#EUCircularTalks

Construction and Infrastructure value chains and market

CEMBUREAU The European Cement Association

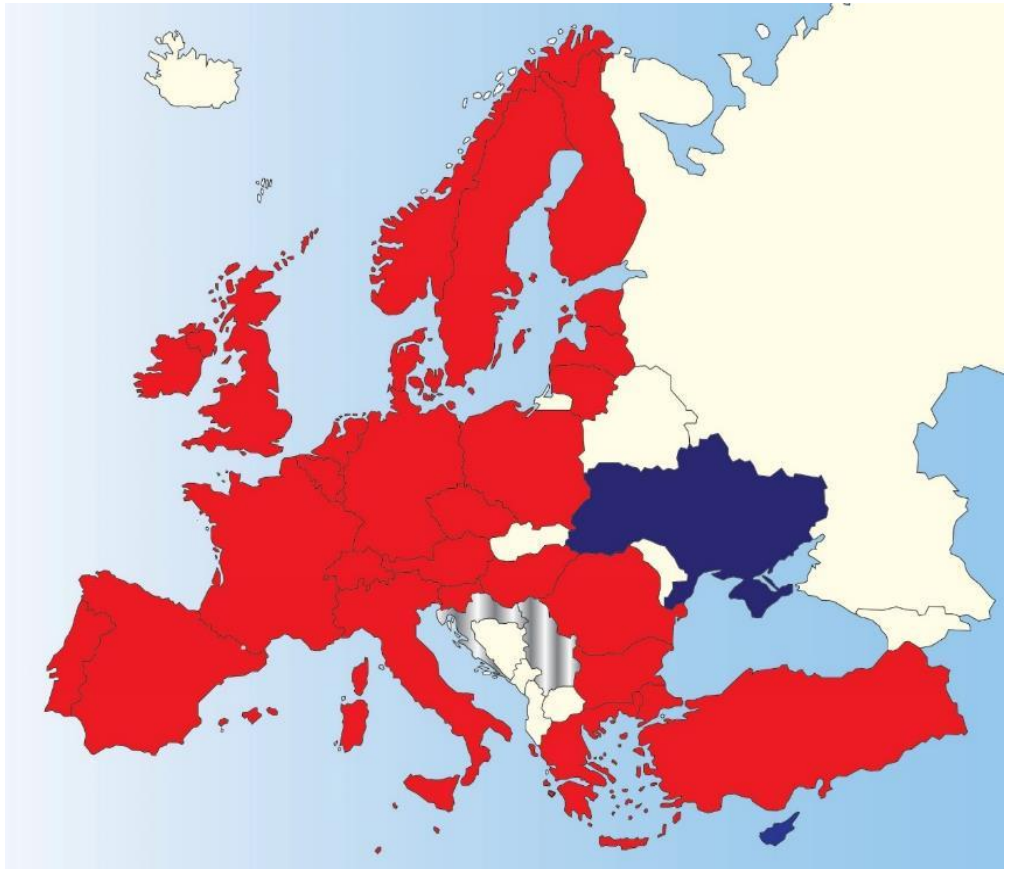
Raw material substitution rate in concrete/cement production and waste derived fuels utilization rate

Nikos Nikolakakos – CEMBUREAU, the European Cement Association

#EUCircularTalks

Construction and Infrastructure value chains and marke

CEMBUREAU
The European Cement Association



CEMBUREAU is the European Cement Association and is based in Brussels

The Association acts as spokesperson for the cement industry before the EU institutions and other public authorities.

- Full Members
- Associate Members
- Cooperation agreement

#EUCircularTalks

Construction and Infrastructure value chains and market

CEMBUREAU The European Cement Association

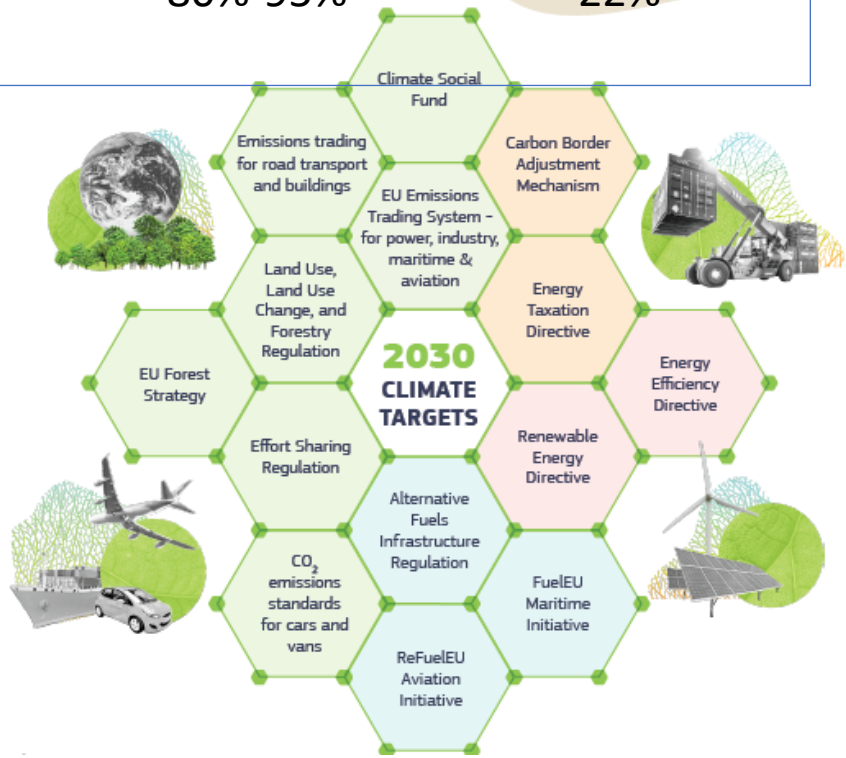
	Target 2020	Target 2030	Target 2050	Actual 2015
Reduction of GreenHouse Gas emissions (GHG)	20%	40% 55%*	80%-95%	22%

Nov'18: "A clean planet for all"

Dec'19: "European Green Deal"

July'21: "Fit for 55"

EU wishes to become world's first climate-neutral region by 2050



#EUCircularTalks

Construction and Infrastructure value chains and market

CEMBUREAU
The European Cement Association

Fuel Substitution and Zero Fuel Emissions Research

CEMBUREAU targets to reach **60% alternative fuels** containing **30% biomass in 2030**, and **90% alternative fuels** with **50% biomass by 2050.**

Alternative Decarbonated Raw Materials

CEMBUREAU envisages up to a **3.5% reduction of process CO_2** using decarbonated materials by 2030 and up to **8% reduction by 2050.**

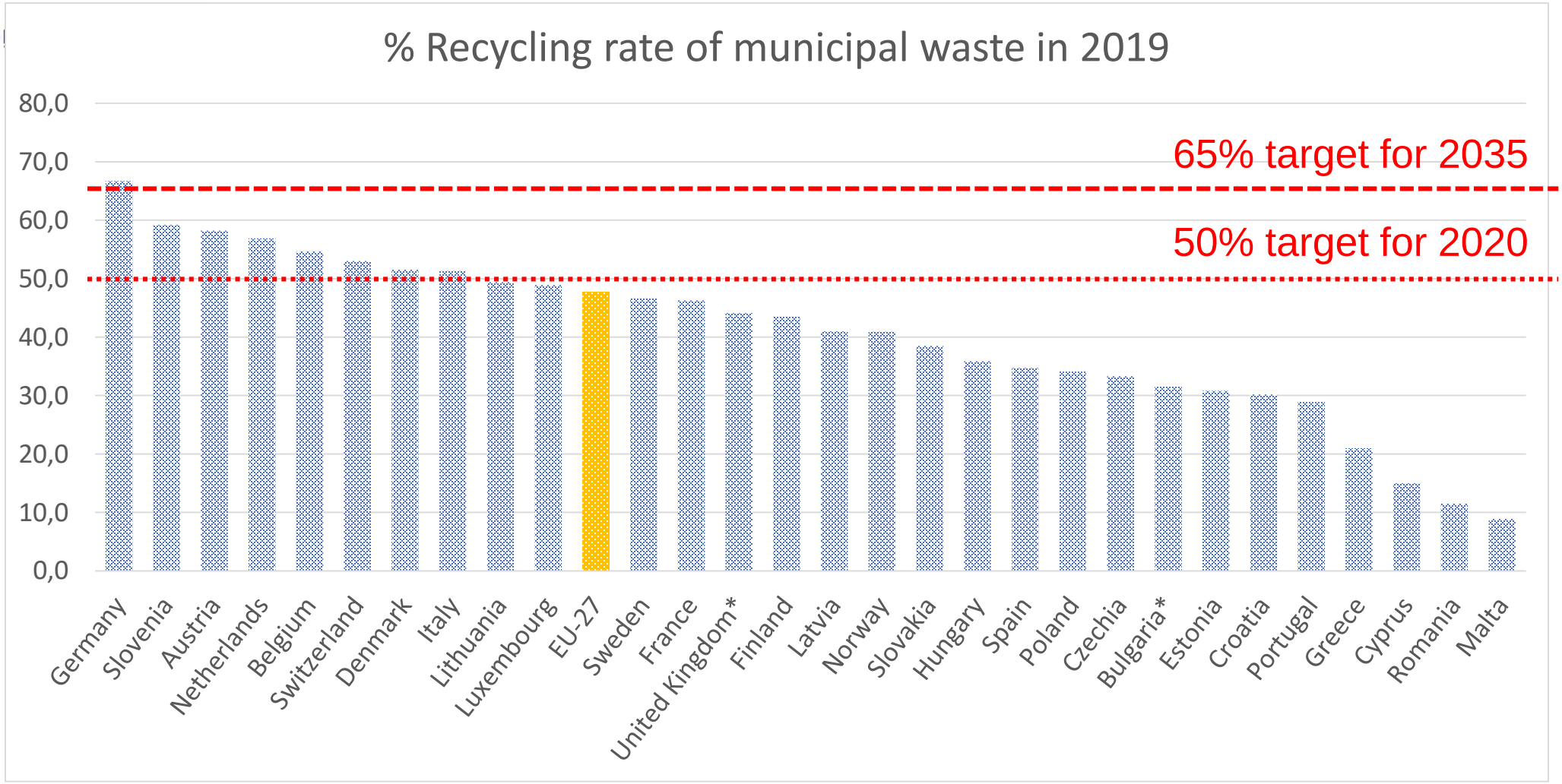
Policy asks

- **Access to non-recyclable waste and biomass waste**
- **Facilitate waste shipment**
- **Ban on landfill**

#EUCircularTalks

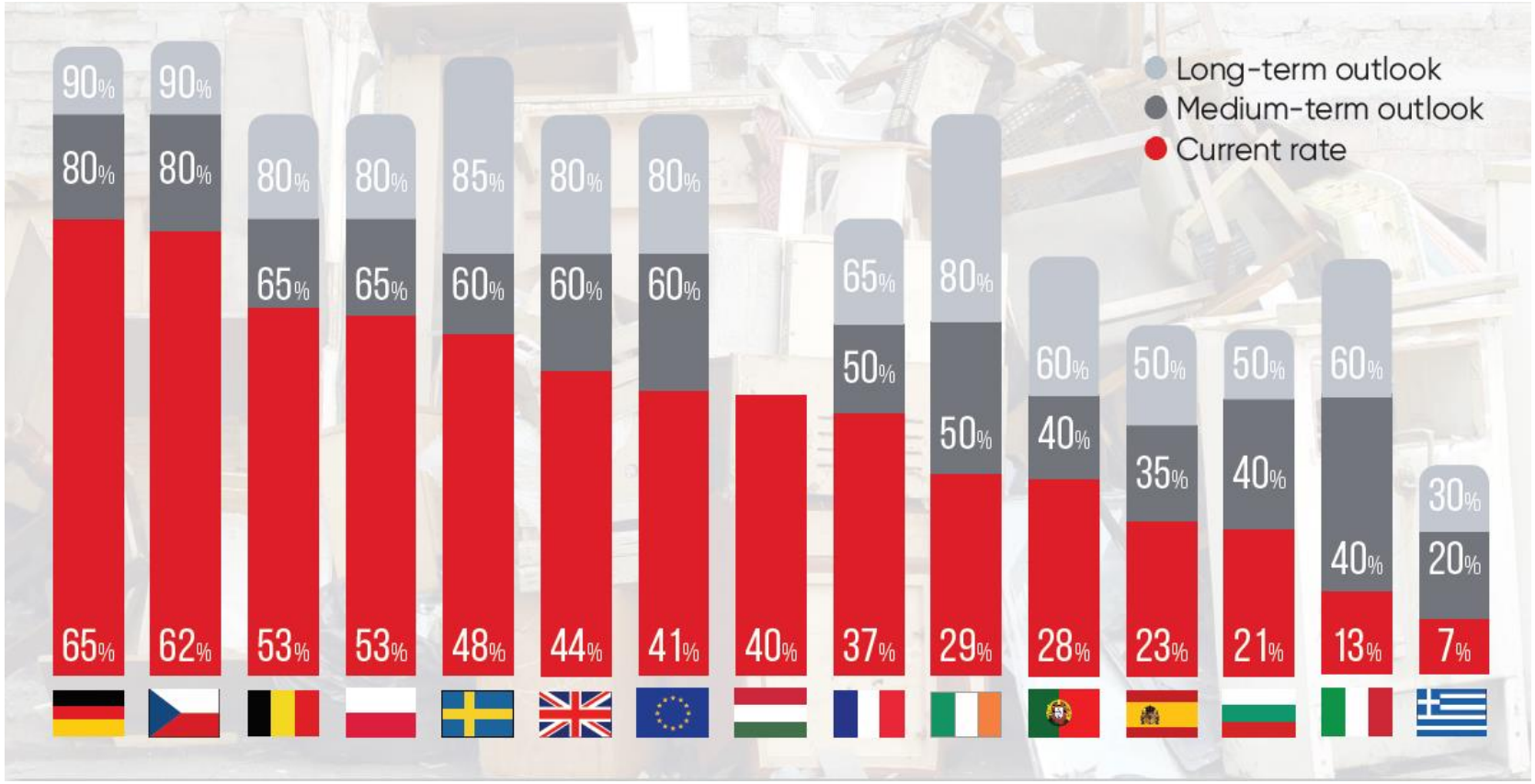
Construction and Infrastructure value chains and market

CEMBUREAU The European Cement Association



#EUCircularTalks

Construction and Infrastructure value chains and market



Ecofys studies

“Status and prospects of co-processing of waste in EU cement plants”,

summary report April 2017

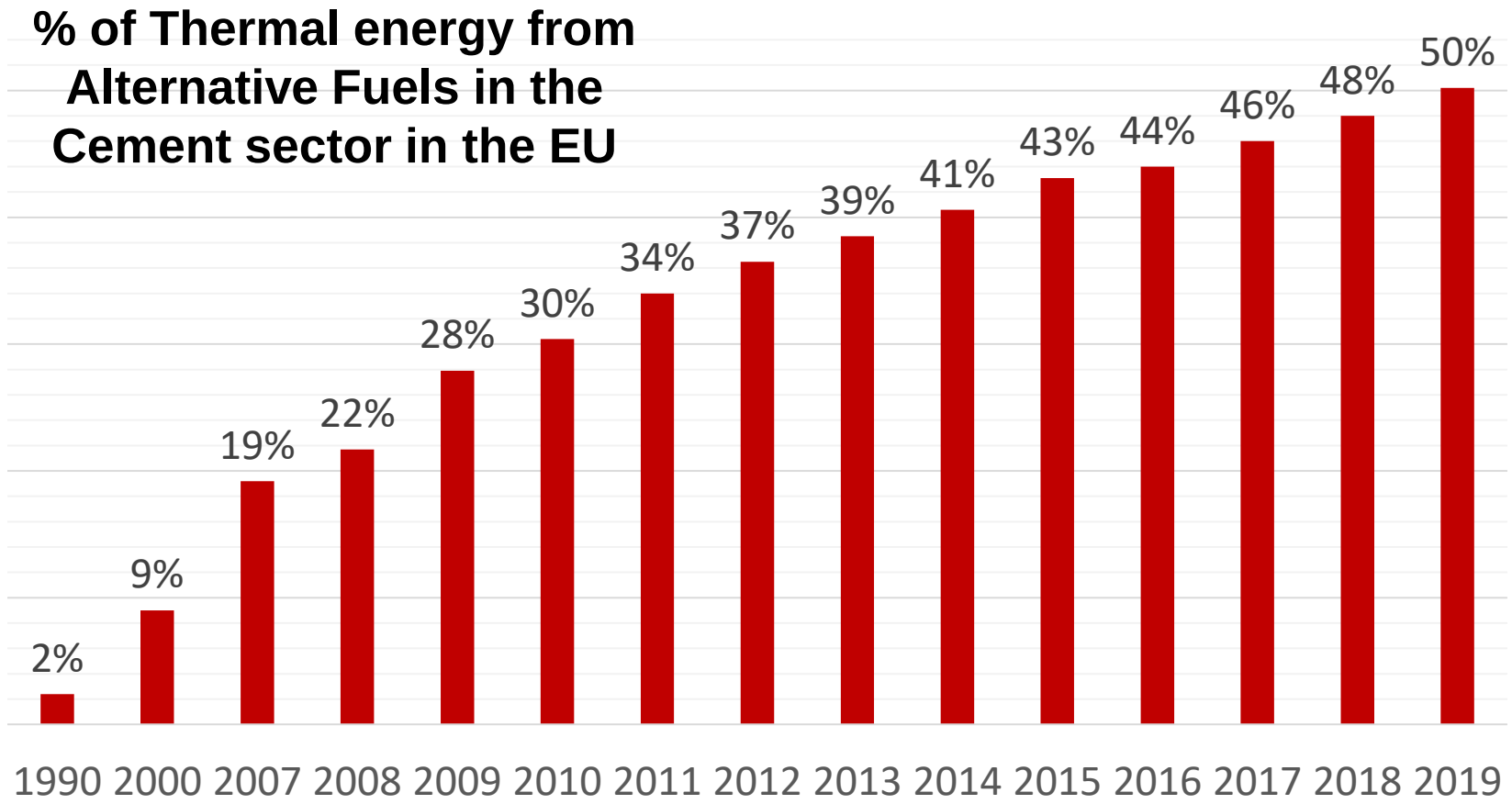
and case studies May 2017

All data are for 2014, with the exception of Portugal and Bulgaria where data are from 2013.

#EUCircularTalks

Construction and Infrastructure value chains and market

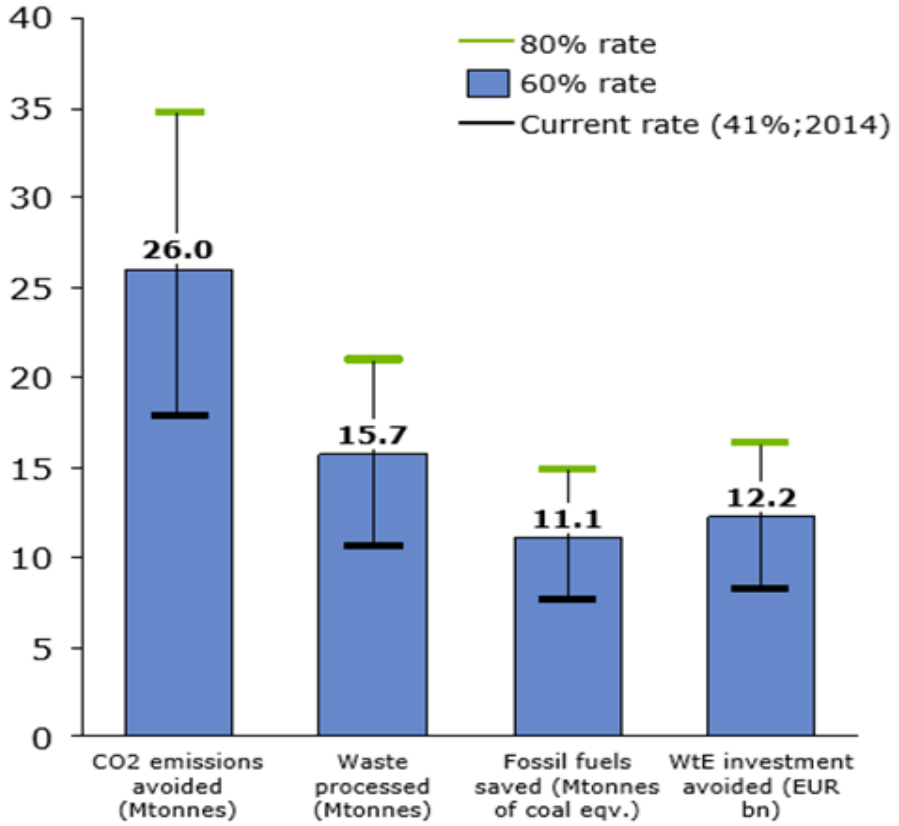
CEMBUREAU The European Cement Association



Source: Global Cement & Concrete Association (GCCA)

Co-processing Advantages

- Co-processing combines both material recycling and energy recovery
- Cement kilns represent existing and available installed capacity for treatment of wastes that cannot be recycled
- Energy-efficient process 70% - 80% independent on the fuel type - ECRA "Energy performance of cement kilns" Nov 2016



#EUCircularTalks

Construction and Infrastructure value chains and market

CEMBUREAU The European Cement Association

Concrete can be 100% recycled – in new concrete or in other applications.

CONCRETE INITIATIVE C&D waste do & don't

CONSTRUCTION & DEMOLITION WASTE
Policy do's & don'ts

The European Commission has embarked on several initiatives to analyse and improve construction and demolition waste (C&DW) recycling rates across Europe. According to the Commission, construction and demolition waste accounts for a third of the EU's total waste production per year, amounting to some 450-500 million tonnes[1]. Given that at least a third of this C&DW is concrete, The Concrete Initiative is working actively on this topic. **This paper provides some "do's & don'ts" for successful policy on C&DW.** These guidelines are relevant for C&DW in general, not just for concrete.

The concrete case

For all types of C&DW, recycling rates are low in many Member States due to a lack of efficient sorting and collecting of C&DW, combined with an insufficient demand for, and confidence in, recycled materials. These aspects are two sides of the same coin. Often, the infrastructure is not in place to allow for quality recycled materials to reach a potential client in a cost-efficient manner.

Fortunately for concrete, recycling is not technically difficult. Concrete can be 100% recycled after demolition. Recycled aggregates from demolition concrete are traditionally used in unbound applications such as for road base, and they are also used as aggregates for new concrete.

Concrete can be 100% recycled – in new concrete or in other applications.

Given these different potential uses for concrete C&DW, and since virgin aggregates will still need to be extracted in order to fulfil the total demand[2], it should be carefully considered whether the best use of recycled aggregates is in new concrete or in unbound applications. Therefore, in policy, both "open-loop" and "closed-loop" recycling should be valid options. Neither option is the clear winner from an environmental perspective in all cases.

Likewise, policy should avoid requirements on minimum recycled content. Given the variable supply of materials coming from C&DW, it is doubtful that this measure would be beneficial or even feasible. One would not wish to see a situation whereby recycled aggregates travel long distances (translating into an increase in transport-related CO_2 emissions), even when virgin aggregates are available nearby.

In conclusion, it is impossible to generalise about how best to use recycled concrete aggregates. One thing is clear: better processes for demolition, collection and sorting of C&DW will help with providing a consistent supply of good quality recycled aggregates.

THE CONCRETE INITIATIVE
solutions for Europe's future

CEMBUREAU – Reuse of concrete

RE-USE OF CONCRETE

The future of construction will see design and building practice become more and more closely aligned with circular economy principles. There is much current focus on the recycling of demolition waste; however, taking broader circular economy principles into account, value is lost in a number of areas[1]. These include underutilised space, buildings demolished prematurely, vacant land, depreciated building materials and under-performing components. Moving to a circular economy means changing business models to retain value in all of these areas. Smart use of concrete as a material and the assets built from it have the perfect potential to recapture this value.

Concrete is a material everyone is familiar with, while perhaps not being fully aware of its contribution to society. Concrete is robust, durable, safe, and requires very little maintenance. It provides shelter against the most extreme weather conditions and renders thermal comfort in dwellings and office buildings, which translates into savings on energy bills.

The concrete frame and many concrete elements can be designed to last over 100 years, which is often much longer than the life cycle of the overall building. The pathway to carbon neutrality in the built environment by 2050 will require the design of new construction works to consider a longer-term view, beyond the original life cycle of the building, whereby building elements and/or the concrete frame can be reused in a future life cycle. This change will require innovation in both design and building techniques and building codes.

By applying durability, disassembly, adaptability and circularity principles to the design of buildings and infrastructure, the properties of concrete elements can be enhanced to enable their re-use in future life cycles of a building or in other future structures. Careful consideration of column spacing and structural properties could, for example, enhance flexibility in the end use of buildings while providing capacity to construct additional floors in the future. Such an approach would help future proof buildings, and significantly reduce demolition and subsequent raw material extraction requirements while avoiding future CO2 emissions.

The solid structure and foundation of a concrete building can be reused to give way to a completely new, renovated or repurposed building. During this transformation, thermal mass can still be incorporated to reduce the energy demand for heating and cooling throughout the life of the new building, through techniques such as adding concrete mass where relevant or exposing existing internal concrete.

If designed with the future in mind, a concrete building enables disassembly and adaptive reuse of systems and elements. The same principles apply to concrete infrastructure.

There are many good examples where the structural frame of a building has been re-used to enable deep retro-fit and/or renovation of the existing building. It is less common today, however, to disassemble and re-use structural elements in a new building. By utilising the power of digitalisation some companies have already developed technology enabling design and construction methods which incorporate disassembly and re-use principles.

[1] *As identified by Arup and the Ellen MacArthur Foundation*

1

All actors, especially architects and designers, should be encouraged to adopt sustainable, long term, multi-life cycle thinking and costing approach in order to enhance durability and to facilitate deconstruction and adaptability of buildings.

Case study: George Green Library, University of Nottingham, UK

In this project the existing structural frame was retained, the basement lowered to provide an additional level and an extension added where the concrete surfaces were expressed. Continuous use of the building was maintained during construction. The completed project provided more student friendly spaces while minimising budget and environmental footprint.

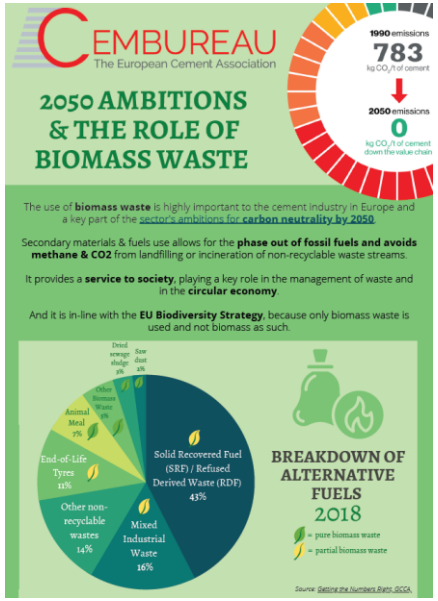
2

#EUCircularTalks

Construction and Infrastructure value chains and market

CEMBUREAU The European Cement Association

Description of the waste streams used



Policy asks

- Access to non-recyclable waste and biomass waste
- Facilitate waste shipment
- Ban on landfill