



RIJKSWATERSTAAT'S VISION ON CONSTRUCTION IN CEAP

Non-paper: Towards a climate neutral and circular European infrastructure

September 9, 2020

Summary

Many of the EU's new CE actions for the built environment focus on buildings, although infrastructure is equally essential for achieving a climate neutral, circular European economy. Infrastructure has a high environmental impact from material use, waste production and CO2 emissions. The sector therefore offers enormous opportunities to tackle climate change, for high-quality reuse and recycling, circular design and the use of renewable materials. It also contributes in many ways to making buildings circular. Infrastructure and buildings are highly interdependent in terms of material flows, supply chains, standards and norms, and share many similarities like digital logbooks, circular design, measurement methods, and etc. At the same time, infrastructure faces a number of specific challenges that involve different stakeholders and requires special consideration. Because circularity in buildings and infrastructure is strongly interlinked, we aim to stress the potential of an integrated approach to circular construction. Rijkswaterstaat calls on the European Commission to integrate the infrastructure sector in the circular construction actions and proposes the following elements:

- *Make the infra sector inherent to the Strategy for a Sustainable Built Environment and integrate high-quality reuse in infrastructure, preferably at the level of infra works;*

- *Extend the scope of digital logbooks for buildings to infrastructure and link it to CE-marking and product passports under the *European Data Strategy and Common European Green Deal data space / smart circular applications*. Rijkswaterstaat can contribute to this with knowledge and experience of passports for construction;*
- *Stimulate the use of Environmental Product Declarations (EPD) for life cycle assessments of construction works, based on existing CEN standards. The CPR should be at the forefront of product information to avoid duplication and ensure compatibility in view of the forthcoming *extension of the Eco-design Directive*, under the *Sustainable Product Policy Framework*. The extension thereof should take into account the design of infra works, as a material-oriented focus can lead to sub-optimization;*
- *Extend circular economy principles for buildings design to infra works, based on lifecycle approaches, and promote to integrate life cycle assessment in public procurement and the EU sustainable finance framework. This could be similar to the *Level(s) framework* for buildings;*
- *Let the European research funds call for climate neutral and circular infrastructure projects to extend the scope of building protocols to the infra sector.*

Context

Infrastructure offers a huge potential for circularity in the construction sector

The new EU Circular Economy Action Plan (CEAP) provides a new Strategy for a Sustainable Built Environment and is connected to the Common European Green Deal data space. The Netherlands strongly supports the Action Plan, being in line with the Dutch ambition to be fully circular and climate neutral in 2050.

Just like buildings, infrastructure such as roads, bridges and waterworks has a high environmental impact. The construction sector is responsible for 40% of all material use in the Netherlands, *half* of which is used by infrastructure, which relies heavily on groundworks and materials like concrete, steel and asphalt. These materials contribute significantly to climate change: approximately 2800 kton CO₂-eq of which the national infra contributes 612 kton and rail infra 115 kton CO₂-eq. Most of the emissions stem from the production of materials for road constructions, bridges, viaducts, etc. and from transport of sand and soil.

Infrastructure therefore offers enormous opportunities to reduce climate impact and CO₂ emissions, for high-quality reuse and recycling, circular design and the use of renewable materials. In view of this potential, the Dutch government has set the ambition to achieve climate neutral infrastructure and operate fully circular by 2030. That means 100% reduction of CO₂ emissions, high-quality reuse of materials and 50% reduction in primary use of raw materials. To achieve this, new business models, including new financing and procurement perspectives, new technologies, and new technical standards are paramount. Given the impact of infra works and the sector's potential to contribute to the realisation of a circular and climate-neutral Europe, Rijkswaterstaat encourages the European Commission to pay full attention to the specific infrastructure challenges in the further elaboration of the new CEAP and European Data Strategy.

An integrated approach to circular construction

The Netherlands has an integrated approach to circular construction: it focusses both on buildings and infrastructure. Buildings and infrastructure are highly interdependent in terms of material flows and industry. The Netherlands is a perfect example of this: 97% of the construction and demolition waste of buildings is reused and a significant part thereof (circa 90%) is used in the infra¹, such as recycled granulate for road foundation. Though aggregates offer additional benefits compared to traditional foundations, construction and demolition waste from buildings will increasingly flow back to new buildings in a circular economy. This transition, particularly concrete-to-concrete recycling, puts pressure on

the availability of secondary materials for infrastructure.

In general, the demand for materials remains greater than what becomes available as a secondary material. The gap between supply and demand is not easy to resolve, but the use of secondary or renewable materials may address this shortcoming², requiring appropriate legislation, standards and instruments. More attention to toxic substances in the design phase of products from both primary and secondary materials, and extending the life of products during the use phase is evenly essential to fill the gap. The further need to phase out the use of scarce primary resources not only drives the sector towards more recycling, but also towards the use of renewable and bio based materials.

The road to a circular construction sector must therefore be better aligned. This also applies to the industry, which supplies materials for both buildings and infrastructure.

An integrated approach to circular construction can also ensure that standards and norms for buildings and infrastructure are complementary. In this way, infrastructure will not be disadvantaged by regulations for buildings that do not fit in with infra and the transition to circular infrastructure will not lag behind. For example, the forthcoming revision of the CPR regulation and extension of the Eco-design directive can act as bottlenecks if infrastructure is not properly taken into account.

Both infrastructure and buildings in the Netherlands work on a number of sector-wide focus points, such as: measurement methods for circularity; materials passports i.e. digital logbooks for construction works; circular use of materials, through supply chain collaborations and Green Deal; circular design to enable high-quality reuse, recycling and value retention; etc. Together, these subsectors are also making sector-wide agreements, developing coherent guidelines and frameworks through the national Platform Circular Construction in 2023 (Platform CB'23). By tackling the transition in an integral way, the industry will be more stimulated to switch to circularity and to innovate, also because the volumes are then large enough. Infrastructure can make a major contribution to this.

Public big buyers can make the change

Infrastructure works are often procured by the public sector. The huge procurement volumes offer unique opportunities to lead the way towards an interesting market for stakeholders to develop climate neutral and circular solutions. Public big buyers and public buyers *groups* can accelerate the transition towards circular and climate neutral solutions by bringing parties together and encouraging cooperation along the supply chain, stimulating knowledge development, enhancing the use of standardized tools for e.g. life-cycle approaches and material

¹ [Transition Agenda Circular Construction Economy, IenW, 2018.](#)

² [Transition Agenda Circular Construction Economy, IenW, 2018.](#)

passports, and requiring the use of digital technologies like BIM. The unique role of public buyers offers opportunities for new business models, for example by becoming a service provider of 'mobility' and 'clean water', instead of constructing roads and installations. Public buyers can also boost innovation by being a launching customer. Plenty of opportunities exist.

The Dutch Ministry of Infrastructure and the Water Management (IenW) has the ambition to be fully climate neutral and to operate in a fully circular way by 2030. This means 100% CO₂ reduction, high-quality reuse of all materials, 50% reduction in the use of primary raw materials and as little production of waste as possible. The Ministry focusses on reducing its own CO₂ emissions and on its influence in the chain as a major provider of infrastructure projects.

To realize these ambitions, the Ministry of IenW, together with its executive agencies Rijkswaterstaat and ProRail, has developed a strategy³ along eight of the so-called "transition roadmaps" for the most relevant projects and activities with the greatest environmental impact. The strategy also includes a proposal for a financial strategy to incorporate the objectives of climate neutral and circular infrastructure in 2030 in the project plans (tenders) and budgets. A joint approach with local authorities will be determined in 2020. Part of the Dutch ambition is that all public tenders will be circular by 2030. Rijkswaterstaat is very active in making its tenders more circular, thereby gaining a lot of experience on key success factors.

Infrastructure specific features

While infrastructure and buildings share many common features, infra has a number of specific features that require a dedicated approach. Infrastructure is a highly government-dominated and consolidated sector. This unique feature offers additional opportunities to promote the transition to circular construction: as the commissioning of infra projects is much more centralized than in the building sector, fewer parties need to be involved in the process and steps may be faster to implement. At the same time, infrastructure is known for its relatively long planning processes, which means that more flexibility is needed to include new circular and climate neutral insights and technologies in the implementation of a plan. The application thereof must not be inhibited by choices that were made many years before.

Infra works also have very long lifespans, which are usually even longer than that of buildings, placing specific demands on circular tools (e.g. digital logbooks), content (e.g. indicators), and on supporting processes (e.g. new asset management roles). Maintenance and asset management differ from buildings and involve different stakeholders. The same goes for circular design. Although similar standardized life-cycle thinking methods can be

applied in both sectors, infra works vary widely, and their function and end-of-life are different.

The transition to circular infrastructure will likely lead to the emergence of new markets that require new innovations and techniques that necessitate, for instance, different products and services. This should be supported effective policies, legislation and technical standards. It also requires a collaborative approach throughout the whole supply chain. New business models may be needed, which in turn require sustainable and innovative financing and new contracting forms to drive innovations and share potential risks. It may also require financial systems that enable and reward value retention strategies.

To promote innovative infrastructure projects, more flexibility is needed in the EU's circular public tendering rules for experimentation and early cooperation. The availability of EU-funds for structural innovation- and research on, for example, innovative and existing materials, design options for value retention and new ways to store material data during the life cycle of constructions (so-called "digital logbooks"), for circular and climate neutral infra is just as essential to promote the transition. In this way, developments in the sector can be further stimulated and the transition to circular infra will not miss out on opportunities.

How to unlock the infrastructure potential

Specific attention for infrastructure has proven successful in the Netherlands, with [initiatives](#) such as dedicated chain collaboration programs, circular public procurement, developing data strategies and promoting circular design principles for infra.

The Circular Public Procurement project in the Baltic Sea Region is a successful example of international cooperation between Denmark, Sweden, Finland, Latvia, Poland, Russia and the Netherlands to further develop the market for circular products and services through government procurement. Bilateral contacts between similar organizations and member states exist and should be further promoted and supported. Supportive policies are an important success factor in supporting the development of new markets, in particular by creating a level playing field for primary and secondary resources. Landfill bans for recyclable materials in e.g. the Netherlands, Flanders and Denmark have boosted the market for recycling. Quality requirements, certification and track & trace systems give the market confidence for the safe use of recycled materials, combined with dedicated policies for soil quality for both primary and secondary resources.

The potential can be further unlocked by:

- Connecting stakeholders in the infra sector across Europe and regionally in climate and circularity platforms;
- Systematically including infra issues in the elaboration of sustainable construction, the digitalization agenda and waste policies

³ Strategy "Towards climate neutral and circular national infrastructure projects", IenW, 2019.

- Encouraging life cycle approaches and circular design principles for infra works;
- Making sustainability assessment tools and circular indicators applicable for both buildings and infrastructure, to be used in Public Procurement;
- Enabling more research into innovative and existing materials and technologies for climate neutral and circular infra.

What can Europe do to help?

Infrastructure contributes to making buildings circular in many ways, and vice-versa. To unlock the potential of an integrated approach to circular construction, EU-policy is crucial. Rijkswaterstaat calls on the European Commission to include the following elements in the further elaboration of the CEAP and Strategy for the Sustainable Built Environment. These are considered by Rijkswaterstaat to be the *most effective* for unlocking the circular infrastructure potential in Europe. A detailed overview can be found [here](#).

i. Strategy for a Sustainable Built Environment, responsible policy department DG GROW

- *Make the infra sector inherent to the Strategy for a Sustainable Built Environment* and integrate high-quality reuse in infrastructure, preferably at the level of *infra works*;

ii. Measuring circularity, responsible policy departments DG GROW & DG ENV

- In view of the forthcoming revision of the CPR, *stimulate the use of Environmental Product Declarations (EPD)* for life cycle assessments of construction works, based on existing CEN standards.
- In the context of the revision of CPR and the extension of the Eco-design Directive, *ensure that CPR is at the forefront of product information to ensure coherence and avoid duplication*. The extension thereof should take into account that the environmental performance of intermediate construction products and materials cannot be assessed stand-alone, but in the context of an entire construction/of a construction work.
- *Extend circular economy principles for buildings design to infra works*, based on lifecycle approaches, and *promote to integrate life cycle assessment in public procurement and the EU sustainable finance framework*. This could be similar to the Level(s) framework for buildings;

iii. Digital logbooks and data management, responsible policy department DG GROW

- *Extend the scope of digital logbooks for buildings to infrastructure*. Rijkswaterstaat can contribute to this with knowledge and experience of passports for construction works. To ensure harmonization, *link digital logbooks to CE-marking and products passports* under the European Data Strategy and Common European Green Deal data space/smart circular applications. Content should aim at common data

strategy issues, such as: digitalization in the supply chain, data management, common language, protocols/standards and data availability on the long-term. Linked data approaches for long-life value chains may be an useful approach to explore.

v. Research and Networks

- *Let the European research funds call for climate neutral and circular infrastructure projects*. The EU research funds for 2021-2027 pay attention to circularity of building materials, which is essential for research and development. In further elaborations, expand the calls to explicitly include the infrastructure in experiments with digital logbooks, circular design principles, and etc. to extend the scope of building protocols to infrastructure.
- *Connect stakeholders in the infra sector across Europe and regionally in climate and circularity platforms*.

What can Rijkswaterstaat do to help?

Rijkswaterstaat wants to contribute to the inclusion of the infra sector in the CEAP actions by sharing knowledge, best practices and lessons learned in our ambition to make public infrastructure circular and climate neutral with Europe. Rijkswaterstaat, as the largest provider for infrastructure works in the Netherlands, plays an important role in this transition and has been experimenting and innovating together with its partners on a [variety of themes](#), such as *material passports for construction works, a strategy for sharing circular data in the infra supply chain, CE indicators and measurement methods*.

Practical experiences in projects have been gained with *circular design principles* to maximize value retention of infra works. Together with other infra clients and market parties, *purchasing instruments* are being further developed. Rijkswaterstaat is giving an impulse to *climate-neutral and circular procurement* by acting as *launching customer* to stimulate the development and upscaling of innovations that contribute to a circular and climate neutral economy. Part of the Dutch ambition is for all public tenders to be circular by 2030. A number of successful *dedicated supply chain collaboration programs* were initiated to close material loops. The recent *Transition Roadmaps⁴* for the most relevant projects and activities with the greatest environmental impact of Rijkswaterstaat will set the pace towards addressing climate neutrality and circularity on the level of infra works in cooperation with all parties concerned with circular construction. Another recent Rijkswaterstaat initiative is *CB'23 Platform*. This platform aims to achieve consensus on a national level on important issues concerning circular construction before 2023. CB'23 has already published several documents, including the subjects of *measuring circularity* and *circular data/material logbooks*. CB'23 is led by NEN, the Dutch National Standardisation Institute.

⁴ Strategy "Towards climate neutral and circular national infrastructure projects", IenW, 2019.

Rijkswaterstaat wants to contribute to the further elaboration and development of the new Strategy for a Sustainable Built Environment, to which the infrastructure sector is inherent.

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ANNEX I – Dutch initiatives to unlock the infra potential

Dutch initiatives to unlock the infra potential	
Chain collaboration	
Dedicated programs for strategic materials. Including innovative material research, life-cycle based eco-design approaches of works.	<ul style="list-style-type: none"> - 'Concrete Agreement' (Betonakkoord) - 'Asphalt Impulse' (Asfaltimpuls) program - 'Green Deal Sustainable Infrastructure' (Green Deal Duurzaam GWW) - 'Exploration of wood chain cooperation in infrastructure' (Verkenning houtsamenwerking in de GWW)
Transition Paths for the infrastructure works that contribute most to CO ₂ -emissions and material use, under the Strategy 'Towards climate neutral and circular national infrastructure projects in 2030'.	<ul style="list-style-type: none"> - Building site and logistics - Civil engineering structures - Coastline care - Road surfaces
Participatory platforms for the development of protocols and guidance document knowledge development and piloting new techniques.	<ul style="list-style-type: none"> - Leading national developing guidance for a uniform circularity measuring method and for passports - Open learning environment for circular viaducts
Public procurement	
Using indicators and life-cycle tools to assess the sustainability of works, by giving more weight to reducing environmental impact, recycling and reuse, and encouraging value retention.	<ul style="list-style-type: none"> - A CO₂ performance instrument (CO₂ Prestatie Ladder) - An LCA based whole-construction calculation tool (DuboCalc) - Incorporating environmental costs in procurement procedures - Buyers group for infra works
Launching customer to stimulate the development and upscaling of innovations that contribute to circular and climate neutral economy by being the first party to apply an innovation on a large scale, and offering the opportunity to test and validate, sharing risks between the public procurer and the private sector.	<ul style="list-style-type: none"> - <u>Circular Viaduct</u> - Refurbished and biobased road furniture - Low Carbon asphalt through high level recycling and on the long term biobased bitumen - Low carbon concrete and next generation concrete recycling - InnovA58 (Living Lab for road construction innovations)
Data strategies	
Development of a data system to storage and share detailed data on raw materials, equipment and structures with parties in the supply chain throughout the whole lifecycle. This will make it possible to track materials from extraction to demolition and subsequent use. Linked to this, development of applications to match supply and demand of released materials, parts and objects and stimulate a market for secondary materials/products.	<ul style="list-style-type: none"> - Exploration of- and experimenting with Linked Data systems (data storage at the source) - Development of material passports for infra; leading towards harmonization - Platform CB'23 Guideline 'Passports for the construction sector' - Practical experiences with Madaster and Excess Materials Exchange in developing material passports for the infra
Measuring circularity	
Circular indicators and measurement methods are being developed together with the sector.	<ul style="list-style-type: none"> - LCA and LCC methods, including future (re)use - <u>Platform CB'23 Guideline 'Core method for measuring circularity in the construction'</u>
Circular design and management	
Promoting circular design principles based on <i>life-cycle</i> thinking	<ul style="list-style-type: none"> - Circular design and maintenance strategies for infrastructure works - Icon project 'Circular Viaduct'
Material strategies	

The strategic materials policy is an important part of Rijkswaterstaat's overarching vision of the circular economy. It enables the organisation to focus its material choices on circularity, i.e. phasing out non-circular materials and preventing the use of scarce and unsustainable materials in our projects.

- Scarcity and availability of materials
- Environmental impact of materials
- Risks of materials that cannot be reused
- Preventing degradation
- Adaptive design and reconstruction technology

ANNEX II – Rijkswaterstaat’s view and input for the inclusion of infra in the EU CEAP actions

1. Strategy for a Sustainable Built Environment, DG GROW

1.1 Integrate infrastructure in the Strategy for a Sustainable Built Environment, responsible policy department DG GROW

- Integrate high-quality reuse in infrastructure, preferably on the level of works, when addressing the sustainability performance of construction products in the context of the revision of the Construction Products Regulation (CPR).
- Facilitate a dedicated event in Brussels in 2020/2021, e.g. under the CE Stakeholder Platform, on climate neutral and circular infrastructure to start sharing experiences and collect views and inputs from the whole sector.

1.2 *Digital logbooks and data management, responsible policy department DG GROW*

- Extend the scope of digital logbooks for buildings to infrastructure and link it to CE-marking and product passports under the *European Strategy for Data and Green Deal data space / smart circular applications*:
- Content should aim at enabling high-quality reuse, value retention and recycling in the future:
 - o Frameworks should allow for data management in dynamic planning processes
 - o Guidance and protocols should be aligned with infra asset management tools and procedures
 - o ‘Language’ should be standardized across the chain and aligned with existing information flows in infra (like CE and BIM)
 - o Data management should take into account the long lifespans of infra works and corresponding issues regarding data availability on the long term. Linked data approaches for long-life value chains could be explored.

1.3 *Measuring circularity, responsible policy departments DG GROW and ENV*

- Consider sustainability principles of products in a coherent framework for construction works. Stimulate the use of Environmental Product Declarations (EPD) for assessment of the full life cycle of construction works, based on existing CEN standards. The CPR should be leading in product information, connected to the eco-design of *works* under the product policy framework. A material-oriented focus could lead to sub-optimization. European or national ‘transition roadmaps’ for infra works with the highest potential for reducing climate impact and increasing circularity could guide development and training on circular eco-design of works.
- Circular economy principles for buildings design should be extended to infra works, based on lifecycle approaches, and promoted to integrate life cycle assessment in public procurement and the EU sustainable finance framework. This should be similar to the Level(s) framework for buildings. Guidelines from the Dutch national Platform CB’23 (Circular Construction in 2023) are readily available.

1.4 Let the European research funds call for climate neutral and circular infra projects

- Let the *Horizon Green Deal call* award projects in infra and civil engineering, piloting for example digital logbooks for infra applications, demonstrating circular economy principles for design of civil engineering works, apply life cycle assessment tools, etc. with the aim to extend the scope of building protocols to the infra sector
- Ensure technical innovative products research to include infra applications and connect to the before-mentioned ‘transition roadmaps’ for infra works.
- Funding of the development of innovative products should support networks of Living Labs for the co-creation of knowledge, piloting new innovations and techniques, business & system models, like testing material passports in infrastructure. Organizations like e.g. CEDR, the European Road Directors’ platform, are well placed for knowledge exchange and open learning environments like Living Labs. Make such a project an “icon” project, like similar projects for buildings (e.g. BAMB, Buildings as Material Banks).

1.5 *Renovation Wave*

- Link climate neutrality and circularity to design principles. In line with the ‘Renovation Wave’ for buildings, optimized lifecycle performance and longer life expectancy of built assets will

contribute to achieving climate neutrality in infra too. The many national infra renovations and restructuring projects currently underway in Europe could benefit from such an approach.

1.6 Material recovery targets

- Material recovery targets for construction and demolition waste and its material-specific fractions should take notice of the interdependence of CDW from buildings and applications in infra works. The goal should be to achieve high-quality reuse.

1.7 Excavated soils

- Initiatives to increase the circular use of excavated soils should be integrated with policies on waste and on soil and water quality.

2. Further align European waste policies: Less waste, more value, DG ENV

Rijkswaterstaat focuses on materials with a high environmental impact, such as: soil, asphalt, concrete and steel; as well as on stimulating the use of wood and biobased materials. To ensure value creation, we propose that the market for high-quality use of secondary raw materials and construction products should be stimulated by:

- Encouraging supportive policies in Member States (bans, quality systems)
- Harmonizing end-of-waste criteria for infra applications
- Further harmonized product standardization including recycling
- Procurement policies and instruments to support demand for secondary raw materials
- Stimulating and aligning quality requirements of secondary materials
- Including infra in the *toxic-free environment* policy to reduce future risks and increase material value. Beware of the dynamics and long lifespans for infra works when elaborating e.g. the SCIP database under REACH.

3. Put focus on infra in Green Public Procurement initiatives, DG ENV & DG GROW

- Promote to integrate life cycle assessment in public procurement by tools developed under the Strategy for a Sustainable Built Environment
- Stimulate lifecycle costing in procurement approaches for asset owners
- Encourage sharing experiences both on European and regional level
- Allow for sustainable procurement in European procurement directives, based on lifecycle approaches and changing roles of stakeholders in a circular chain.

4. Include infra in sustainable financing

- Make financing available for sustainable infra projects, based on integrate life cycle assessment in the EU sustainable finance framework
- Embed circular infra in the taxonomy for sustainable financing
- Take notice of new business models emerging in the sector with potential financing implications.