



FIR

FÉDÉRATION INTERNATIONALE
DU RECYCLAGE

Developing the recycling of Construction & Demolition Waste

**A 10-step approach to
achieve 70% recycling in
Member States**



This document has been developed by FIR based on the expertise of its members. Members of FIR are involved in recycling of C&DW and have excellent knowledge on how recycling was made possible in their country. All collected experience makes it possible to distil an approach for developing successful and good quality recycling. This document describes that approach. It has the aim of informing stakeholders in Member States how they can effectively take up recycling of C&DW.

FIR represents European recyclers of Construction & Demolition Waste and of Incinerator Bottom Ash. These wastes are a main resource for circular construction products. Existing practices in Member States show how recyclers contribute to a sustainable solution, creating jobs and safeguarding the environment.

Our vision and goal

In a Circular Economy, Construction & Demolition Waste (C&DW) is fully recycled by crushing mineral parts into recycled aggregates and sorting of mixed waste. The EU 70% target for C&DW can readily be achieved by recycling of the mineral part.

Whereas not all municipal and commercial waste can be recycled, it is necessary that in the EU non-recyclable waste is incinerated in energy-from-waste plants. Resulting Incinerator Bottom Ash (IBA) can be fully recycled by recovering metals and turning the mineral parts into aggregates.

Our goal is to achieve high quality recycling of all C&DW and IBA in the EU.

Full circular solutions are available

The main product from C&DW recycling is recycled aggregates. Recycled aggregates are used as building products, mainly in roads but also in concrete. They are produced in accordance with existing European product standards, such as EN13242 (aggregates for civil engineering works and road construction), EN13285 (unbound mixtures for roads, airfield and other traffic areas) and EN12620 (aggregates for concrete). Like primary products they substitute, recycled materials meet all technical requirements for said uses. The environmental fitness of our aggregates is proven time and again.

Increasingly, the recycling sector is looking for optimised solutions. Projects aiming at sand to sand, binder to filler and concrete to concrete are examples of practices that already exist and which prove the innovative power of the industry.

High recycling rates have already been achieved by some Member States. For example, in Flanders, The Netherlands and Austria almost all mineral C&DW is recycled into high quality recycled aggregates. This has been achieved by development of several tools needed to guide recycling in the right direction. The tracking and tracing of C&DW is well regulated, each tonne of waste is accounted for. The good quality of products is ruled by a Quality Assurance scheme which leads to certified products. Certification includes environmental testing based on leaching tests. Certified recycled aggregates can be safely used. The main drivers for recycling came however from politics: it is forbidden to landfill C&DW so the only option left is recycling.

Benefits

Main benefits from recycling C&DW are:

- * *A main contribution to the Circular Economy.* One third of all waste in the EU will become more "circular". New developments enable recycling on the highest levels: concrete to concrete, sand to sand, etc.
- * *Safe handling of hazardous materials.* In those Member States where recycling is well developed, hazardous materials are removed prior to recycling and subsequently well managed. In Member States where recycling is lacking, chances are high that C&DW disappears out of control, posing a risk to the environment.
- * *Reduction of CO₂ emissions.* This is for instance achieved by the fact that using recycled aggregates in road construction reduces the thickness of the asphalt layer
- * *Decrease traffic load.* As urbanisation ever increases, recycling is starting to be a part of the transport solution. As urbanisation requires new construction materials, these need not be acquired from more distant quarries. Far away landfills need not be driven to as waste material circulates within the built environment. Urban mining is the buzz word and C&DW recycling the perfect example of it. It is even possible to recycle on site using mobile crushing facilities.
- * *Recycling delivers jobs.* In those Member States where recycling is fully developed, thousands of jobs are created.

Conditions for recycling

Good quality recycling of C&DW is currently happening in only a few Member States. In these Member States authorities have shown to be willing to pursue recycling. We see this as the prime condition for any sort of recycling.

Requirements for recycling were already laid down in 2003, by a Task Group consisting of representatives from the European Commission, member states and industry in the framework of the EU program on Competitiveness of the Construction Industry. The requirements still stand. If they are not fulfilled, recycling will not happen.

Requirements for recycling

- * Fly tipping of C&DW must be sanctioned
- * Landfilling is only allowed at significant cost
- * Planned demolition including selective demolition
- * Recycling facilities must be available
- * Recycled aggregates meeting the relevant technical specifications are accepted and meet no discrimination in the market

Based on over 30 years of experience, we can state that three main elements must be in place: a landfill ban (or very high costs of landfilling), a quality assurance scheme for the production of aggregates and prescribed use of recycled aggregates in road construction. If these elements are not in place, it is safe to say that high quality, continuous and consistent recycling will not happen.

A main threat for quality recycling is disposal of C&DW in excavated areas and landscaping. The EU targets refer to backfilling, which in our view should only be allowed if the following conditions are met:

- * Backfilling must be done in an environmentally sound way. The environmental fitness for use of materials must be demonstrated based on leaching testing
- * Soil should only be used if no other (higher) purposes are found for that soil
- * C&DW may only be used after treatment, including crushing to produce recycled aggregates
- * Backfilling materials must comply with existing standards (including EU product standards) that apply for the specific purpose



Way forward in Europe

Action is now required at national levels to pursue the 70% recycling target for C&DW. First of all willingness must be there to make it happen. If that exists, FIR offers its support and expertise so that effective steps can be taken. The EU C&DW management protocol and guidelines for waste audits are available. Current statistics on C&DW are often not reliable. In order to monitor progress, we recommend that a full list of recycling facilities be made by Member States and that existing requirements on registration of incoming waste are applied and enforced.

The approach for stakeholders at national or regional level to take has been summarized by FIR in the following 10 steps.

STEP 1.

Willingness and building a coalition

Firstly it is required that authorities, national, regional and local, be convinced that improper management of C&DW is detrimental to the environment and to human activity and that recycling must happen. If such determination is lacking and authorities are not willing to achieve good quality recycling, this will not stand any chance. Proof of determination and willingness is given by the fact that authorities take the lead and actively put in place legislation that is bound to result in recycling.

However, authorities can not do the job alone. If they have given proof of their willingness, there will be stakeholders wanting to contribute. Entrepreneurs and organisations stand up readily, as they sense the opportunities. It is key to build a coalition of the willing and discuss with them the route to follow. As the circle of stakeholders will widen rapidly, an important thing is to ensure that agreements are made with the right parties. A main task will be on the shoulders of recyclers and as they are a newcomer in the market, they need to organise a recycling association. Such an association is the natural partner for the authorities, as are associations of other branches such as the demolition industry.



STEP 2.

Making a plan

The joined stakeholders should gather and design a plan for quick development of recycling. Whereas the goal is set (70%), it is now a matter of identifying what is needed and who should take action. This is written down in an implementation plan. Main issues are:

- * Legislation must be put in place which will divert C&DW from landfill to recycling. In the most successful Member States this is achieved by banning landfilling. It is a task of the central authorities to develop proper legislation and of all authorities to ensure that it is fully implemented and enforced.
- * The recycling industry must ensure the production of high quality recycled aggregates. Key to that is that rules for waste acceptance are defined and that good quality can be proven by way of quality assurance.
- * Public road owners perform demonstration projects to prove the sound and safe use of recycled aggregates. Based on that, they prescribe the use of recycled materials in their procurement.

Many more issues must be dealt with. For instance; a method of collecting accurate waste statistics, safe handling of hazardous materials such as asbestos and tar, good practices and rules for demolition etc. As recycled aggregates fulfil the same requirements as primary aggregates, the overall outcome of a plan will and should be the end-of-waste status.

STEP 3.

Stop landfilling, and other measures to take

It is already noted in Step 2, but it is worth repeating. There is only one way to kickstart recycling, that is by banning it from landfills. Of course C&DW should not, as a result, be tipped illegally. The most effective way to ban landfilling is by implementing a landfill ban. It is as simple as that.

The overall approach of the management of C&DW should be well established in the (obligatory) national waste management plan. Proper management of C&DW requires that measures are prescribed for all steps in the chain. This includes at least the following:

- * Rules for selective demolition
- * Rules for waste accounting in the chain
- * Rules for environmental testing

STEP 4.

Accounting for waste

A major challenge is to collect accurate data of the C&DW that is generated. It is required by EU legislation that waste may only be transferred to undertakings that carry out waste treatment operations. EU legislation also requires that such undertakings obtain a permit from the authorities. Therefore, C&DW (in theory) can only be guided to and received by companies known to the authorities. Moreover, these companies should, in line with EU legislation, keep chronological record of the quantity, nature and origin of waste received and make that information available, on request, to the competent authorities. Again in theory then, it should be possible for Member States to give full account of all C&DW generated and recycled – that is, if the EU legislation is fully adopted and implemented.

STEP 5.

Building an infrastructure

The basic rule is: start simple. There are very nice examples of high level recycling to be found, but when recycling is in its first phase, only basic treatment is feasible and necessary. Basic treatment means crushing of inert waste into recycled aggregates. Prior to that, selective demolition must take place to separate hazardous waste and materials that have a negative influence on recycling. At construction and demolition sites the non-inert waste (mixed C&DW) must be separated from inert C&DW.

When recycling and markets for recycled products mature, the demand for higher quality material will increase. This makes it necessary to adjust and upgrade technologies so as to remove all impurities and meet demands for higher applications. The volume of markets also grows, requiring more professional attitudes. This is reflected in better overall quality management of a recycling plant. Whereas mobile crushing may have been a solution on the short term, bigger and more advanced plants are needed to deal with a variety of inputs.

In the first stages of recycling the main focus should be on treatment of clean inert C&DW. Treatment of any other parts of the integral C&DW (such as gypsum, insulation etc.) is far from feasible in a stage when first steps are taken. Besides, the inert fraction (masonry, cement, tiles, ...) makes up the biggest volume and its recycling requires the lowest investments.



STEP 6.

Prescribing the use of recycled aggregates

Recycled aggregates have an added value for road construction. As there is a remaining binding capacity in crushed inert C&DW, it makes up a stronger subbase than some primary materials. It is therefore possible to save on the use of asphalt. This is where greenhouse gas savings come in. Use in road construction is the first step, full closing of the loop will soon become possible such as use of recycled concrete aggregates in (poured) concrete.

Clients and contractors will not be convinced right away, therefore performing demonstration projects will be helpful. They help to understand the performance of recycled aggregates, adjust the recycling process if necessary and find out about the specifications that recycled aggregates need to meet.

In a next stage public road owners need to take the responsibility of prescribing the use of recycled aggregates. Usually road owners have already established specification rules for the application of materials in road building. It is important to also include the use of recycled aggregates in the relevant guidelines.

STEP 7.

Safeguarding environmental fitness for use

A major concern, at least in the early stages of development, is about the environmental behaviour of recycled aggregates. One can easily refer to more than 30 years of safe use of recycled aggregates in some Member States. Evidence must however be built on national and even regional level.

For markets to develop and for recycling to be successful, it is important that environmental soundness is not to be proven for each individual project. If that is the case, discussions arise for every project (or per municipality or regional level) whereby stakeholders may have their own perception of what is safe. It is very important that rules for environmental testing are set at national level. This provides clarity and uniformity for everyone and a sound basis for entrepreneurs to invest.

Environmental testing includes that leaching behaviour is determined. Use must be made of the European test method for aggregates, EN16637. This test method is new and replaces earlier national test methods. Care must be taken that leaching limit values need to be adjusted to this new test method as the conditions of leaching will differ from those in national test methods.

It is frequently discussed how often leaching tests must be performed. It is of course not possible to test each batch of recycled materials. Instead a testing regime should be developed on the basis of a statistical approach whereby the variability of test results is taken into account.



STEP 8.

Securing quality

Recycled aggregates must be produced according to European product standards. Main standards to apply are EN13242 (for unbound use) and EN12620 (aggregates for concrete).

As with other secondary materials, just giving proof that a certain standard is achieved is not enough. The constant good quality and moreover the constant environmental soundness must be secured at all times. A national quality assurance scheme is a powerful means to achieve that. Based on such a scheme the production process and resulting products can be certified by a third party. A certification scheme ideally includes both technical and environmental issues. A certificate will give proof that recycled aggregates are safe to be used at all times.

A quality assurance scheme includes the following issues:

- * Waste acceptance
- * Product requirements
- * Process requirements
- * Factory production control
- * Certification rules



STEP 9.

Tools enabling recycling

Recycling can be made possible, and will become easier to achieve, when several tools are developed that enable a structured way of working. Such tools can either be privately developed (for instance by a recycling association) or be a part of legislation, or somewhere in between. The main thing is that tools are acknowledged and generally used by actors in the chain.

Examples of tools that enable effective recycling are:

- * Guidelines for selective demolition
- * Rules for asbestos removal prior to demolition
- * An approach for determination of tar in asphalt and rules for removal
- * A standardised way of waste acceptance

STEP 10.

Learning from experiences

A great advantage of starting C&DW recycling now is, that some Member States are already at a very advanced state of recycling. Their experiences include most or all of the above and much expertise is available for other regions in Europe. In those Member States examples can be found how issues mentioned in this document have been dealt with. Well involved experts are available who have experienced in the national developments and who have excellent knowledge how things matured. These experts can for instance be found working for national recycling associations or for (national) authorities.

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