



Rijkswaterstaat

6th Conference on Roads and Regional Development

14-18 September 2009, Venue: Sinaia, Romania

Opportunities for Sustainable Road Infrastructure

Meeting Social, Economic and Environmental Challenges in a Changing World

Questions that reflect the theme of the conference

The Conference looks at concepts like "Sustainability" and "Cradle-to-cradle" (C2C) from different angles.

We would like the speakers to choose one or more of the questions below in relation to the topic of their presentation and deal with them in their presentation.

General: what can C2C contribute to infrastructure projects?

One of the objectives of C2C is a cyclic approach regarding materials: materials get a new life, after having been used in one application, they can be used in another application, without loss of quality. For further explanation on the concept of Cradle to Cradle (C2C) please see the annex to this document.

- *In your view, how will such a cyclic approach look in a concrete road project?*
- *What procedures exist in weighing the pros and cons of social impact, environmental impact and economy?*

Social and environmental impact (Theme for Wednesday 16 September)

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.



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- *Could you give an example of an application of sustainability principles in a road project in your country?*

Development of infrastructure requires major investments and involves many years of preparation. Once completed, infrastructure projects should function for decades.

- *How does your organisation look at sustainability as a guiding principle for road planning?*
- *In general, how urgent is sustainability considered an issue in your country?*

The principle of Cradle to cradle (C2C) is that all material has a new life, after having been used in one application, it can be used in another application. The difference with conventional recycling is that there is no loss of quality and no residual waste that has to be dumped.

- *Do you encounter situations where you can apply cradle to cradle principles or situations that come close to this situation?*
- *In your view, how does the ideal sustainable road look from the beginning till the end of the life cycle?*

Economy and finance (Theme for Thursday 17 September)

Efficient material use, lean design and finding the shortest connection can be important design criteria, which could be decisive input for a CBA.

• *Do you include both these and environmental effects in your CBAs?*
C2C principles do not have to imply that the costs for investment and maintenance will rise. Actually, application of C2C could lead to cost-effective solutions. Saving energy and raw materials may actually lead to the saving of hard cash, especially in times when resources are becoming more and more scarce.

- *Can you give an example of such a situation in your country?*
- *In case of a tender, do you sometimes allow market parties to come up with plans for the reuse of building materials such as sand, gravel, cement and marl? Can significant cost savings be realized in your country?*



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Annex: Cradle to Cradle and Sustainable Design

Cradle to Cradle is a new approach to sustainable design that was introduced in the book *Cradle to Cradle: Remaking the Way We Make Things* (2002) by William McDonough and Michael Braungart. Sustainable design was defined in 1987 by the Brundtland Commission (in the Brundtland Report) as the development that the current generation provides for itself without limiting the next generation. The goal of the Cradle to Cradle (C2C) vision goes beyond that, i.e. providing for ourselves and ensuring that next generations have more opportunities. Cradle to Cradle tries instead of being “less harmful”, to be more than that.

Making an application or a project – such as a road - less harmful starts off with making the choice to use cleaner raw materials, ensuring that the application is more efficient in use, and optimising it for recycling. Despite the connotations that the term “recycling” brings with it, this can be seen as designing from “Cradle to Grave”. The central theme of the “Cradle to Cradle” philosophy, is that all material has a new life, after having been used in one application, it can be used in another application. The difference with conventional recycling is that there is no loss of quality and no residual waste products that have to be dumped. This cycle is what is meant with the motto: “Waste Equals Food”.

Waste Equals Food

A tree is a good metaphor to use to describe the ideal cycle. The goal of a tree is to ensure its own maintenance and to produce nutrients for its descendants. People have been doing this since the industrial revolution by forcing back the threats of nature, by depleting the earth and fauna for consumptive purposes and producing destructive by-products. Trees, on the other hand offer a habitat and food for insects and birds, they feed the soil and purify the air. To provide for ourselves, we need technical materials such as metal, thinners and other materials that inherently should not end up in a biological cycle. On the one hand because they damage the biological processes and on the other, because the biological material influences the quality of the technical material. For “waste equals food” to work, the biological and technical nutrients must be separated, and each must be recycled within its own cycle.

Downcycling and Upcycling

Downcycling is the term that is used for most examples of recycling. The project or application it loses its original worth. An example with respect to roads is a post with reflection that can be found along the roadside, perhaps made of either old PET-bottles or used tyres. The materials would have been dumped, but have received a second life. At first the idea sounds nice, but during the second life sulphur and other damaging materials seep into



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the ground. Because of the swift degradation of the poor quality material the UV light causes the post to become porous and dull. After a while the post has to be replaced and must yet be dumped. The end result is not that useful material is regained, but that poisonous materials are spread and high quality material is lost. Luckily there is a solution. A post made of high quality, renewable raw material does exist. It does not leak poison, it feeds the ground, after use it does not have to be reclaimed, it provides nutrients for the ground. This post is made of.... wood.

Towards Sustainable Roads

The example above just sketches just one situation. But the C2C philosophy can be extended to the whole process of planning and realisation of road infrastructure. Therefore we need a way of thinking that is called "backcasting". This means that, based on a fully sustainable C2C end situation first we determine what is feasible and subsequently the needs are set regarding realisation phase and, further back, planning phase. For example, on this basis noise can be important in the planning phase of a road project and an input for the EIA. Efficient material use, lean design and finding the shortest connection can be important design criteria, which could be important input for location issues and CBA. In case of a tender for a tunnel construction in a road, market parties could be allowed to come up with plans for the reuse of building materials such as sand, gravel and marl. In this case one site will produce building materials for the other and cost savings can be realized.

C2C and Cost-effectiveness can go hand in hand

From the last example it already appears that using the C2C principles does not have to imply that the costs for investment and maintenance will rise. Actually, application of C2C can lead to cost-effective solutions. Saving energy and raw materials may actually lead to the saving of hard cash, especially in times when resources get more and more scarce. In turn, in order to underpin sensible decisions a sound financial and economic analysis should be inextricably bound up with applying C2C principles.

Link with the Conference

The above example shows that implementing C2C principles do not have to be complicated. It does, however, require a different way of thinking during the design process. The theme of the 6th Conference on Roads and Regional Development is "Opportunities for Sustainable Road Infrastructure". It is precisely these opportunities that we would like to exchange knowledge on during the conference. By studying how to implement the C2C principles in road infrastructure together, we can contribute to a more sustainable world.