



Let's Talk: #grey2green – Jointly build up a green ecosystem for cement industry

This year marks the 15th year of the concept "green water & green mountain is of great treasure". Over the past 15 years, under the guidance of this concept, green development has been deeply rooted in the hearts of the people and the construction of ecological civilization has blossomed. Taking the cement industry as an example, over the past ten years in China, the cement industry has been exploring and upgrading on the road

of sustainable development of deep emission reduction and green transformation, and has achieved remarkable results. According to the “Bulletin of the second National Census of Pollution sources” released in June this year, China's high-emission industries such as cement production has increased by more than 50% in the past decade. However, the total emissions of major pollutants in the industry have dropped significantly, among which nitrogen oxides in the cement industry have fallen by 23% compared with 2007. How can the cement industry achieve green upgrades? Ccement.com interviewed Dr. Björn Olaf Assmann, CEO of thyssenkrupp Industrial Solutions (China) Co., Ltd., at the 21st China International Cement Industry Exhibition (Cementtech 2020).

Below is the original interview with Dr. Björn Olaf Assmann:

1. Since the State Council issued the "Three-Year Action Plan to Win the Blue Sky Defense War" in 2018, the cement industry has accelerated the pace of green transformation. Now after more than two years of development, in your view, the current cement industry green upgrade is in what stage? What breakthroughs have been achieved?

We definitely see the changes of the cement industry in China towards green transformation. Many provinces have decided to enforce stricter emission limits in 2021, which means in less than one year from now on. This is in accordance to the “Three-Year Action to Win the Blue Sky Defense War”. Almost every cement plant is considering investments on emission abatement, like NO_x-reduction, avoidance of dust emissions or even SO₂-removal, in order to comply with the new standards for emission limits. On the other hand we also see that some cement plants intent to invest in the most advanced emission abatement technology such as SCR in order to ensure that even stricter requirements in future on reduction of NO_x, NH₃ or even for Mercury (Hg) can be met with the investment of today. And in my opinion the major breakthrough is, that cement industry does not see green transformation as a hurdle because of costs - the cement industry takes green transformation as a chance for improving their business.

2. In order to realize the transformation from grey to green, the cement industry is changing in terms of green mines, green production, resource re-use and so on. Your company has been deeply cultivated in cement industry for many years, from what aspects can you help cement enterprises achieve green sustainable development?

The transformation towards a more sustainable cement production can be triggered by governmental policies. And we think that this development can be strongly supported by economically attractive solutions, which we are offering to our customers.

Let me give you following examples:

The utilization of wastes to replace coal as fuel is a real business case. Our prepol® SC - technology is the ideal solution for this application. And there are so many different waste sources available that cement plants can optimize the waste composition in order to gain certain profits because of replacement of standard fuel like coal on one hand while reducing expensive landfill disposal of these wastes on the other hand. This is a perfect win-win-situation for the cement industry and for the environment and the society.

One of the biggest challenges the cement industry will face in future will be the reduction of CO₂ emissions, because cement production is responsible for more than 7% of the global CO₂ emissions. However, we as thyssenkrupp are providing technologies to reduce the carbon footprint of cement production. A very attractive solution are Activated Clays, which can replace clinker to a very high extent while keeping or even enhancing the cement properties. And with our polysius® carbon neutrality technology we can even almost eliminate the emissions of CO₂ during cement production, while using Oxyfuel process and capturing the CO₂ for further separate downstream processing.

Another example is the development of the next generation in high-efficiency grinding technology. By introducing this new kind of technology, cements can be produced with significantly improved quality properties and also enables cement plants to extend their existing grinding capacities at minimum investment.

So, our vision of green sustainable cement production is considering a bunch of different solutions and technologies serving the market needs and requirements of our clients.

3. Atmospheric governance is an urgent concern of the current industry. As industry emission standards are tightening, the task of reducing nitrogen oxides and CO₂ emissions is challenging. In your opinion, what are the difficulties of nitrogen oxide and carbon dioxide management in the cement industry? How does your company respond to it?

The options and the strategies to avoid or to reduce the emissions of nitrogen oxide and carbon dioxide are different. For nitrogen dioxide the situation is quite clear and suitable solutions like SCR-technology are already available and proven. Modern firing systems like our polflame burner or the latest generation of calciner systems can help to reduce the formation of nitrogen oxides. But the formation of nitrogen oxides cannot be avoided completely, so that specific treatment will be still required. And with our High-Dust-SCR-technology we are able to achieve extremely low emission levels in converting the harmful nitrogen dioxides to non-harmful elements as nitrogen and water. And we integrate this conversion into the cement production process without any interference to the cement quality and to the production process. In other words: The nitrogen oxides will simply disappear to the major extend.

For carbon dioxide the situation is little different as CO₂ cannot be treated in the cement process in order to get it disappeared. And as long we are using Limestone as raw material for the production of cement, we cannot avoid the emission of CO₂.

But there are several options to avoid CO₂-emissions:

Cement can be produced with lower clinker factor, so less clinker is required for the same amount of cement. This is directly linked to lower consumption of Limestone as the major source of CO₂ emissions in cement industry. Clinker can be replaced by several other materials, like Limestone, Slag, Fly Ash or

in an even more effective way by special treated clay – so called Activated Clay.

Another option is to capture the CO₂ from the cement process and to treat the CO₂ in a separate process. Here are already certain technologies under development. But in order to process CO₂ separately and in an economical way, the CO₂ content in the waste gas has to be available in highest concentration possible. And this can be achieved by implementation of Oxyfuel-process – the replacement of ambient air by oxygen for combustion. This enables very high CO₂-concentration of more than 90% in the waste gas of the cement process and makes this gas usable for further downstream processes to re-use CO₂ or even to storage CO₂.

4. Energy conservation and consumption reduction is a topic that the cement industry cannot bypass for green development. Among them, reducing electricity consumption and coal consumption can save a lot of costs for cement plants. In your opinion, what is the key to reducing energy consumption in cement plants? What can the company do for cement companies?

The grinding processes to generate raw meal and as the final step to cement are the major contributors to the electrical power consumption for cement production. So the key is to implement the most efficient technologies for grinding such as HPGR for raw material and for cement grinding. With our polycom-HPGR solution we are offering a system with lowest operational costs and highest availability. But the grinding process can only be efficient, when it is connected to an effective separation process. And our latest separator technology helps to reduce the specific power consumption significantly. We also developed many other technologies to reduce power consumption. For example, we re-designed our polytrack® clinker cooler in order to reduce the specific power consumption significantly and further improved the design in view of maintenance and spare parts concept. We also re-engineered the design of our preheater cyclones in order to further reduce the pressure drop without compromising on the separation efficiency. We are checking the entire value chain of cement production to enable our customers to produce cement in a most efficient way.

We also focus on fuel saving as in the past coal has been the major fuel for cement production. And this is changing now rapidly, as the cement process is very suitable to burn waste instead of coal. With our calciner combustion chamber prepol® SC we are able to replace coal by using a variety of different types of waste such as RDF, household waste or even hazardous waste. And currently we see a huge number of projects in China underline the attractiveness of this solution. And we are happy that within the next weeks our first prepol® SC reference in China will go into operation – it will be a milestone for the cement industry in China and a big step for our company serving the needs of the local market.

5. During this year's two sessions of the National People's Congress, deputies to the National People's Congress proposed to remove the cement industry from the high-polluting and high-energy list. What do you think of this? What more do you think the cement industry needs to do in the following green transformation process?

The suggestion to remove the cement industry from the high-polluting and high-energy list shows the confidence and commitment of the whole China cement industry in terms of industry upgrade and green transformation.

And I believe the transformation will be a continuous journey where we are discussing emission reduction on nitrogen oxide and CO2 right now and where we might discuss how to avoid emission of other harmful elements like Volatile Organic Material, Mercury in future.

From my point of view, the goal could only be realized with the joint efforts of everyone from this industry, be it cement plants, technology suppliers, institutions, associations or universities.

As part of this ecosystem, we as thyssenkrupp foresees the future trend and sets the focus in terms of research and development. And we are of course committed to contributing to this the goal with our advanced technology and global experiences.

6. Your company has been committed to promoting the industry's green and high-quality development. In the future, what's your company's plan in the promotion of green transformation of cement industry? Could you please elaborate a bit?

Our #grey2green initiative is covering the entire value chain of cement production and therefore sets the focus on multiple dimensions: emissions, resources, smart manufacturing, energy management and cement quality. And these elements are also to be seen as interconnected.

The reduction of emissions and the preservation of resources are already part of the green strategies of most of our customers - in China and also outside of China.

In order to utilize the resources to a maximum extend, we have to consider smart manufacturing solutions. For example, our advanced laboratory automation system polab® enables our clients to control the cement production process so precisely that the required raw material mixture can be achieved with minimum quantities and at lowest deviation from the desired set-point. On a manual basis this level of precision can never be achieved.

The trend towards renewable energy resources plays an important role for the cement industry. Questions like "how can wind power be used in cement industry" need to be answered, as the cement industry has specific requirements on energy management in terms of quantity, timing and reliability.

And we have to focus on the cement itself – what are the requirements regarding the cement properties now and in future and how can be clinker substituted without compromising on the cement quality. Activated Clay is the most promising material to replace clinker in a most economical way. As the availability of Slag and Fly Ash as clinker substitutes is limited.



The bottom line: Our #grey2green-initiative is to be seen as an umbrella for all of our activities and technologies to produce cement in a more environmental-friendly way. It is our vision and our conviction to be more sustainable in cement production.
