting and points out issues that should be considered for promoting innovation within circular asphalt. It also lists challenges that require further analysis to address the identified risks and the potential for broader use of circular asphalt.

The members also recognised that road construction projects should foresee that the material reclaimed during maintenance or other construction work is used for producing asphalt for future projects. This requires planning to reuse or recycle the material from its production, which means using materials suitable for reusing or recycling. However, this is currently impossible in all Member States due to local regulations. Some have limited possibilities due, for example, to suboptimal information-sharing between Public Buyers and the industry.

At the same time, the members recognised that asphalt production is heavily dependent on local conditions, i.e., the availability of material and national regulations vary across Europe. The members agreed that market actors should recognise the need for economically and environmentally sustainable asphalt road construction. They also found that road construction projects should account for the reuse of asphalt reclaimed during maintenance or other construction work in future projects, i.e. predicting the life cycle. This requires further adjustments to national regulations and the introduction of tender evaluation criteria that favour performance.

**The working group's main takeaways are described in more detail in the Joint Declaration of Intent:**

- Reduce the environmental impact of asphalt road construction 'from cradle to grave', avoiding any problem shifts within the life cycle or compromising its technical performance.

- Accelerate innovation through a performance-based procurement approach allowing eco-efficient solutions, such as dematerialised and zero-emission construction methods, cleaner production of asphalt mixtures, appropriate end-of-life treatment and recycling.

- Create opportunities to increase the amount of reclaimed asphalt in road construction by matching supply and demand while minimising transportation of materials.

- Facilitate and/or participate in market dialogues and information-sharing to optimally respond to future challenges that cities and the industry face. For example, Lisbon plans to hold local market dialogues, to the extent permitted by national regulations, to understand the challenges that affect the development of circular asphalt production at the national level while ensuring optimal quality.

- Reduce $CO_2$ emissions in the implementation of construction projects through (1) further promotion of low-temperature asphalts (mastic asphalts, asphalt concretes) by indicating appropriate contract provisions or award criteria, (2) the determination and evaluation of the $CO_2$ emissions of construction materials through environmentally-related award criteria, and (3) the increase in the proportion of reclaimed and thus recycled asphalt, if allowed by local regulations.

- Launch internal dialogues to consider using a performance-based procurement approach using Product Category Rules and Environmental Product Declarations, if permitted by local regulations, to introduce more sustainable asphalt mixes.

- If applicable, work towards developing, evaluating and adapting verification processes of the current local standards and norms regulating the percentage of reused or recycled asphalt to boost innovative solutions that guarantee high quality.

- If applicable, work towards revising regulations that categorise asphalt as waste, preventing producers from storing and reusing asphalt reclaimed from road maintenance or reconstruction projects.

- Improve dialogue, information-sharing and mutual understanding with market actors to optimally respond to the challenges faced by cities and the industry. For example, use the existing channels to exchange information on procurement across the EU and share data through local online platforms.

The industry points out that cities should ensure they have a good understanding of their material flows, i.e. what happens with the asphalt and how they can optimally control these processes most sustainably. The European Asphalt Pavement Association (EAPA) recognises that agreeing on a universal position is challenging; nevertheless, it recommends that Public Buyers focus on facilitating the innovation process without imposing solutions.

The current cap on the share of recycled materials in asphalt may need to be revised to allow producers to offer more innovative solutions less-dependant on fossil fuels and imported materials like bitumen. Suppliers need a long-term perspective. They will invest when there is a business case. Hence, the contracting authorities should decide on their precise goals and ensure that the regulation is adjusted accordingly and promptly. The approach to producing asphalt at the lowest price to keep the most significant profit and invest as little as possible is slowly changing as more board members have more significant considerations about climate change.

## Resources

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[1] Big Buyers for Climate and Environment, study visit of the members of the working group on circular construction to Rotterdam, the Netherlands, March 2022.

[2] European Asphalt Pavement Association (EAPA). *Recommendations for Road Authorities to achieve circular economy goals through the re-use and recycling of asphalt. Technical Briefing (2022) 18 pages.* https://eapa.org/download/15437.

[3] Mahesh Moenielal. (March 2022). *TNO for Life: Circular Asphalt in the Netherlands* [Power Point slides], Netherlands Organisation for Applied Scientific Research (TNO).

[4] *Dutch Roadmap towards circular roads* [Power Point slides]. (7 April 2022). Rijkswaterstaat, Dutch Ministry of Infrastructure and Water Management.

[5] European Asphalt Pavement Association (EAPA). *Recommendations for Road Authorities to achieve circular economy goals through the re-use and recycling of asphalt. Technical Briefing (2022) 18 pages.*

[6] Mahesh Moenielal. (March 2022). *TNO for Life: Circular Asphalt in the Netherlands* [Power Point slides], Netherlands Organisation for Applied Scientific Research (TNO).

[7] European Asphalt Pavement Association (EAPA). *Recommendations for Road Authorities to achieve circular economy goals through the re-use and recycling of asphalt. Technical Briefing (2022) 18 pages.*

[8] European Asphalt Pavement Association.

[9] *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices.* (15 April 2021). Kies für Generationen.

[10] *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices.* (15 April 2021). Kies für Generationen.

[11] Based on: Mahesh Moenielal. (March 2022). *TNO for Life: Circular Asphalt in the Netherlands* [Power Point slides], Netherlands Organisation for Applied Scientific Research (TNO).

[12] *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices.* (15 April 2021). Kies für Generationen.

[13] *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices.* (15 April 2021). Kies für Generationen.

[14] Mahesh Moenielal. (March 2022). *TNO for Life: Circular Asphalt in the Netherlands* [Power Point slides], Netherlands Organisation for Applied Scientific Research (TNO). Page 6.

[15] *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices.* (15 April 2021). Kies für Generationen.

[16] European Asphalt Pavement Association (EAPA). *Recommendations for Road Authorities to achieve circular economy goals through the re-use and recycling of asphalt. Technical Briefing (2022) 18 pages.*; page 7.

[17] *Dutch Roadmap towards circular roads* [Power Point slides]. (7 April 2022). Rijkswaterstaat, Dutch Ministry of Infrastructure and Water Management.

[18] *Dutch Roadmap towards circular roads* [Power Point slides]. (7 April 2022). Rijkswaterstaat, Dutch Ministry of Infrastructure and Water Management.

[19] *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices.* (15 April 2021). Kies für Generationen.

[20] *Recycling of asphalt aggregates and use of warm asphalt – Guide to good practices.* (15 April 2021). Kies für Generationen.

[21] Big Buyers for Climate and Environment, study visit of the members of the working group on circular construction to Rotterdam, the Netherlands, March 2022.

[22] Norm EN 15804+A2

[23] KWS belongs to Royal VolkerWessels and is a Dutch market leader in road infrastructure operates three own asphalt plants and participates in five others across the country. The Highly Ecologic Recycling Asphalt System (HERA) used by KWS plants is based on indirectly heating the raw materials. This results in a higher percentage of reuse of old asphalt and lower emissions of harmful gases. KWS belongs to the Koninklijke Bouwend Nederland, which is an association of construction and infrastructure companies, the largest business organisation in the construction industry with approximately 4800 affiliated members. The association connects and supports construction and infrastructure companies in the Netherlands, dealing with the application of asphalt as an important construction material in road construction. It also contributes to European regulations, and promotes sustainable development with affiliated partners.

## Contact:

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**Big Buyers for Climate & Environment**

This guidance is based on the experiences and expertise of the members of the Big Buyers working group on zero-emission construction sites, active since May 2019. The Big Buyers Initiative is a European Commission platform for promoting collaboration between big public buyers in implementing strategic public procurement. By working together to aggregate demand and jointly approach market actors, public buyers can maximise their market power and impact, promoting the creation of new solutions more targeted to their needs.

ICLEI Europe and EUROCITIES are currently running the initiative on behalf of the European Commission, DG Internal Market, Industry Entrepreneurship and SMEs (DG GROW).