



Dear reader

In this issue of the "BREAKING NEWS RE-CON line" newsletter we **focus on the Re-Con Dry Washing** process. What is it? What can it do for the reduction of waste? We will answer these questions and take you for a tour around the world with the **interviews with 4 experts about sustainability and recycling** in concrete production. Use the contact details on the last page for feedback, subscriptions, and requests for information. I wish you an informative reading!

Sven-Henrik Norman - Corporate Product Manager - RE-CON line

The **Re-Con Dry Washing** method was invented by Mapei in 2019. It **greatly reduces washing slurry waste and washing water consumption from concrete trucks** by using the absorbing properties of the Re-Con Zero EVO aggregates made from transformed returned concrete. The method makes it possible transform washing slurry into a recycled aggregate, instead of having to process, transport and deposit it at landfills.

Much less water is needed to complete the cleaning of the truck mixing drum after it has been dry washed. The residual washing water has a lower solids content, lower pH and a lower risk of containing heavy metals like hexavalent chrome. All this is due to the **unique absorption of cementitious residue onto the dry washing aggregates**.

And there is one more advantage: Mapei analysed and tested the dry washing aggregates together with the renowned research institute SINTEF in Norway and discovered that the **Re-Con Dry Washing** particles absorb carbon dioxide through the process of carbonation. **The RE-CON Line offers unique possibilities to produce carbon negative aggregate materials** and Mapei Research continues in this field.

**THIS ISSUE
FOCUSES ON**

RE-CON DRY WASHING

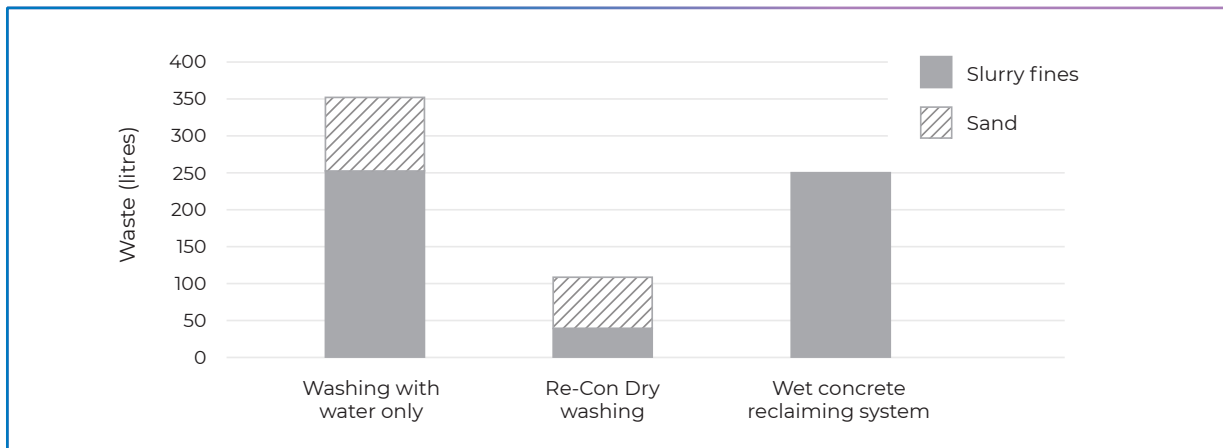


RE-CON DRY WASHING: A METHOD TO REDUCE TRUCK WASHOUT SLURRY

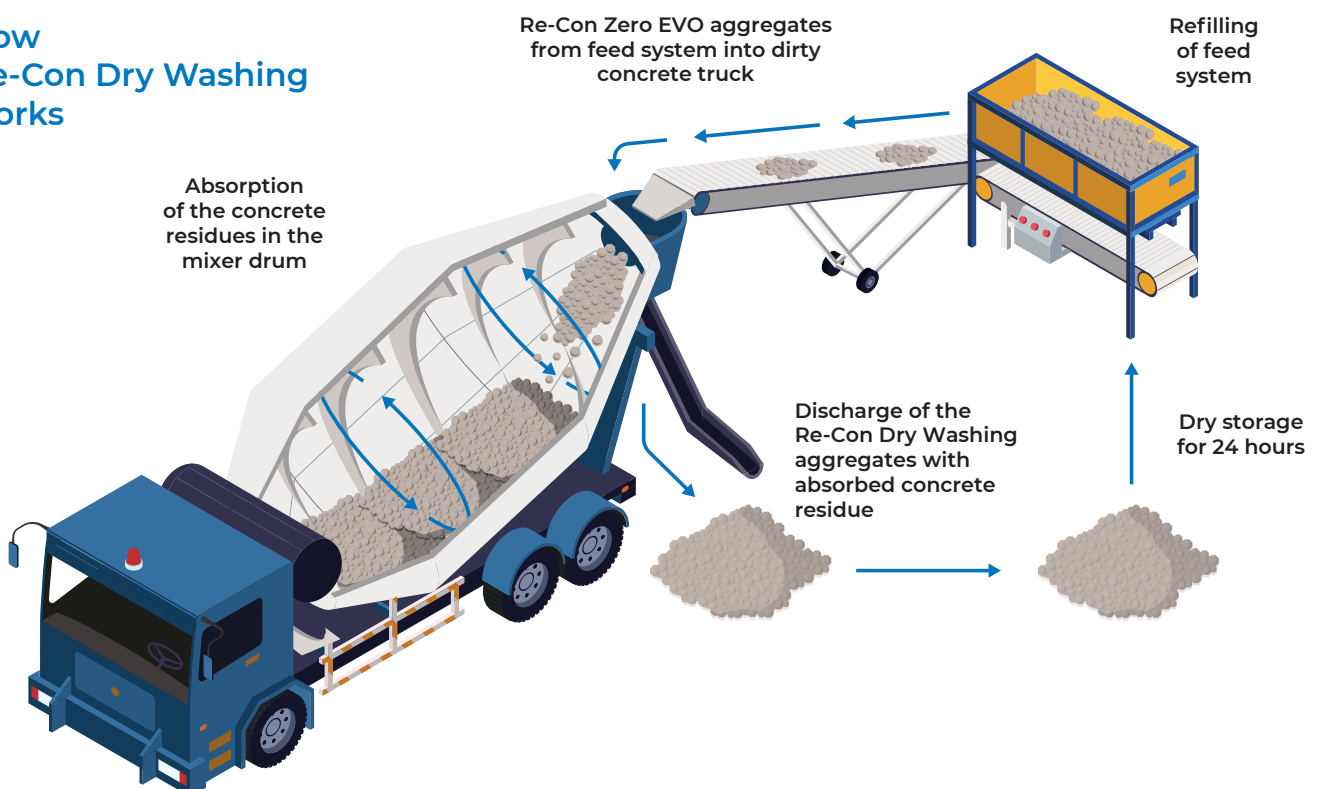
Does Re-con Dry Washing really work? **How can we prove it?** Let's have a look at some **concrete data and real case histories** in the following pages.

70% LESS CEMENTITIOUS WASTE IN EVERY TRUCK WASHOUT.

Re-Con Dry Washing utilizes the absorption capability of the Re-Con Zero EVO aggregates to **clean trucks of cementitious waste** that is otherwise washed out. Using Re-Con Dry Washing followed by a light wash with water **greatly reduces truck washout solids that lead to a high pH** and increased risk of pollution of heavy metals like hexavalent chrome. With Re-Con Dry Washing, **the root cause of truck washout pollutions is removed** by the transformation of waste into aggregates in a repeatable process. You can find more details and data in the graph and infograph below.



How Re-Con Dry Washing works



ØLEN BETONG IN NORWAY

In Scandinavia, the Re-Con Dry Washing process has been in use since 2019. Mapei was awarded the 2020 Innovation of Year Award in the Norwegian Building Industry for this innovation.

The company Ølen betong is operating one of their many ready-mix plants in Norway. They were the first customer to start using the Re-Con Dry Washing method in close cooperation with Mapei's Sustainability team.

The process starts when the concrete truck comes back in the evening and is parked next to the hopper. **The feed hopper feeds the dry-washing aggregate onto the conveyor belt that feeds it into the concrete truck** which is rotated at high-speed. The **aggregate absorbs the washing slurry** inside the truck. The driver moves the truck to the materials storage unit and with the dry-washing material inside the drum **rotates it forwards and backwards for a few minutes** and then empties it into the storage unit. **When it has dried for about 24 hours, the operator breaks it** with the wheel loader and put it into another storage unit. **Then the process starts over:** the material is fed back into the hopper and continues the dry-washing process. If the weather is nice and dry, the process can be repeated for several weeks. If it is rainy and wet, one needs to replace the material after one week.

When the trucks have completed their work for the day and do their dry-washing process, **the mixing trucks are much cleaner** because much more of the washing slurry is caught than before. **When the trucks have been dry washed, they only need a light wash** and can be parked for the day.

Ølen betong's representatives claim: "When the aggregates are saturated, **we use them to produce concrete blocks to make what we call "Lego blocks"** which is a product we can sell out. In this way, we **manage to recycle both concrete and slurry.**" The result speaks for itself: the Ølen betong plant today has **very little washing slurry and the vast majority is transformed into recyclable aggregates** and used for concrete block production on site.

The company has set an ambitious target for this plant: "The goal is no doubt to reach 100% recycling. Everything we put in our concrete trucks should be used as a product in one form or another. We see lots of possibilities here. We have already been able to realize some of them and we are excited to see what we will be able to do in the future. There is no doubt that **Re-Con Dry Washing process helped us enormously tackling our problems with washing slurry.** We can say: "It works!"



Above, left - Simple feed hopper and conveyor solution to feed dry washing aggregates into a dirty truck.

*Above, right - End result of the **Re-Con Dry Washing** process: recyclable aggregates with increased carbonation potential by absorption and hardening of the cementitious waste from concrete truck washing.*



AB SYDSTEN IN SWEDEN

The company **AB Sydsten** operates a ready-mix plant that has been using the **RE-CON DRY WASHING** method since 2021.

We asked AB Sydsten to share their thoughts on the **Re-Con Dry Washing** method. “We have seen many advantages with this method,” they claim. “**The water consumption is greatly reduced** and the water that we do get from washing the trucks with our new high-pressure system is much cleaner than before, even if we use less water for each truck. The washing water basically contains only sand and so it sediments much quicker than before. This way **we can recycle the water easier in the washing system** and we are preparing **to start to use it for washing the concrete mixer as well.**”

As for the economic aspects of the method, they admit that the method does require some investment in storage units, crusher bucket and the high-pressure washing lance. But the total investment is much less than if they had invested in a completely new concrete reclaiming system.

Reduced washout waste, cleaner water and less water usage are the three aspects that, according to AB Sydsten, makes **this method a success**. The method in combination with producing and selling blocks from some of the returned concrete and used material from the dry washing process also generates an income, and this combination is very positive.

4 VOICES FROM THE WORLD

Mapei is a global company and we take a leading role in **developing products and solutions for more sustainable concrete production**. Both in our daily work supplying our customers and in our strategic Research and Development of new solutions, **we take on board the thoughts and considerations of academics, customers and industry experts**. Below is a sample of those thoughts and considerations. We **asked 4 people from around the world the same two questions** about awareness of waste reduction in their area and what is needed to increase the use of recycled materials in new concrete.



*Professor Takafumi Noguchi,
University of Tokyo*



How high is the level of awareness in your geographical area regarding the environmental impact of returned concrete and washing water slurry?

I am aware that in Europe it is common practice to discharge returned concrete on the ground, let it harden, crush it and then use the hardened recycled aggregates to manufacture new concrete. This also happens in Japan, but **most Japanese concrete manufacturers are unwilling to use these aggregates for new concrete**. Even though there is a national standard that permits their use, nevertheless, only **a small amount of recycled aggregates (probably less than 1%) is used in the manufacture of new concrete**. They can be used but their use is discouraged, which suggests that environmental awareness in Japan is not yet high enough to allow for a wider use of these materials.



In your opinion, what is the most important factor in order to increase the usage of recycled aggregates in new concrete?

Standards and government incentives are very important in achieving this goal, but they are not the only key factors. I am aware that, according to current European standards, such as EN 206, up to a maximum of 5% of reclaimed aggregate is permitted in new concrete; so, **European concrete manufacturers can use up to 5% of reclaimed aggregate** for new concrete without any restrictions. **In Japan we have a similar standard that allows us to use reclaimed aggregates**, but we need to wash them: no dry system is permitted. Currently we are working on a new standard which will allow us to use the dry system to make granulated aggregates by using such additives. Nevertheless, **the use of reclaimed aggregate in Japan is limited.**

Even though the Japanese government incentivizes the use of recycled materials rather than natural crushed aggregates for concrete used for public works, **many concrete manufacturers and construction companies do not like using these materials.** This is also due to the fact that the demolition of structures mainly takes place in cities, whereas the construction of new roads takes place in rural areas, so there is some distance between the places where returned concrete is processed and the places where new concrete is manufactured, thereby creating the need for transportation which, in turn, generates new environmental disadvantages.

Quality is also crucial: we need to be sure that **recycled aggregates enable concrete to maintain its properties** both in the fresh and hardened state. This is why we are looking at the new developments by Mapei with great interest and **are willing to work together with Mapei in this field.**

In addition, it is important to cooperate with other industries so that we can work together on the reduction of carbon dioxide on the road to carbon neutrality.

BIOGRAPHY

Takafumi Noguchi is currently Professor at the University of Tokyo, Department of Architecture. He holds many prestigious positions in the field (Vice-president of the Architectural Institute of Japan, President of the Japanese Society for Finishings Technology, Chief Director of the Ready-mixed & Returned Concrete Solutions Association, Chair of ISO/TC71/SC8) and has been awarded several prestigious prizes (the ACI "Excellence Award in Concrete Construction" in 2017, the 2018 fib Award for Outstanding Concrete Structures in the Building Category, the Technology Award of the Japanese Concrete Institute in 2021). His main fields of research include carbon-neutral concrete, sustainable recycling and optimum resource circulation of concrete, performance assessment and conservation of historical concrete structures and the durability, design and optimum rehabilitation of concrete structures.



**Christian Engelsen,
Chief Scientist, Sintef**



How high is the level of awareness in your geographical area regarding the environmental impact of returned concrete and washing water slurry?

The general view held by the ready-mix concrete industry in **Northern European countries is that concrete and concrete washout slurry (water and solids) should not be landfilled but recycled.** However, it is difficult for the companies and the professionals working in this industry to fully understand what this means in detail when it comes to the real impact of recycling on the environment. The reason for this is that assessing all the environmental effects is complex. **New legislation is coming into effect in Norway, but has yet to be fully implemented.** Many ready-mix



producers have started to investigate the effects of the new legislation and what changes they will need to make in their waste handling of concrete, slurry and water. More and more often they are asking us at Sintef for advice and are turning to suppliers for solutions and equipment. To summarise, **the level of awareness is quite high in the Nordic region** and changes are being made to become more sustainable and circular. But some questions still remain unanswered.

In your opinion, what is the most important factor in order to increase the usage of recycled aggregates in new concrete?

To use recycled aggregates in newly produced concrete the most important factors are:

- a. **Ensuring sufficient and stable quality of the aggregates;**
- b. Ensuring **sufficient availability of the recycled products:** they must be available when customers need and require them;
- c. **Ensuring cost-effective production processes** with recycled aggregates and their availability at market prices, and with a clear declaration of the technical quality and environmental benefits of the resulting concrete. This is essential in order to gain trust among producers of ready-mixed concrete.

SINTEF

The SINTEF foundation is a non-profit research foundation. Its purpose is to contribute to the development of society by carrying out research into natural sciences, technology (including construction and civil engineering), and health and social sciences in collaboration with the Norwegian University of Science and Technology (NTNU). One of Europe's largest research institutes, SINTEF is an independent foundation which, since 1950, has been creating innovation through development and research assignments for business and the public sector at home and abroad.



Richard Amadio,
Director, PumperDump



How high is the level of awareness in your geographical area regarding the environmental impact of returned concrete and washing water slurry?

I believe that **in Australia the importance placed on waste streams**, and particularly on cleanly collecting and recycling concrete waste and concrete washout, **isn't yet high enough** on anyone's list of priorities. The current focus on material and labour costs in the built environment is distracting from current opportunities in the circular economy that could offer savings in different areas.

Whilst the carbon intensity of cement and concrete production is very high, this lack of concern around concrete waste is accentuated because **builders can easily and simply go and buy Green Credits to tick the environmental boxes**. This practice creates inadequate incentives which act as **a major barrier to progress**.

Builders are still happy to line concrete washout trays and blow back bins using plastic and tip the dried concrete into the on-site skip bin, comingling it with other building waste. **Concrete contaminated by plastic greatly reduces the quality and quantity** of what can be recycled or considered for upcycling into new concrete.

The washout slurry water is allowed to slop around and go wherever it runs, creating slip risks for



workers and environmental run-off risk. The slurry part of the washout process isn't even considered as a resource for the circular economy!

In your opinion, what is the most important factor to be able to increase the usage of recycled aggregates in new concrete?

We believe that there are numerous factors needed to increase the usage of recycled aggregates in concrete and it starts with the prime driver, mindset. **The mindset shift required will be assisted by policy, regulation and enabling technology.** Policy will build awareness, regulation will create incentive and **industry actors will undoubtedly then find the investment needed to innovate** and collaborate to go forward. Clean waste streams, new systems, infrastructure and processes will follow to deliver upcycled concrete that uses significant proportions of recycled aggregate.

PUMPERDUMP

PumperDump has been operating in Sydney, Australia over the past 20 years providing solutions that assist in lowering the environmental impact, costs and safety risk of concrete waste. Sustainability has always been at the forefront of our business principles, driving further innovation and development of new systems for the industry, including the latest patent-pending 5 m³ blowback bin. PumperDump is member of The Green Building Council of Australia which has had a major role in educating, bringing people together, and helping develop new standards for the construction industry.



**Lina Margarita Cure Bojanini,
Director for Quality and
Optimization, Cementos Argos**



How high is the level of awareness in your geographical area regarding the environmental impact of returned concrete and washing water slurry?

As a company, we prioritize sustainability and **strive to minimize our environmental impact when using materials.** This includes our use of recycled concrete, which we aim to reuse whenever possible. We currently have **recovery systems for some operations,** but we are always looking for ways to improve their efficiency. In addition, **we have conducted investigations into concrete slurries** and found that their composition varies greatly. This makes it difficult to use them in economically and operationally viable percentages in our mix design.

In your opinion, what is the most important factor in order to increase the usage of recycled aggregates in new concrete?

In order to promote the use of recycled aggregate in concrete, it is important to **approach the issue from multiple angles.** Firstly, it is necessary to develop **standardized regulations** that govern the industrial production of recycled aggregate and its use in concrete mixes. Additionally, it is crucial to continue regulating the minimum amounts of recycled material that can be used in concrete mixes. Secondly, the construction industry needs to be **educated on proper waste management and the use of debris** to facilitate the production processes of recycled aggregates. This will lead to the production of recycled aggregates with better characteristics at a lower cost.



Thirdly, research should be conducted to **determine the impact of using recycled material on the different properties of concrete**. This will help determine the optimal percentage of recycled material that can be used in concrete mixes to achieve the best performance of the material.

CEMENTOS ARGOS

Argos is a growing concrete and cement multinational with a consolidated presence in 16 countries and territories with emerging and developed economies. It has an 80-year history and today it is the number one cement and concrete company in Colombia and one of the most relevant companies in the sector in the United States, Central America, and the Caribbean.

