Sustainable construction with CCPs – an update for Europe

Fabrice Fayola and Joachim Feuerborn

In Europe, the developments towards carbon neutrality by 2050 with impacts on fossil-fired production but also for construction materials and construction are finding it's way. For fossil-fired energy and heat production this results in increased production by renewables and respectively discontinuous replacement production by coal power plants, and by this in availability issues for Coal Combustion Products (CCPs). For most member states phase-out dates have been published and some countries already phased-out.

Although known and used for decades, especially fly ash is subject of increasing interest for the production of carbon-reduced cement and concrete. The CCP production in coal-fired power plants in Europe still totals to about 75 million tonnes with decreasing tendency. Beside fresh production in power plants, especially fly ash is re-used from stocks and stocks with fly ash and bottom ash are under investigation. Furthermore, imports serve for customer needs. In addition to CCPs also other alternatives serve as raw or construction material having partly only regional significance. The declaration of sustainability factors is a must for future construction, also data base entries are important for planners.

The report gives an update on the diverging developments of market needs and options by CCPs.

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Secretariat of ECOBA is managed by vgbe energy e.V.)

ECOBA in brief

ECOBA, the "European Coal Combustion Products Association", was established in 1990 by European energy producer and marketing companies to deal with matters related to the use of coal combustion products (CCPs) as raw and construction materials. Today also downstream users are members of ECOBA. It represents more than 90 % of European (EU-27+) CCP production. ECOBA members consider coal combustion products valuable raw and construction materials which can be utilized in various environmentally compatible ways.

Facing the aim of carbon neutrality and the developments in member countries the scope of activities was extended to materials which are beneficially used to replace or complement byproducts from coal-fired power stations with the same aims but also focussing on sustainable construction.

Introduction

Since many years the European power Industry is under continuous pressure to meet stricter emission limit values (ELVs) and increasingly also CO_2 reduction targets resulting in shut down of coal-fired power plants. Since 2008, the European Commission has constantly published climate an energy packages with targets for CO_2 reduction, increased use of renewables and improvements in energy efficiency. The aim of 55 % CO_2 reduction by 2030 was published as European Climate Law in 2021. Recently, the EC has published the 2040 climate target of 90 % CO_2 reduction by 2040 being the next intermediate step on the path to climate neutrality.

With the European Green Deal the member states have agreed on climate neutrality by 2050 of the EU economy. The increased installation of renewable power result in using less coal for energy production. In 2020, the production by renewables was first time higher than that of coal. The renewables are mainly wind and solar but also hydro and biomass for co-combustion in coal-fired power plants and pure biomass in FBC- and converted dry-bottom boilers. Along with all scenarios on reduced power production and significant changes on power production in single member states the production of Coal Combustion Products in Europe decreased to about 75 million tonnes, about 22 million tonnes of this amount in EU15 member states.

Since decades, CCPs serves as raw materials in the building material industry, in civil engineering, in road construction, for construction work in underground coal mining as well as for recultivation and restoration purposes in open cast mines. Availability is a major problem in regions and member states which resulted in re-use from stock and also imports. The use of CCPs is not only essential for the performance of building material, especially on long-term durability, but also important for the sustainability of materials and constructions established. As carbon neutrality have to be considered also for constructions the use of Environmental Product Declarations and specific data of materials in data bases are increasingly required by customers. Environmental requirements in form of requirements for release as well as for sustainability will be part of the new product standards to be revised in the coming years.

Climate change policies a nd regulations

Over the last years the European Commission (EC) agreed on energy strategies with a

Tab. 1. Milestones in EC regulations and initiatives on the path to net-zero.

Achievements	Dec 2008 Climate and Energy Package	Jan 2014 Climate and Energy Framework	Dec 2019 European Green Deal	Juli 2021 European Climate law (2021/1119)	Feb 2024 assessment for 2040 climate target
Reduction of greenhouse gas emission (basis 1990 level)	20	40	55 (by 2030)	55 (by 2030)	55 (by 2040)
Increase renewables energy consumption	20	32			
Improvement energy efficiency	20	32.5			
Interconnection EU electricity system		15			

vision for carbon neutrality in 2050 with the Green Deal and the Fit-for-55 initiative (Table 1). In 2008, the European Parliament and the Council agreed upon the so-called "Climate and Energy Package", which entered into force in 2009 [1]. The legislative package put in place what is collectively known as the EU-20-20-20 targets to be met by 2020:

- Reduction of greenhouse gas emissions of at least 20 % below 1990 level,
- Increasing the share of renewable energy to 20 %, and
- Improving the EU's energy efficiency by 20 %.

With this package additional legislation was installed for promotion of the use of renewable energy (RES), geological storage of carbon dioxide and a revised Trading Scheme for greenhouse gases (GHG). Since that time the installed capacity of renewable power has increased but the geological storage of separated CO_2 faced technical and economic problems. The European Trading System (ETS) for CO_2 was installed and expected to serve for more emission reduction but was not effective at that time.

In 2014, EU countries have agreed to meet at least a 40 % reduction in greenhouse gas emissions, a binding target of at least 27 % of renewable energy in the EU and an increase in energy efficiency increase of at least 27 % by 2030 [2]. In November 2016, the Commission released draft legislative proposals designed to help achieve the set targets with measures including proposals on electricity market design, renewables and energy efficiency. The EU aims to achieve an 80 % to 95 % reduction in greenhouse gases compared to 1990 levels by 2050. Its Energy Roadmap 2050 analyses a series of scenarios on how to meet this target [3]. In 2019, the EU overhauled its energy policy framework to move away from fossil fuels towards cleaner energy – and, more specifically, to deliver on the EU's Paris Agreement commitments for reducing greenhouse gas emissions. The agreement on this new energy rulebook – called the Clean Energy for all Europeans Package – marked a significant step towards implementing the Energy Union Strategy, published in 2015 [4].

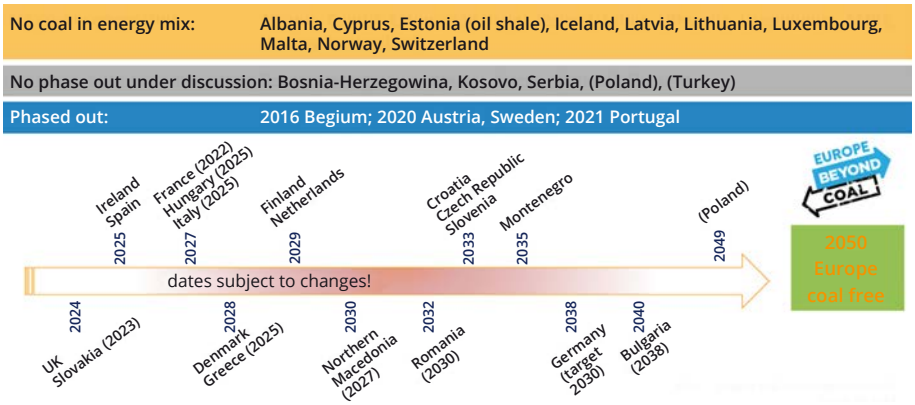

Fig. 1. Coal phase-out in Europe (based on updated information by Europe beyond fossil fuels [10]).

In its communication (COM 2019/640) [5] of 11th December 2019, the Commission presented the "European Green Deal" which sets out a detailed vision to make Europe the first climate-neutral continent by 2050. In its Climate Target Plan 2030 [6], the Commission proposed to raise the Union's ambition on reducing greenhouse gas emissions to at least 55 % below 1990 levels by 2030, which is a substantial increase compared to the existing 40 % target. To implement this, the European Commission 2021 Work Programme announced a 'Fit for 55' package [7] to reduce GHG emissions by at least 55 % by 2030, and achieve a climate-neutral Europe by 2050. This package covers a wide range of policy areas including energy efficiency, renewables, land use, energy taxation, effort sharing, emissions trading and the carbon border adjustment mechanism.

In June 2021, the EC published the European Climate Law [8]. In addition to the goal of climate neutrality and an aspirational goal for the Union to strive to achieve negative emissions after 2050, the European climate law sets a binding Union climate target of a reduction of net greenhouse gas emissions (emissions after deduction of removals) by at least 55 % by 2030 compared to 1990.

And recently, in February 2024, the European Commission presented its assessment for a 2040 climate target for the EU. The Commission recommended reducing the EU's net greenhouse gas emissions by 90 % by 2040 relative to 1990.

The 2040 climate target [9] will reaffirm the EU's determination to tackle climate change

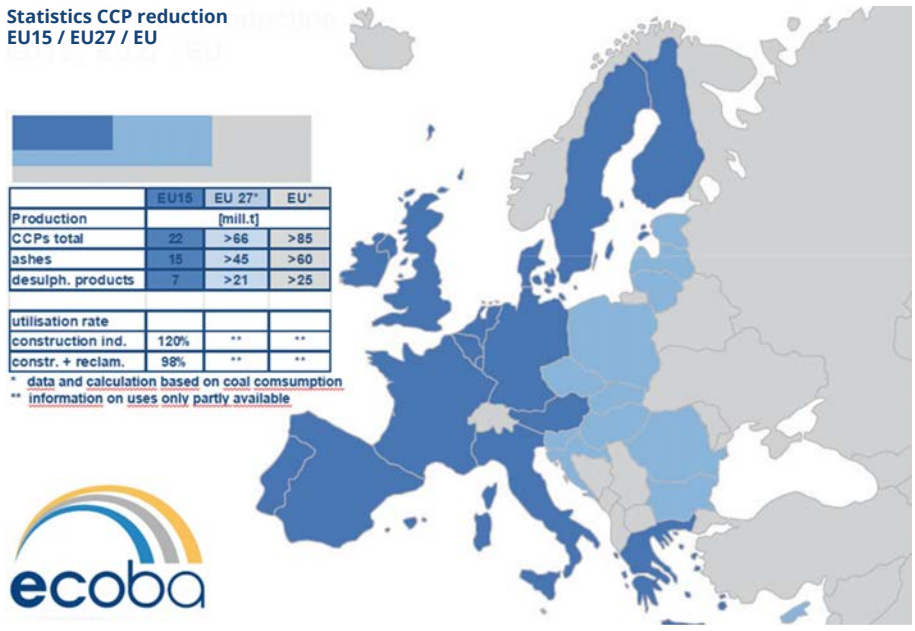

Fig. 2. Production and use of CCPs in Europe (EU15/EU27/EU) [12].

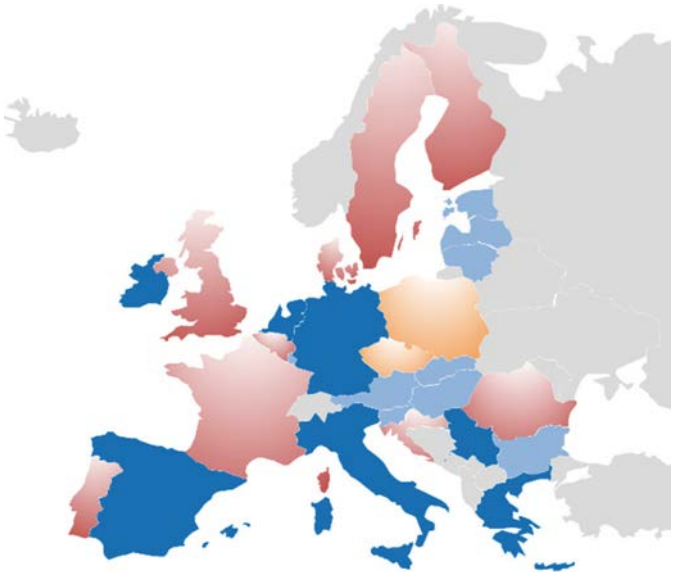

Fig. 3a. "Historic" re-use from stock.

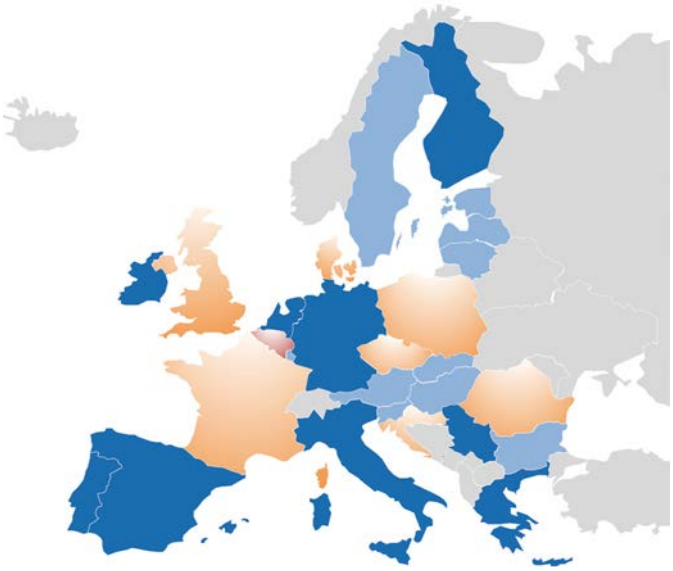

Fig. 3b. Re-use from stock: ongoing and/or developing.

and will shape our path after 2030, to ensure the EU reaches climate neutrality by 2050. The climate neutrality objective is at the heart of the European Green Deal, and is a legally binding objective set out in the European Climate Law.

The EU's 2030 climate target is to reduce net greenhouse gas emissions by at least 55 % relative to 1990. The 2040 climate target is the next intermediate step on the path to climate neutrality.

In consequence of all the initiatives member states have announced coal phase-out deadlines which are already corrected for some countries. An overview of the situation with phase-out decisions is given in Figure 1.

Coal combustion product – Availability – Fresh production in coal-fired power plants

In EU-15 member states, a continuous decrease in fresh production have been observed which result in 22 million tonnes of CCPs in 2022 [11]. But also the total production in EU-27 countries was reduced to 66 million tonnes and that for total Europe to about 85 million tonnes [12] (see Figure 2). For the total amount of ashes this is a reduction over the last year of about 30 %.

– Re-use from stock: ongoing and/or developing

Before CCPs were identified as valuable raw materials they were either disposed-off or stockpiled. With the development of markets for the beneficial use the amount of disposed ashes were reduced. However, in Europe more than 500 million tonnes of ashes on identified stocks are subject of increasing interest.

In Europe, the re-use from stock is practiced since decades for different reasons, mostly due to extension of municipal areas or for reducing environmental risks on long-term storage. The ashes were mostly used as raw material for cement clinker production or as filling material in earthworks and road construction. (Figure 3)

The ongoing re-use reflects the regular re-use in e.g. Belgium, the United Kingdom and especially in France where such ashes are used since more than 50 years for different purposes and since more than 30 years with use in cement and concrete after drying.

The developing use reflects the ongoing identification of stock, the research work on properties of ash from stock and the identification of markets, processing technologies and combined logistics.

– Imports

In addition to fresh production and re-use from stock also imports from other countries help to serve the market needs. The annual statistics of cross border transport figures [13] shows a regular import of about 2 million tonnes which is mainly for transport by truck cross border but also by rail and ship for longer distances. (Figure 4)

CCPs in standards

The quality of ashes is defined by technical and environmental requirements in standards and regulations which have to be met all the time. A continuous quality management including auto and third-party control is required. The standards and requirements are subject of regular updates to meet regulatory as well as market needs.

The most important standards with definitions for siliceous and calcareous ashes are EN 197-1 for cement, EN 450-1 for (siliceous) fly ash for concrete, EN 13282 for hydraulic road binders and EN 14227 fly ash for hydraulically bound mixtures. The aggregates standard deal with ashes as "manufactured aggregates" and the source materials are described in a CEN Technical Specification [14]. The rules for the application are provided with application standards as e.g.

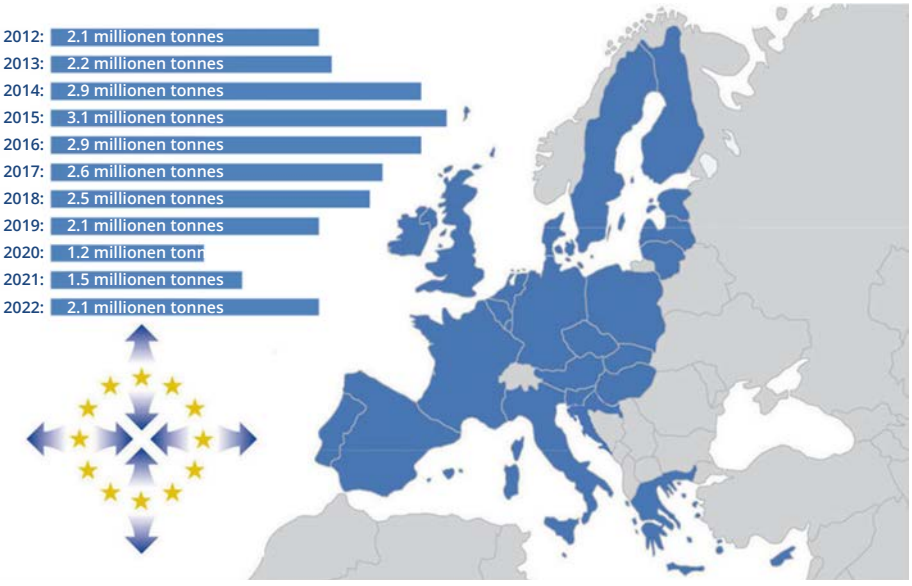

Fig. 4. mport/cross border transport of ashes in Europe [13].

EN 206 for concrete. In addition to the European standards national standards have to be considered, especially for earthworks where mostly non-harmonised standards are used.

The standards are evaluated all 5 years on revision needs. However, due to the Construction Products Regulation (CPR) [15] published in 2013 and Court rulings giving the European Commission the responsibility for all harmonized standards only few revised standards have been published in the Official Journal and the majority of revised standards were deemed not sufficient related to CPR requirements. Due to this legal struggle several CEN Technical Committees have compiled the necessary updates in non-harmonised standards. For example, TC 51 published a new non-harmonised standard for Portland-composite cement (CEM II/C-M) and composite cements (CEM VI) as EN 197-5 in 2021. Before such cements can be used they need to be cited in the building law of the single member states and also in application rules. It is expected that such standards will be incorporated into the revised product standard once it is possible.

One of the major obligations of the CPR is the inclusion of environmental criteria in the product standard. These are on one hand requirements on chemical constituents (content, leaching, concrete leaching) which are required on national level, and on the other hand the information on sustainability which are provided by now in Environmental Product Declarations (EPD).

To overcome the standstill with non-publication of revised harmonized product standards the EC has installed the "acquis process". This process is to ensure compliance of harmonised product standards (hEN), European Assessment documents (EADs) and legal acts. The EC has started to install working groups for the definition of the essential characteristics for the specific products covered by mandates. The existing CEN working groups, which are working on this for a long time, are meanwhile invited to support. The experts for the aquis working groups are nominated by the member states.

Based on the developments in the aquis process for the first two mandates (M100 precast concrete; M120 structural metallic products) first outcomes for standardisation requests (replacement for mandates) were presented end of 2023. The working group for cement (M114) met already twice and the first draft outcome is expected early 2025. The start of the working group for concrete (M128) is expected for end 2024 and for aggregates (M125) early 2025.

For the preparation of this work the CEN Committees are preparing for identification of parameters and respective test procedures. A major problem is identified with alkali-silica reaction which is evaluated with different methods for concretes in the member states and where no single test procedure is accepted by now.

The Technical Committees are also tasked to develop (or revise) Product Categories Rules (PCR) in order to fulfill the future requirement on sustainability. This work has to be based on EN 15804 [16] for sustainability of construction works and subject of evaluation by CEN/TC 350. It is up to the TC to decide whether only one PCR for additions and "admixtures" is prepared.

CCPs and sustainability

Over decades the environmental benefits for using CCPs in construction have been highlighted. Unavoidable combined with the combustion process of coal in power plants for energy and heat production there use in any construction resulted in economic advantages and environmental benefits such as saving of natural resources, saving of energy, saving of emissions of pollutants to the air, saving of CO_2 emissions and saving of disposal space.

Raw materials arising from natural resources are used in the construction industry, particularly as aggregates and as raw material for the production of cement, lime and gypsum. For mining, transportation and processing of these natural materials energy is required, either in form of electrical energy or fuel for trucks. The use of CCPs helps to reduce the need to quarry of mine these natural resources and therefore contribute to sustainable development.

Also in the last years Environmental Product Declarations (EPDs) have been produced as requested from customers. They are based on the principles of life cycle assessment of ISO 14044 [17]. Today, the EPDs have to be prepared based on EN 15804 [16] and the general principles must be specified in product-specific Product Categories Rules (PCR). This is meanwhile also a precondition for the revision of harmonized product standards.

For co-products allocation clause 6.4.3.2 of EN 15804 [16] provides that:

Allocation shall be avoided as far as possible by dividing the unit process to be allocated in to different sub-processes that can be allocated to the co-products and by collecting the input and output data related to these sub-processes. ….

In the case of joint co-production, where the processes cannot be sub-divided, allocation shall respect the main purpose of the processes studied, allocating all relevant products and functions appropriately. The purpose of a plant and therefore of the related processes is generally declared in its permit and should be taken into account. Processes generating a very low contribution to the overall revenue may be neglected. Joint co-product allocation be allocated as follows:

- *Allocation shall be based on physical properties (e.g. mass, volume) when the difference in revenue from the co-products is low.*
- *In all other cases allocation shall be based on economic values.*
- ….

When the contribution from coal combustion in former EPDs were neglected and considered "0" today the rules of EN 15804 provides that at least parts should be taken into account. However, this is differently interpreted by the acting parties mostly in considering economic allocation being the solution for all co-products. However, the power industry is of different opinion as being fully reliable for the CO_2 emission allowances.

In recent EPDs the global warming potential is calculated to up to 2 kg CO_2/t fly ash. For processed fly ash there are indicative figures published on UKQAA's website [18] considering different steps of processing with GWP rate up to 6.5 kg or up to 97 kg CO_2/t fly ash. Real scale EPDs for specific processing plants show GWP of 47.5 kg CO_2/t fly ash in case of processing and drying and of 61 kg CO_2/t fly ash in case of separation of fine fractions by air-classification.

For the fly ash produced in power plants a PCR for processed fly ash [19] was published which provides as follows:

The power plant operation outlays are allocated in full to the generation of electricity and heat as the primary purpose of this process in which hard coal fly ash is incurred as waste is the generation of electrical and thermal energy. Within the power plant process, hard coal fly ash reaches its end-of-waste after the electric filter in the power plant. For this reason, power plant operation outlays must be allocated in full to electricity and heat generation. The outlays associated with storage, conformity assessment and transport with the power plants as well as outlays associated with processing/refining after the electric filter are allocated to hard coal fly ash. The system boundary is formed by the finished product at the plant gate.

Based on these considerations EPDs have been produced which show mean result of 12 kg CO_2/t fly ash. Also a generic data set [20] was prepared for data bases to be used in the calculation of EPDs for end-users.

This will be the basis for the future work on a CEN PCR as the power producer allocate the CO_2 emission in full to the power and heat production process.

Conclusions and outlook

Environmental Strategies, Directives, Regulations and laws with strict aims for CO_2 reduction and carbon neutrality by 2050 inter alia result in closures of power plants due to economic consideration and phase-out deci-

sions. Based on this, the amount of CCPs as raw and construction materials is reduced and due to phase-out in some countries no longer available.

To serve the demand ash from stockpile and import from other countries are developing. Ashes from stock have been produced formerly in coal-fired power plants and are available in huge amounts. Licensing issue are a precondition for re-use from stock. Quality aspects have to be considered and processing is a must. For imports the respective quality control systems and the REACH registration for serving materials to markets have to be considered.

In addition, sustainability aspects will have an impact of transport distances. Product Category rules (PCRs) and Environmental Product Declarations (EPDs) for ashes from fresh production and from stock exist and are under further development.

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Kurzfassung

Nachhaltiges Bauen mit Kraftwerksnebenprodukte – ein Update für Europa

In Europa schreitet die Entwicklung in Richtung CO_2-Neutralität bis 2050 voran, was sich auf die Produktion mit fossilen Brennstoffen, aber auch auf Baumaterialien und das Bauwesen auswirkt. Für die Energie- und Wärmeerzeugung aus fossilen Brennstoffen führt dies zu einer verstärkten Erzeugung durch erneuerbare Energien bzw. zu einer diskontinuierlichen Erzeugung durch Kohlekraftwerke und damit zu Verfügbarkeitsproblemen bei Kraftwerksnebenprodukte (Coal Combustion Products CCPs). Für die meisten Mitgliedstaaten wurden Ausstiegsdaten veröffentlicht und einige Länder haben bereits den Ausstieg vollzogen.

Obwohl sie seit Jahrzehnten bekannt ist und verwendet wird, ist insbesondere Flugasche Gegenstand eines zunehmenden Interesses für die Herstellung von kohlenstoffreduziertem Zement und Beton. Die Produktion von Kraftwerksnebenprodukten in Kohlekraftwerken in Europa beläuft sich immer noch auf etwa 75 Millionen Tonnen mit abnehmender Tendenz. Neben direkten Herstellung in Kraftwerken wird insbesondere Flugasche aus Deponien mit gemeinsamer Ablagerung von Flugasche und Kesselasche untersucht. Zur Deckung des Bedarf wird Flugasche auch aus anderen Ländern importiert. Neben Kraftwerksnebenprodukten dienen auch andere Alternativen als Roh- oder Baustoff, die teilweise nur regionale Bedeutung haben. Die Angabe von Nachhaltigkeitsfaktoren ist ein Muss für zukünftiges Bauen, auch Datenbankeinträge sind für Planer wichtig.

Der Bericht gibt einen aktuellen Überblick über die unterschiedlichen Entwicklungen der Marktbedürfnisse und -optionen durch kohlenstoffarme Produkte.

vgbe Chemiekonferenz 2024
vgbe Conference Chemistry 2024

22. bis 24. Oktober 2024, Potsdam | mit Fachausstellung
22 to 24 October 2024, Potsdam, Germany | with Technical Exhibition

Chemiekonferenz 2024

Die 60. „vgbe Chemiekonferenz“ befasst sich in diesem Jahr zu Beginn ausgiebig mit der Wasseraufbereitung und deren Einfluss auf den Wasser-Dampf-Kreislauf.

Hierbei werden Erfahrungen zum Betrieb und zur Optimierung von Membranverfahren hinsichtlich der Energieeffizienz, der Ausbeute und der Lebensdauer der Membranen vorgestellt.

Auch werden Möglichkeiten zum tieferen Verständnis einer Wasseraufbereitungsanlage mit Ionenaustauscherharzen und der Einsatz mobiler Wasseraufbereitungssysteme aufgezeigt.

Wie der Einfluss einer ungenügenden Wasseraufbereitung zu einer Versalzung der Turbine führen kann und welche Maßnahmen sowohl zur Reinigung als auch zu einer verbesserten Überwachung der eingesetzten Dosierchemikalien ergriffen werden können, wird aufgezeigt und diskutiert.

In Zeiten von Reserve- und zyklischen Betrieben entstehen neue Herausforderungen für die Chemie des Wasserdampf-Kreislaufs. Diese werden anhand von Beispielen erläutert und Erfahrungen mit den Auswirkungen auf die Anlagenteile dargestellt.

Für Elektrodenboiler und Großwärmepumpen sind aufgrund neuer Anforderungen andere Dosierungskonzepte und Werkstoffe nötig. Hierzu werden erste Erfahrungen vorgestellt.

Neu in diesem Jahr wird es am zweiten Konferenztag eine offene Podiumsdiskussion zu den aktuellen und kommenden Herausforderungen und Themenfeldern für die Kraftwerkschemie geben.

Die Konferenz wird bewährt von einer informativen Fachausstellung begleitet.

vgbe energy freut sich,
Sie im Oktober in Potsdam begrüßen zu dürfen.

Essen, im Juli 2024

Conference Chemistry 2024

This year, the 60th vgbe Chemistry Conference will begin by focusing on water treatment and its influence on the water-steam cycle.

Experiences in the operation and optimization of membrane processes with regard to energy efficiency, yield and the service life of the membranes will be presented.

Possibilities for a deeper understanding of a water treatment plant with ion exchange resins and the use of mobile water treatment systems are shown as well.

How the influence of insufficient water treatment can lead to salinization of the turbine and what measures can be taken to clean and improve monitoring of the dosing chemicals used will be addressed and discussed.

In times of reserve and cyclical operations, new challenges arise for the chemistry of the water-steam-cycle. These are explained using examples and experiences with the effects on the system components are presented.

Due to new requirements, different dosing concepts and materials are needed for electrode boilers and large heat pumps. Initial experiences will be presented.

For the first time this year, there will be an open panel discussion on current and future challenges and topics for power plant chemistry.

The conference will be accompanied by an interesting trade exhibition.

vgbe energy looks forward to welcoming you to Potsdam in October.

Essen, July 2024

Online-Anmeldung / Registration

https://register.vgbe.energy/21124/

Kontakt (Teilnahme) / Contact (Participation)

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Tagungsprogramm
Conference programme

mit Fachausstellung / with Technical Exhibition
Änderungen vorbehalten
Konferenzsprachen: Deutsch und Englisch
mit Simultanübersetzung
Subject to change
Conference languages: English and German
Simultaneous translation intended

DIENSTAG, 22. OKTOBER 2024
TUESDAY, 22 OCTOBER 2024

18:00	Get-together in der Ausstellung Swan Systems Engineering lädt alle Konferenzteilnehmer zum zwanglosen Treffen ein. Get together in the exhibition Swan Systems Engineering invites all participants to a Get together in the exhibition area.

MITTWOCH, 23. OKTOBER 202
WEDNESDAY, 23 OCTOBER 2024

08:50	Begrüßung, Eröffnung Welcome, Opening
09:00 V01	Utilisation of membrane technology processes (desalination plants) for demineralized water production in power generation – the ESKOM experience Einsatz von membrantechnischen Verfahren (Entsalzungsanlagen) zur Vollentsalzung in der Stromerzeugung – Erfahrungen von ESKOM *D. Lalla, Z. Dladla, S. Sulliman, Eskom Holdings, Johannesburg, South Africa*
09:30 V02	Probleme mit einer Wasseraufbereitung am Standort Kirchmöser (Brandenburg) Problems with water treatment at the Kirchmöser site (Brandenburg/Germany) *M. Volpert, Uniper Kraftwerke GmbH, Gelsenkirchen, Germany*
10:00 V03	Wassereinsparung durch hocheffiziente Membrantechnik Highly efficient membrane technology saves water *Dr. R. Kohler, Dr. Kohler, Heilbronn, Dr. M. Wienecke, Boehringer Ingelheim Pharma GmbH & Co. KG, Ingelheim, Germany*
10:30	Pause / Break
11:15 V04	Hocheffiziente Wasseraufbereitung – Vorteile der Membrantechnologie in der Zusatzwasseraufbereitung Highly efficient water treatment – advantages of membrane technology in make-up water treatment *C. Maurer, OSMO Membrane Systems GmbH, Leonberg, Germany*
11:45 V05	Wie kann man mehr als 18 Jahre RO-Membranlebenszeit erreichen? How to achieve more than 18 years RO membrane lifetime? *J. Henkel, DuPont Water Solutions, Rheinmünster, Germany*
12:15 V06	Transformative solutions: Enhancing petrochemical water management with mobile treatment technologies Transformative Lösungen: Verbesserung des Wassermanagements in der Petrochemie mit mobilen Aufbereitungstechnologien *L. Bloss, NSI Mobile Water Solutions, Heinsberg, Germany*
12:45	*Pause – Imbiss in der Ausstellung* *Break – Lunch in the exhibition area*
14:15 V07/08	Warum verstehe ich meine VE-Straße nicht? Weil sie ihre eigene Sprache spricht...Sie spricht in Korrelationsdiagrammen – und wie können wir enormen Nutzen daraus ziehen, z.B. pH-Kalibration auf wenige Hunderstel ph-genau? Why can't I understand my DI line? Because it speaks its own language ... It speaks in correlation diagrams – And how can we benefit enormously from this, e.g. pH calibration to within a hundredths of a pH? *Dr. D. Mauer, MionTec GmbH, Leverkusen, Germany*
15:15 V09	Praxisbeispiele: Turbinenversalzung – altes Thema, aber immer aktuell Practical examples: Turbine salinization – An old topic, but always up-to-date *C. Giebmanns, vgbe energy service GmbH, Essen, Germany*
15:45	*Pause/Break*

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vgbe Chemiekonferenz 2024
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22. bis 24. Oktober 2024, Potsdam | mit Fachausstellung
22 to 24 October 2024, Potsdam, Germany | with Technical Exhibition

16:30 V10	Schaumreinigung von Dampf- und Gasturbinen Foam cleaning of steam and gas turbines *F. U. Leidich, Worms, Germany*
17:00 V11	Konzentrationsbestimmung filmbildender Amine im Wasser-Dampf-Kreislauf – ein Verfahrensvergleich How to measure film forming amines in the water steam cycle *R. Wagner, REICON Wärmetechnik und Wasserchemie Leipzig GmbH, Leipzig, Germany*
17:30 V12	Assessment of the impact of a high-temperature-stable organic corrosion inhibitor on acid conductivity in superheated steam circuits above 600 °C Bewertung der Auswirkungen eines hochtemperaturstabilen organischen Korrosionsinhibitors auf die Säureleitfähigkeit in überhitzten Dampfkreisläufen über 600 °C *Salih Gurkan Uyumez, Limak Energy, Ankara, Türkiye*
18:00	*Ende des ersten Konferenztages* *End of the first conference day*
19:00 – 22:30	*Die Abendveranstaltung findet im Restaurant Krongut Bornstedt mit freundlicher Unterstützung von der Kurita Europe GmbH und der Purolite GmbH statt.* *The evening event will take place in the restaurant Krongut Bornstedt, kindly supported by Kurita Europe GmbH and Purolite GmbH.*

DONNERSTAG, 24. OKTOBER 2024
THURSDAY, 24 OCTOBER 2024

9:00 V13	Impact of low load operation on cycle chemistry – Eskom experience and perspective at two coal-fired power stations Auswirkungen des Schwachlastbetriebs auf die Zykluschemie – Erfahrungen und Perspektiven von Eskom in zwei Kohlekraftwerken *Z. Dladla, D. Lalla, Eskom Holdings, Johannesburg, South Africa*
09:30 V14/15	Typische und häufige chemische Probleme in Anlagen mit zyklischem Betrieb Typical and frequent chemical issues in cycling plants *M. Rziha, PPCHEM AG, Hinwil, Switzerland*
10:30	Panel Discussion with all participants • Welche Herausforderungen an die Chemie sehen die Teilnehmer? What challenges do the participants see for chemistry? • Welche Themenfelder der Kraftwerkchemie sind derzeit sehr kritisch? Which areas of power plant chemistry are currently very critical? • Weitere Themen / Further issues
11:00	*Pause / Break*
11:30 V16	Verhalten und Auswirkungen von Korrosionsprodukten bei Anlagen mit häufigen Anfahrvorgängen und deren Überwachung – Trübungsmessungen als Trendmonitor für partikuläre Korrosionsprodukte Behaviour and effects of corrosion products in plants with frequent start-ups and their monitoring – Turbidity measurements as a trend monitor for particulate corrosion products *L. Dittmar, SWAN Analytical Instruments, Ilmenau, Germany*
12:00 V17	Water Chemistry in electrode boilers – Experience from Ørsted in Denmark Wasserchemie in Elektrodenkesseln – Erfahrungen von Ørsted in Dänemark *M. Nielsen, Ørsted A/S, Fredericia, Denmark*
12:30 V18	Kupfer (Cu-DHP) als Werkstoff für Wärmeüberträger von Großwärmepumpen Copper (Cu-DHP) as a material for heat exchangers in large heat pumps *H. Woizick, RheinEnergie AG, Köln, Germany*
13:00	*Pause / Break*
14:00 V19	Digital twin for industrial heating networks: innovation and increased efficiency Digitaler Zwilling für industrielle Dampfnetze: Innovation und Effizienzsteigerung *T. Schulze, Gradyent BV, Rotterdam, The Netherlands*
14:30 V20	Hermetisch dichte Kreiselpumpen zur Förderung von Medien mit Feststoffen und Gasanteilen – geht das? Hermetically sealed centrifugal pumps for the delivery of media containing gas and solids – is that possible? *J.-Ch. Poppe, Paul Bungartz GmbH & Co.KG, Düsseldorf, Germany*
15:05	*Schlusswort – Ende der Vortragsveranstaltung* *Closing speech*

Online-Anmeldung / Registration

https://register.vgbe.energy/21124/

Kontakt | Fachausstellung/Technical Exhibition

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Practical Information

VENUE
Dorint Sanssouci Berlin/Potsdam
Jägerallee 20
14469 Potsdam, Germany
https://hotel-potsdam.dorint.com/en/anreise

CONFERENCE LANGUAGES
German and English (with simultaneous translation)

REGISTRATION
Please make your registration online:
https://register.vgbe.energy/21124/

CONDITIONS OF PARTICIPATION

vgbe members	€ 820.00
Non-members	€ 980.00
Universities, authorities, retired	€ 480.00

CONFERENCE DOCUMENTS / PUBLICATIONS
A conference programme, including a list of participants, will be handed out to the conference participants. The lectures will be available for download following the event. A separate e-mail will be sent to inform you of this.

GET TOGETHER
Tuesday, 22 October 2024 at 18:00
Swan Systems Engineering invites all participants to a Get Together in the exhibition area.

EVENING EVENT
Wednesday, 23 October 2024, 19:00 – 22:30
The evening event will take place in "Krongut Bornstedt" kindly supported by Kurita Europe GmbH and Purolite GmbH.

HOTEL RESERVATION
A limited number of rooms have been set up in the conference hotel under the keyword "Chemie".

WEBSITE OF THE CONFERENCE
w https://t1p.de/vgbe-chem24 (external shortlink)

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Call for Papers!

11 & 12 September 2024
Potsdam, Germany

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vgbe/VEÖ Expert Event
River Management and Ecology

21 and 22 May 2024
Salzburg, Austria

Contact
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Konferenzen | Fachtagungen

DIHKW 2024
Energieversorgung Deutschlands – Chancen und Risiken

Fachtagung mit Fachausstellung

16. und 17. April 2024
Garmisch-Partenkirchen, Deutschland

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vgbe KELI 2024
Elektro-, Leit- und Informations-technik in der Energieversorgung

mit Fachausstellung

14 to 16 May 2024
Bonn, Germany

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vgbe Dampfturbinen und Dampfturbinenbetrieb 2024
vgbe Steam Turbines and Operation of Steam Turbines 2024

mit Fachausstellung/
with Technical Exhibition

28 and 29 May 2024
Würzburg, Germany

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vgbe Chemiekonferenz 2024
vgbe Conference Chemistry 2024

mit Fachausstellung/
with Technical Exhibition

22 to 24 October 2024
Potsdam, Germany

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Seminare | Workshops

Basics Wasserchemie im Kraftwerk

vgbe | Online-Seminar

21. und 22. Februar 2024

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Information on all events with exhibition
Auskunft zu allen Veranstaltungen mit Fachausstellung

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Updates **www.vgbe.energy**

Wasseraufbereitung
vgbe | Seminar

20. und 21. März 2024
Velbert, Deutschland

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Flue Gas Cleaning 2024

Workshop

22 and 23 May 2024
Frankfurt a.M., Germany

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Chemie im Wasser-Dampf-Kreislauf

vgbe | Seminar

13. und 14. November 2024

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Offshore Windenergieanlagen – Arbeitsmedizin 2024

Fortbildungsveranstaltung

6. und 7. September 2024
Emden, Deutschland

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Immissionsschutz- und Störfallbeauftragte 2024

Fortbildungsveranstaltung

26. bis 28. November 2024
Höhr-Grenzhausen, Deutschland

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Exhibitions and Conferences

E-world energy & water

20. bis 24. Februar 2024
Essen, Deutschland

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Enlit Europe 2024

22 to 24 October 2024
Milan, Italy

www.enlit-europe.com/

56. Kraftwerkstechnisches Kolloquium

8. und 9. Oktober 2024
Dresden, Deutschland

https://t1p.de/tud-kwt (Kurzlink)