

## **Circular economy in practice: How to integrate CE principles into road infrastructure projects**

Link: <https://www.iema.net/resources/event-reports/2020/06/09/circular-economy-in-practice-how-to-integrate-ce-principles-into-road-infrastructure-projects>

**09.06.20**

Question Asked	Answer given by David Smith (AECOM)	Answer given by Colin Holm (Highways England)
What are the practical steps taken to minimise the use of these primary resources, bearing in mind that most of these materials for road construction are imported which effectively overlooks the embedded emissions in these materials?	CE includes consideration of supply chain impacts and promotion of local sourcing. It's important to understand and verify the environmental and ethical impacts associated with materials sourcing as well as their whole life impacts.	Engaging designers is really important here. The designing for resource efficiency workshops at the circular economy pathfinder projects identified opportunities to reduce primary material consumption. Similarly, we specify that 'design solutions shall seek to minimise consumption of materials and the generation of waste' in our Design Manual for Roads and Bridges (DMRB) ( <a href="https://www.standardsforhighways.co.uk/dmrbs/search/89d10ef2-7833-44df-9140-df85cd6382b9">https://www.standardsforhighways.co.uk/dmrbs/search/89d10ef2-7833-44df-9140-df85cd6382b9</a> ).
Often, we face key trade off between sustainability considerations and cost/value. What levers are you applying to influence construction managers to enhance circularity in construction planning especially where it is not commercially desirable?	It is important to recognise and consider whole life costs. It may, for example, be more financially expensive to design a more durable product, but it may be more cost effective if its longer operational lifetime or reduced maintenance requirements are considered.	In our DMRB we require that whole life costing shall be used to inform design decisions. However, we know there's a case to be made for circular solutions to make a greater contribution here. This is where our pathfinder projects are helping to provide evidence that value and efficiency can be achieved. Its also sometimes about rewarding good practice too. We see some fantastic entries from our supply chain coming through our Supplier Recognition Awards, where we include a category that picks up on themes in our sustainable development strategy, including circular economy.

		This links to the IEMA Environmental Management Briefing: Driving Sustainable Resource Management through ISO 14001.	
To Colin perhaps, what is the HE vision on the use of roads by 2030? type of users volumes, any forecasts they work to? what is the expected use of roads by 2040? is there leisure overtaking logistics or are there any trends we already aware about?	Answered in session		The Strategic Vision to 2050 for the Strategic Road Network is set out in the Road Investment Strategy (RIS) 2. In broad terms it is 'a network that supports the economy', 'a greener network', 'a safer and more reliable network' and 'a more inetgrated network'. Particularly in relation to the environment it states "The majority of all vehicles using the SRN, including almost all cars and vans, are zero emission at the tailpipe, transforming the impact of the SRN on air quality and carbon emissions". On logistics specifically, the vision states "The SRN supports the freight and logistics industry and continues to carry more freight and more business than any other part of the transport system. It works well to connect together people who are keen to do business and ready to compete in the global economy. It is also a good workplace for those who spend their day on the road", so there is a continued role here, meanwhile it plays a major role in other types of journeys, including through linking with the wider transport network and by providing facilities, physically separated from the SRN, for leisure and works travel by cyclists, pedestrians and equestrians".

Really interesting, thank you! Have the case studies been published in detail?		We haven't published case studies of circular economy pathfinder projects yet, but there are a number of published articles about our circular economy work, such as in New Civil Engineer ( <a href="https://www.newcivilengineer.com/innovative-thinking/highways-england-and-the-circular-economy-07-04-2020/">https://www.newcivilengineer.com/innovative-thinking/highways-england-and-the-circular-economy-07-04-2020/</a> ).
As circular economy (CE) involves system thinking, there is a growing interest in considering CE in a city scale, has there been any consideration to implement project such as pathfinder at city scale in collaboration with local authorities and businesses (system thinking)?	Answered in session	The pathfinder projects to date have primarily been to demonstrate the application of circular economy thinking at a project level. However, it is right to suggest that for a truly circular economy much greater collaboration will be needed. Of course the scale at which the circular economy operates may be an important consideration, particularly where seeking to deliver carbon reductions.

Have cost and carbon appraisals of CE opportunities been completed and do these valuation support implementations, generally? Are there examples of conflict between carbon reductions and CE Opportunities	Issues such as cost and embedded carbon have been / are being evaluated. This is a key element of the Pathfinder Project's shared interest with the wider project's Efficiency and Benefits Realisation Teams.	
Hi. Excellent presentation - thank you. What challenges, if any, have you experienced or foresee with respect to regulatory (i.e. Environment Agency) approvals for re-use of materials/ acceptance criteria?	Good question - the circular economy seeks to promote innovation and approaches such as servitisation can encourage this. However, innovation, including reuse of materials, can bring risk / perceived risk. This can be addressed through trials and changes to specification.	It's important for circular solutions to accord with regulatory requirements and our standards. We've been updating our DMRB to include some key standards that support resource efficiency and circular economy but there's still a lot to do.
What are some of the CE metrics developed for the A303 project?	We're currently discussing a range of potential metrics, which, even if not ultimately adopted for this project will, I hope, widen the concept of 'value' and potentially influence future schemes.	
It was mentioned that the A303 has a green bridge to link habitats, we know roads are highly detrimental to habitat connectivity, so why are there so few green bridges or wildlife tunnels within	Answered in session	

Highways England schemes? Are there plans for more of these?		
What have been some of your challenges on working together to deliver the major benefits of a circular economy. We are working on some of these, such as design standard restrictions, and lack of locations to store materials for reuse, and we are working together with SICEF, CEEQUAL, and others on this. We are also aware of work in Europe and across the world, however fully understood metrics are quite important. (Drew Hill, Transport Scotland)	It is important to recognise that Highways England cannot achieve 'circular economy' in isolation, nor can this happen in just one project - the approach has and will continue to evolve, to take advantage of opportunities as they arise.	There are lots of challenges, but real benefits too from working together. Through our membership of the Major Infrastructure Resource Optimisation Group (a group of infrastructure operators allied to SICEF) we have shared good practice and shaped ideas around issues such as monitoring and resource exchange. You can see some of this work in the Mi-ROG white papers at <a href="https://aecom.com/projects/circular-economy-action-major-infrastructure-resources-optimisation-group-mi-rog/">https://aecom.com/projects/circular-economy-action-major-infrastructure-resources-optimisation-group-mi-rog/</a>
To what extent are the pilots succeeding in achieving circular economy and low carbon objectives? e.g. what proportion of on-site re-use and use of recycled materials, how much of a reduction in carbon footprint relative to previous methods, what reduction in operational carbon emissions and environmental impacts?	Because of the current project stage of the A303 Circular Economy Pathfinder project it is too soon to measure our impact. We are however, selecting metrics and will seek to quantify the impact of the initiatives implemented.	

Can you give some specific examples that have been used on these highway projects? Re-processing of tarmac, re-use of signs etc	The 100+ opportunities identified are listed in the Project Reports produced for Highways England.	The A303 has published an Environmental Statement which includes analysis of materials and waste impacts and mitigation measures at <a href="https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010025/TR010025-000203-6-1_ES_Chapters_12_MaterialAndWaste.pdf">https://infrastructure.planninginspectorate.gov.uk/wp-content/ipc/uploads/projects/TR010025/TR010025-000203-6-1_ES_Chapters_12_MaterialAndWaste.pdf</a>
How are HE sharing opportunities and information with Transport Scotland and Wales?	Answered in session	Highways England work with devolved administrations when developing standards and work across a number of sustainability forums with other infrastructure bodies to exchange good practice
Are the list of opportunities for the A303 available publically?	The 100+ opportunities identified are listed in the Project Reports produced for Highways England.	The presentation we delivered covered some of these and will be available through the IEMA website. We haven't published case studies of circular economy pathfinder projects yet, but there are some published articles about our circular economy work, such as in <a href="https://www.newcivilengineer.com/innovative-thinking/highways-england-and-the-circular-economy-07-04-2020/">New Civil Engineer</a> ( <a href="https://www.newcivilengineer.com/innovative-thinking/highways-england-and-the-circular-economy-07-04-2020/">https://www.newcivilengineer.com/innovative-thinking/highways-england-and-the-circular-economy-07-04-2020/</a> ).
Are there any examples of practises that haven't been taken forward on the A14 or A303 project that in hindsight could have been implemented.	I can only comment on the A303 - and it is too soon to say. However, I'd be surprised if there weren't examples as the final built design will involve consideration of a wide range of aspects. During the preliminary design we identified over 100	

		opportunities, with about 20 not take forwards.	
Is Highways England familiar with emerging technologies to incorporate waste plastic into asphalt? In India there are something like 40,000kms worth of roads that appear to be proving more durable, less prone to potholing and other wear. In light of China's decision to stop taking international waste shipments, it sounds like it could be a promising opportunity.		The project has identified some research in this area.	Thankyou. We work with our supply chain and academia to support research on a range of sustainability interventions. You can see more information on research work we support here: <a href="https://highwaysengland.co.uk/industry/innovation/research/">https://highwaysengland.co.uk/industry/innovation/research/</a>
Low temperature asphalt (with lower embodied carbon) has been available in the UK for a number of years. When will Highways England specify this material as standard spec rather than traditional hot rolled asphalts?			Warm asphalt has been used on a number of Highways England schemes, for instance at the A160.
How do we deal with the dilemma between short term initial cost versus the long term sustainable whole life value. Will we eventually move to a carbon dollar value to allow direct comparison to demonstrate the benefits of delivering sustainably?		This is a good question - but also very difficult to answer. As a consultant, I see it as my role to help my clients make informed decisions.	It's a difficult question. Considering the whole life cost of design is in our Design Manual for Roads and Bridges. In the appraisal of road schemes monetary valuation of schemes' impacts on GHG emissions is informed by carbon values. These values are in the process of being updated: see: <a href="https://www.gov.uk/government/publications/tag-unit-a3-environmental-impact-appraisal">https://www.gov.uk/government/publications/tag-unit-a3-environmental-impact-appraisal</a>

Good afternoon! In the "Pathfinder Project", how do you ensure that "Lessons Learned" - positive and negative - are incorporated into future projects? Can you track the success of each of these and perhaps integrate an improved version in subsequent projects?	Yes - that's exactly what we try to do. We have prepared a project report for each stage of the project. The list of opportunities will continue to expand and the overall approach will evolve to take advantage of opportunities as they are identified.	
Do the presenters have some specific examples of actions that have been taken - with specific materials - to deliver circular economy solutions. Or is this still all at the concept stage? It would be good to hear some practical examples to illustrate the principles.		The A303 the project is awaiting determination
Is HE buying on environmental performance as well as give incentive to suppliers who are innovative in CE? Also, Is the CE opportunities learnt publicly available? Also, it would be ideal to create platforms for suppliers to talk to each other to allow for exchange of ideas and technology?	The 100+ opportunities identified are listed in the Project Reports produced for Highways England. I look forward to working with suppliers / contractors as these are appointed.	Sustainable procurement is an important part of achieving a circular economy. Environmental performance is considered and monitored. There are also supplier forums where ideas and best practice are exchanged.
How do you integrate circularity in road projects implemented in developing countries where majority of the raw materials are imported? Any remainder material or waste generated may have to be disposed due to absence of local capacity to recycle and reuse.	CE includes consideration of supply chain impacts and promotion of local sourcing. It's important to understand and verify the environmental and ethical impacts associated with materials	Highways England work on responsible sourcing and circular economy projects in support of our Sustainable Development Strategy. The circular economy is essentially about optimising resources and moving away from an extract, utilise, dispose model, so has benefits potentially at a global scale. From a developing world perspective circularity is certainly something that the UN have recognised as supporting a number of the UN Sustainable Development Goals. There is a really good website





Transforming the world  
to sustainability

	sourcing as well as their whole life impacts.	that looks at the global interdependence on circular economy published by UNEP ( <a href="https://buildingcircularity.org/">https://buildingcircularity.org/</a> ) and a number of innovative projects that are adding value in developing economies.
--	---	---