

# ASHTRANS®

How to move PFA around the globe  
- a facilities overview -

Ad Ligthart  
6 September 2022

CEMENT  
DISTRIBUTION  
CONSULTANTS

## Preamble



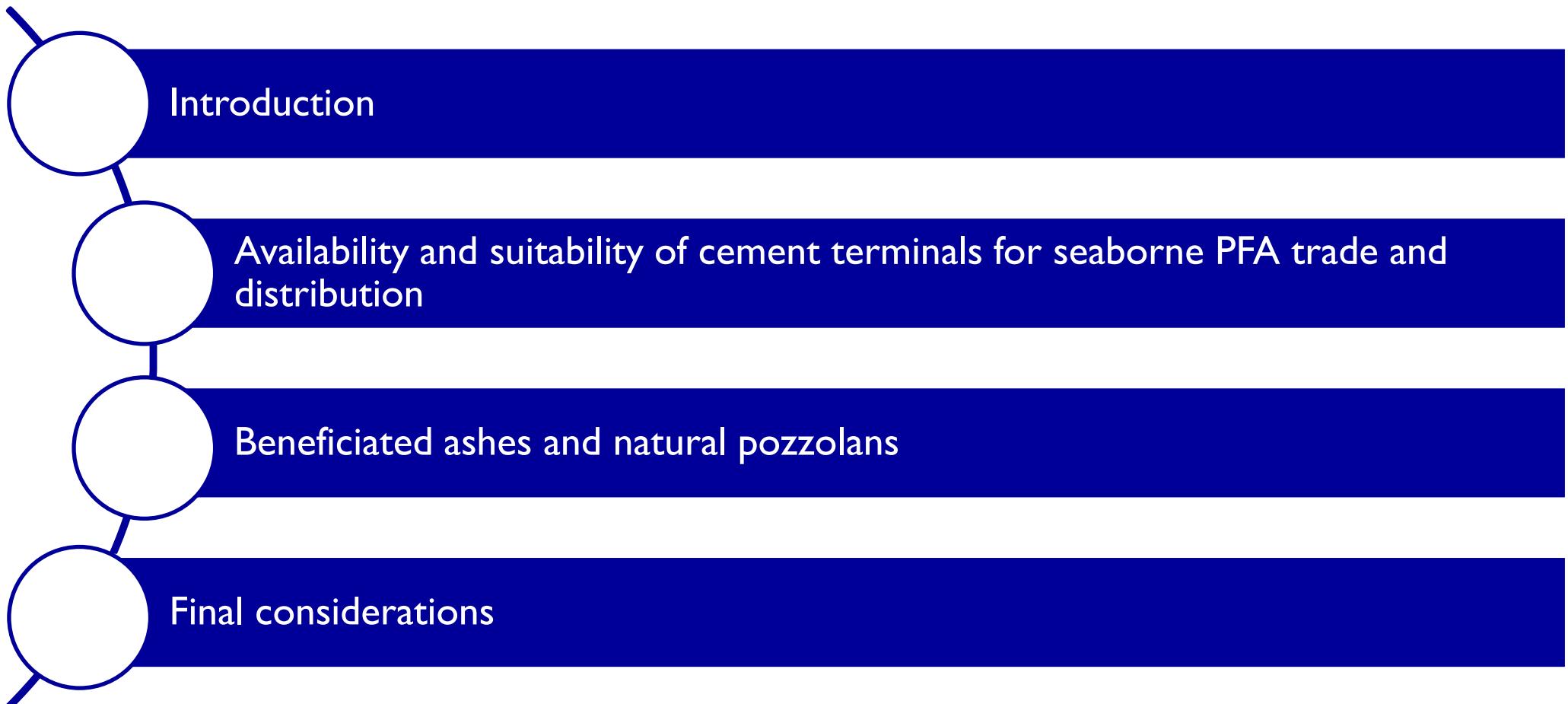
Pulverized Fly Ash is a difficult material to store, handle and transport. For seaborne trade and distribution therefore dedicated facilities, equipment and ships are required. In this, PFA is very similar to cement, and it also covers the same markets. It is therefore logical that the rapidly growing fly ash trade and distribution piggyback on the existing global cement terminal networks.

But ash trade and distribution also have significant differences with cement. There is a completely different supply base. Although the markets are the same, consumption of fly ash will be lower than cement so that logistics and economics are different too. Also, the strategical aspects are quite different.



This presentation, taking into account the different supply base for PFA and its rapid changes, will look at the availability and suitability of the existing cement terminal networks in the world.

# Contents of presentation





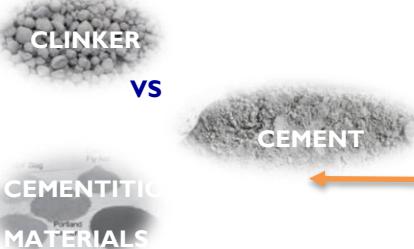
## Introduction



Trade vs Distribution



Market  
statistics and  
developments



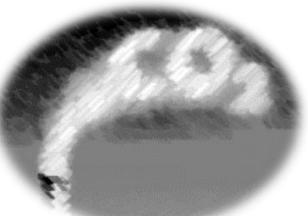
CLINKER  
vs  
CEMENTITIOUS  
MATERIALS



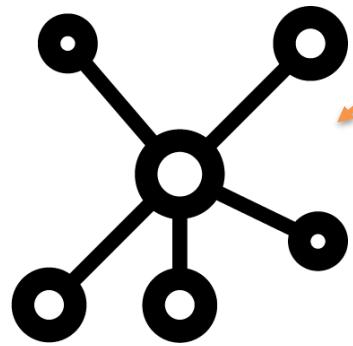
Logistics



Economics

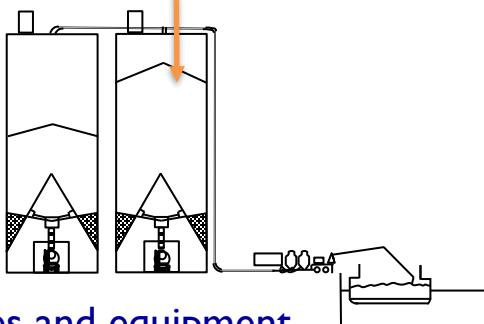


CO<sub>2</sub>



Networks

## WHAT IS INVOLVED IN SEABORNE TRADE AND DISTRIBUTION OF CEMENT , CLINKER AND CEMENTITOUS MATERIALS?



Facilities and equipment



Ships & Shipping

CEMENT  
DISTRIBUTION  
CONSULTANTS

# Cement Distribution Consultants

## an introduction

Facilities and Markets	Logistics and Economics	Technical and Operational
<ul style="list-style-type: none"><li>The global cement industry on Google Earth including integrated cement plants, grinding plants, coal fired powerplants, blast furnace steel plants / granulators, all related logistical facilities and ready-mix plants / concrete product plants.</li><li>A database with general and technical information on facilities related to seaborne (and waterborne) trade and distribution.</li><li>Significant experience in market studies.</li><li>Significant experience in logistical competitiveness studies for new plants and terminals.</li></ul>	<ul style="list-style-type: none"><li>The ability to advise customers on every aspect of trade and distribution of cement, clinker and cementitious materials including strategical economical, logistical technical and operational aspects as well as materials sourcing, shipping, facilities, handling system, etc. etc.</li><li>Significant experience in feasibility studies on complete logistical chains as well as individual components including logistical and economical modelling.</li></ul>	<ul style="list-style-type: none"><li>A clear vision on port and facility design that can adapt to changing trade and industry conditions.</li><li>Consultant to two of the largest cement terminals in the world and numerous other facilities.</li><li>Significant involvement in design and operation of self-discharging ships.</li><li>Significant experience in realising projects and operating complete logistical chains.</li><li>Projects realised on every continent.</li></ul>

**cementdistribution.com**

A free and comprehensive website  
on trade and distribution of cement

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# Cooperation Cement Distribution Consultants and Engineering Services Hamburg



Cement Distribution Consultants and Engineering Services Hamburg have started a cooperation in January 2022. The combination of Cement Distribution Consultants and Engineering Services Hamburg aims to provide a full range of services on every aspect of seaborne trade and distribution of cement, cementitious materials and clinker.

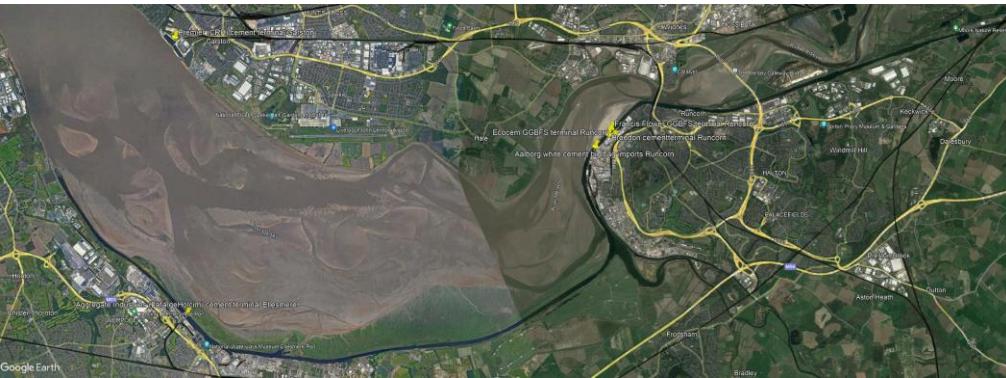
This ranges from in-depth market studies, strategical considerations, logistics and economics, feasibility studies, facility design and operations support.

Ad & Marcia Ligthart of Cement Distribution Consultants and Mario Rämmele of Engineering Services Hamburg represent a combined 90 years of experience in this field covering the largest terminals in the world, mechanical and pneumatic ship loaders and unloaders, all types of conveying systems, self-discharging cement carriers, any type of storage facility and so on. All this based not just on technology but on the logistics, economics and strategical aspects behind it. We are fully independent and value the trust given to us by our customers.

# Global database of cement facilities on google Earth



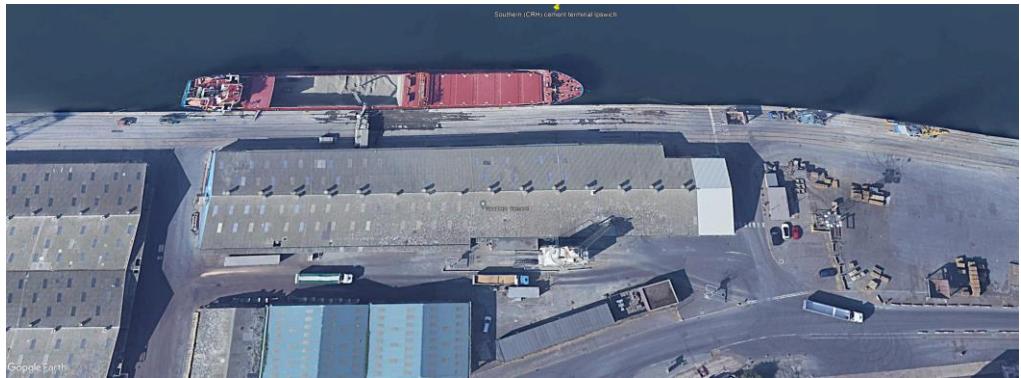
GE global



## Local



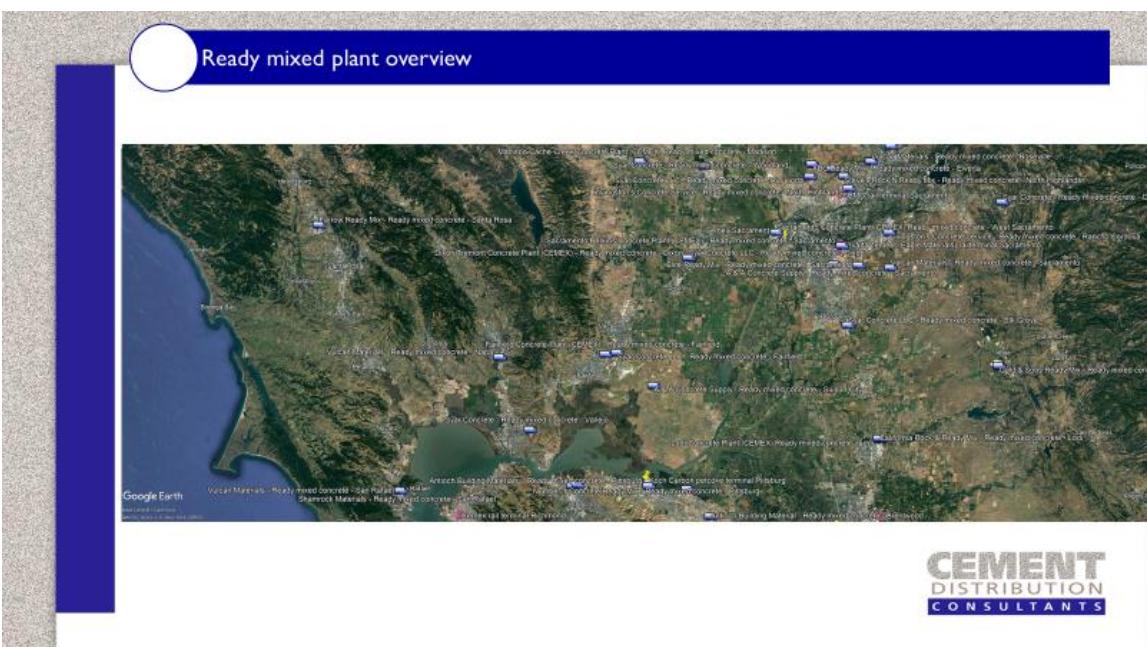
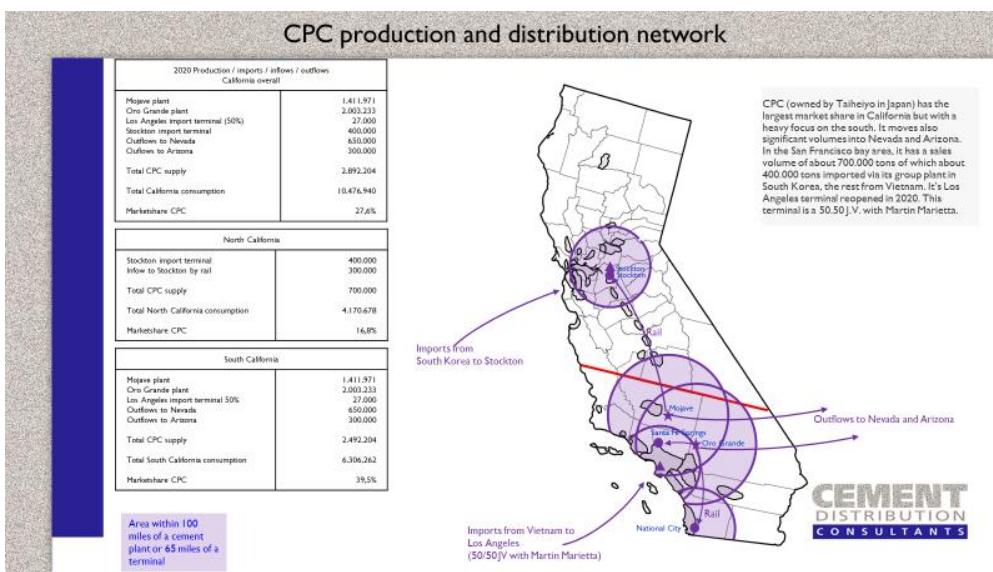
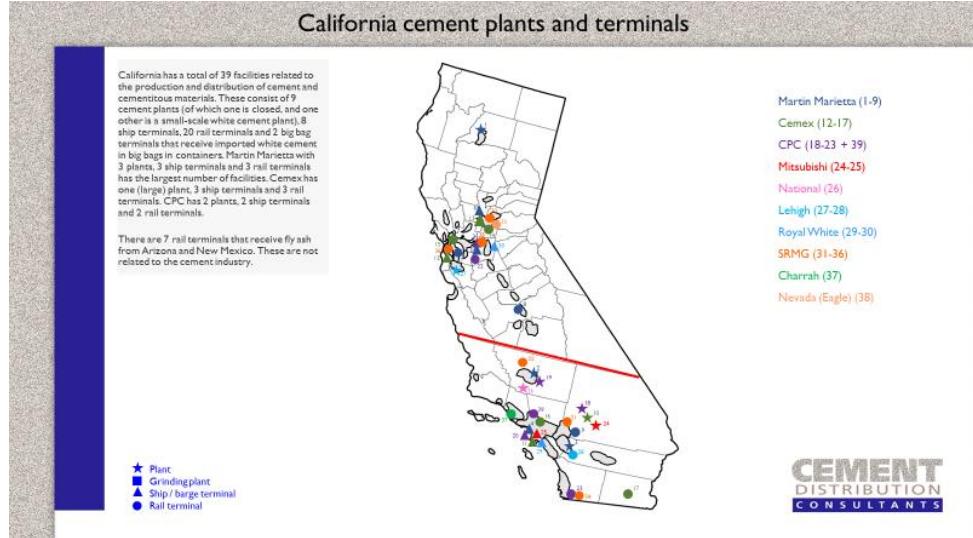
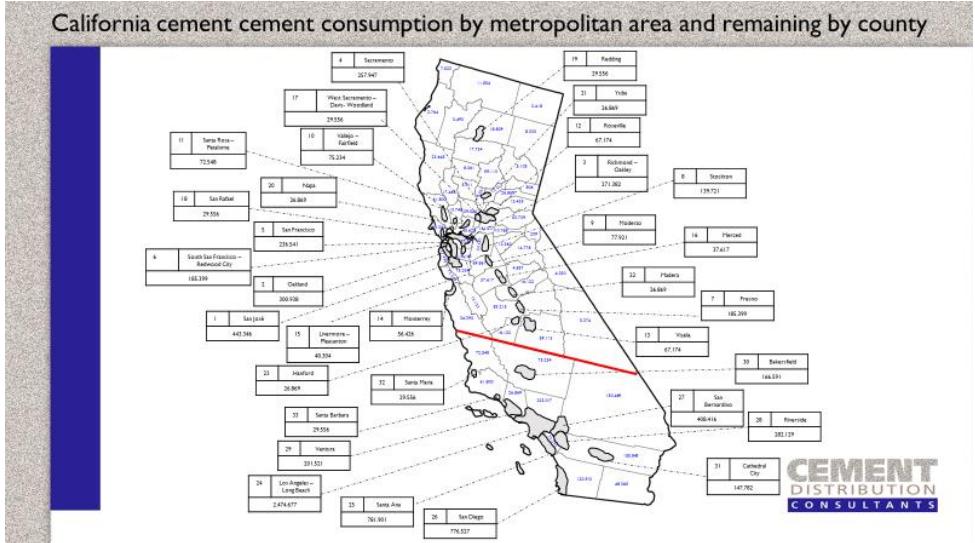
## Regional



## Detailed view

# CEMENT DISTRIBUTION CONSULTANTS

# Market studies based on statistics in combination with distribution capabilities

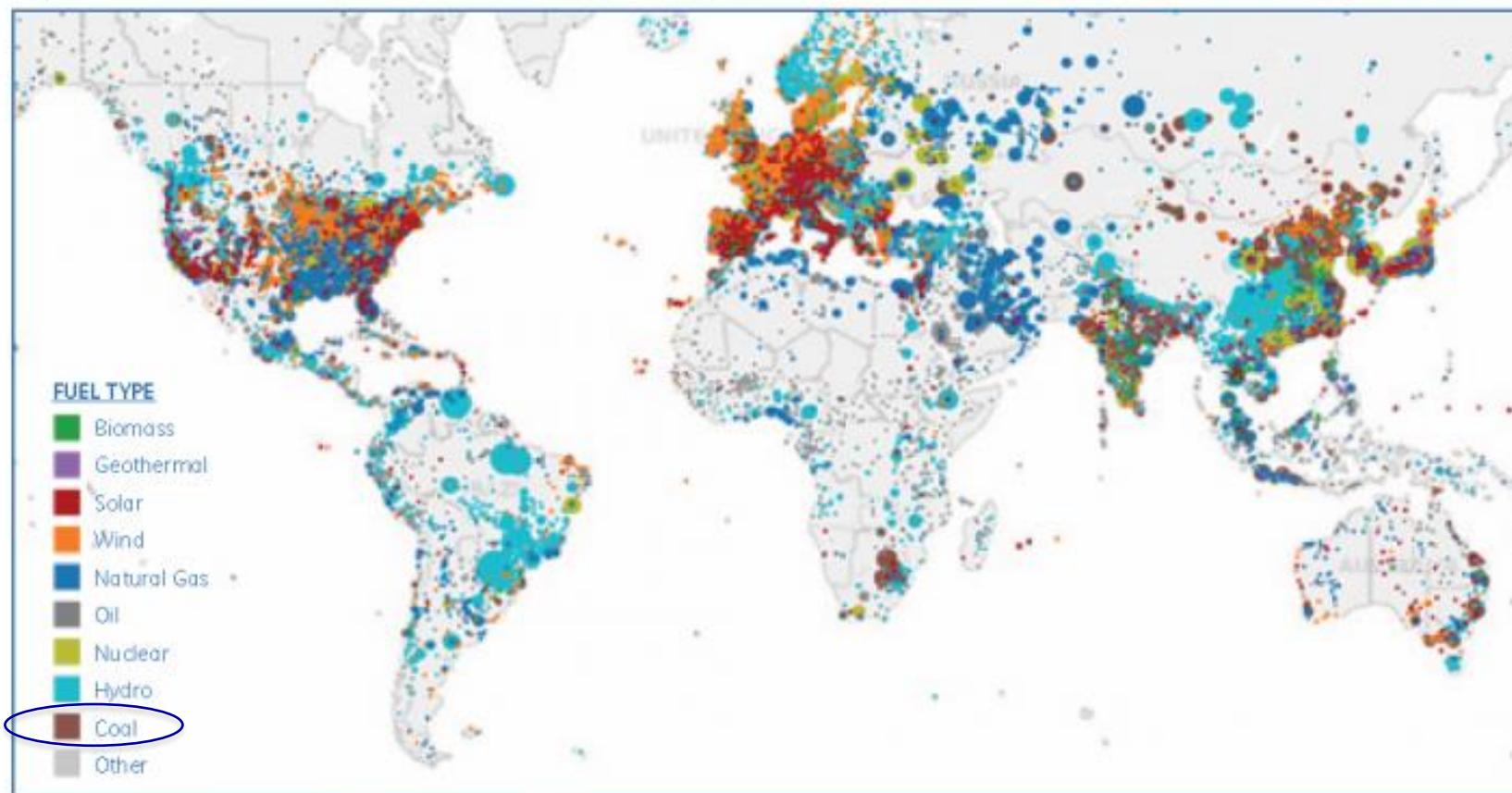




Availability and suitability of cement terminals for seaborne PFA  
trade and distribution

## Global power plants by technology

Figure 7. Global Power Plant Fleet by Technology



Source: Power plant data source Platts UDI Database, June 2012  
Note: Circle size represents installed capacity (MW).

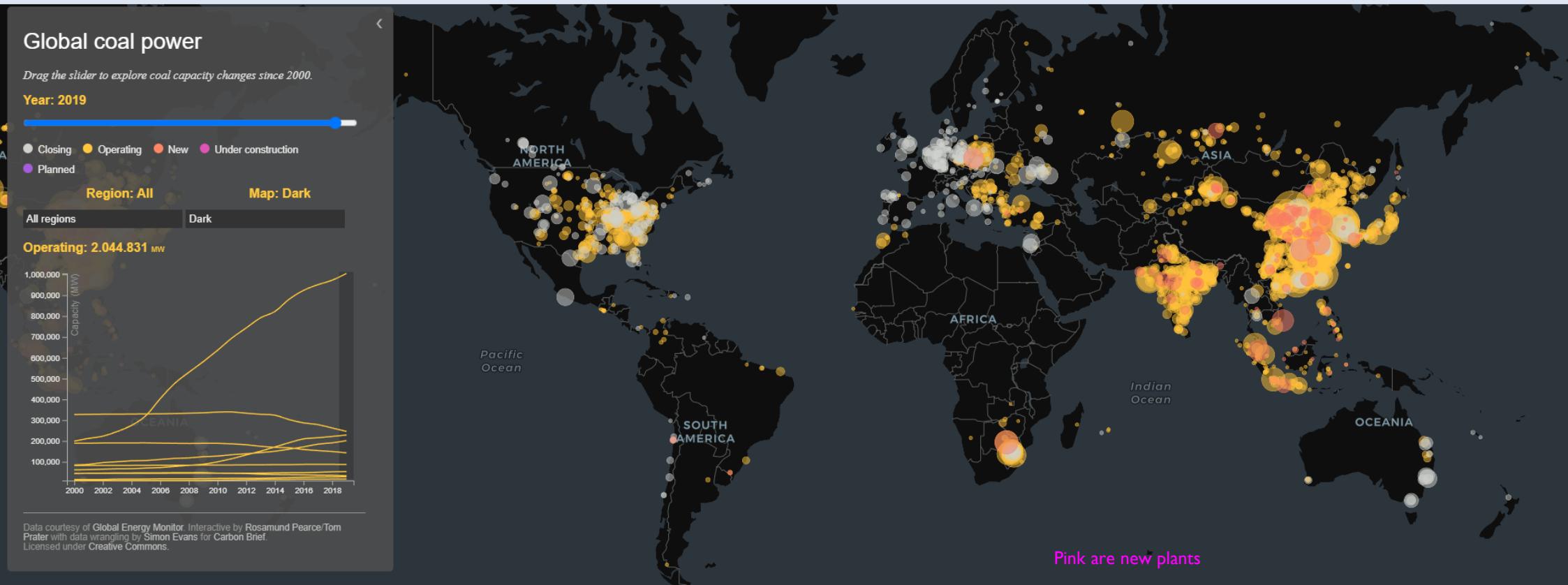
# Global PFA supply base 2019

Global coal-fired powerplants 2019 situation. This slide shows (in grey) which powerplants are scheduled to close. However, the war in Ukraine and resulting energy crisis have resulted in postponement of the closing of coal fired powerplants with probably 2-3 years.



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COUNTRY PROFILES EXPLAINERS FACTCHECKS FEATURES GUEST POSTS INFOGRAPHICS INTERVIEWS MEDIA ANALYSIS TRANSLATIONS WEBINARS



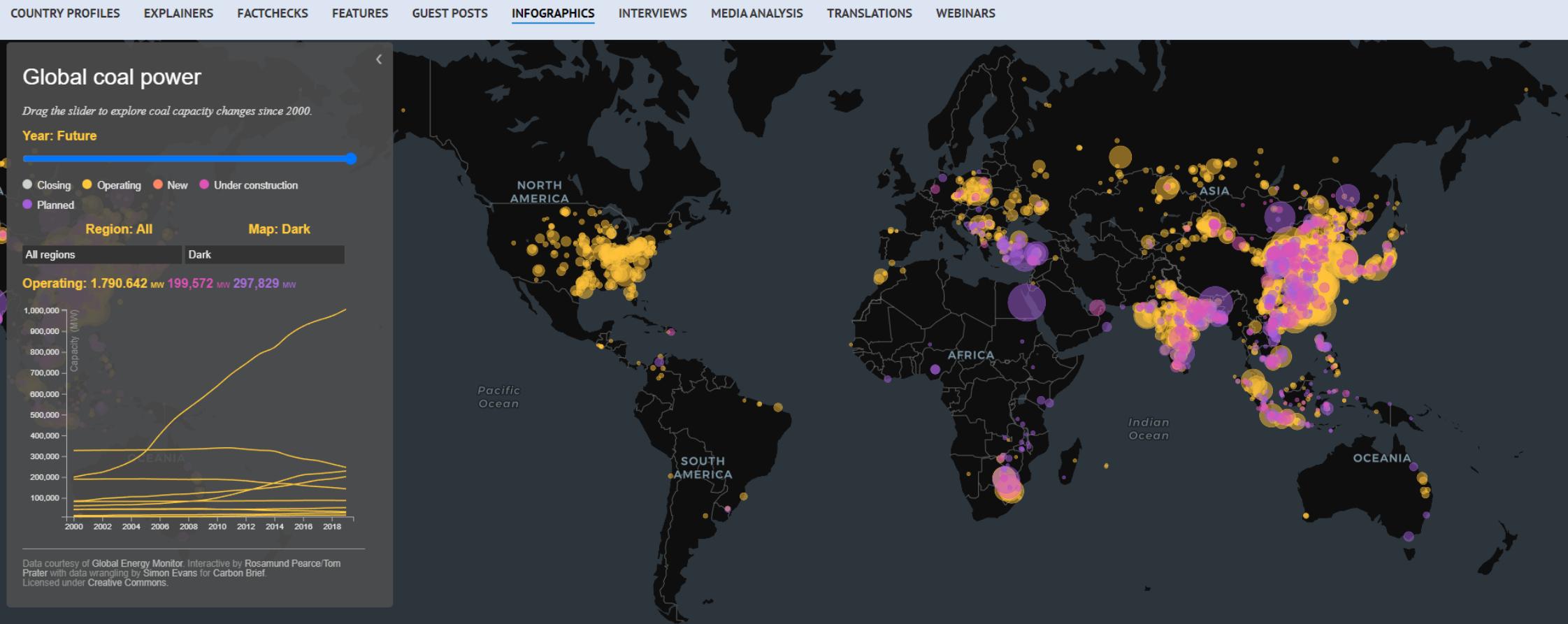
# Global PFA supply base forecast

Coalfired power plants forecast after  
current scheduled closures.

**CarbonBrief**  
CLEAR ON CLIMATE

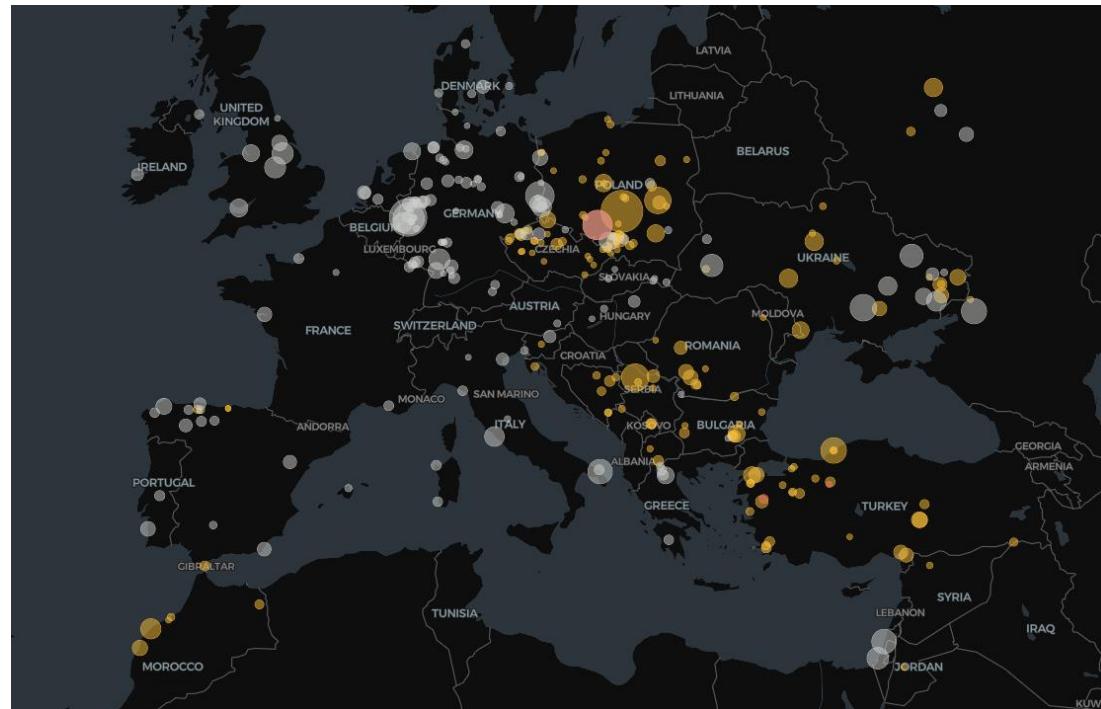
Orange is currently operating.  
Pink is new.  
Purple is planned.

SCIENCE ENERGY

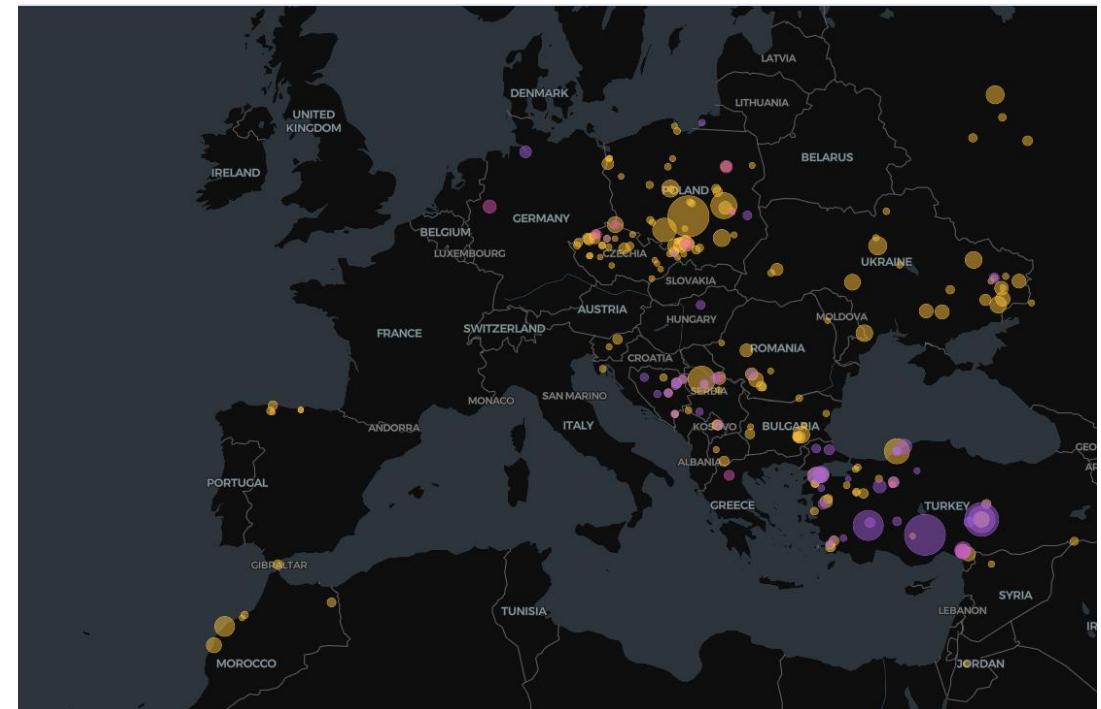


Source: Carbonbrief.org

## Europe PFA supply base



2019 situation



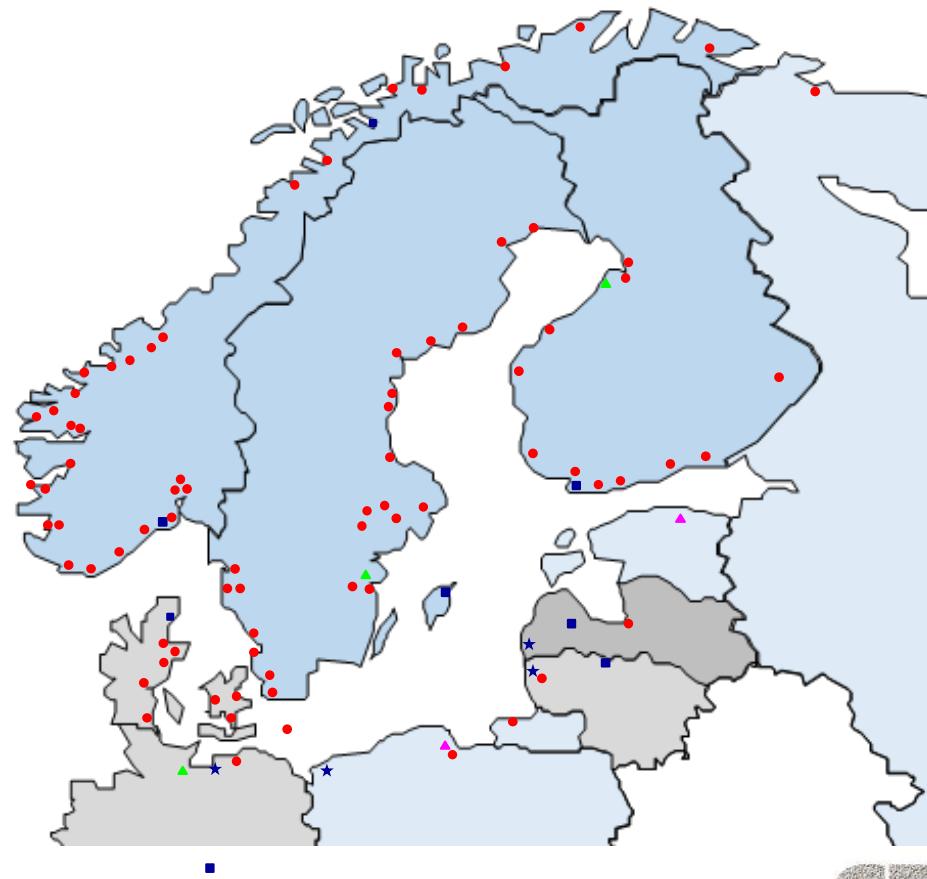
Forecasted situation after scheduled closures

West Europe will end up without coal-fired powerplants and will need to import significant volumes of PFA and probably natural pozzolans. In some countries it might be possible to reclaim and beneficiate ashes from ash ponds.

# Europe Nordic cement terminals



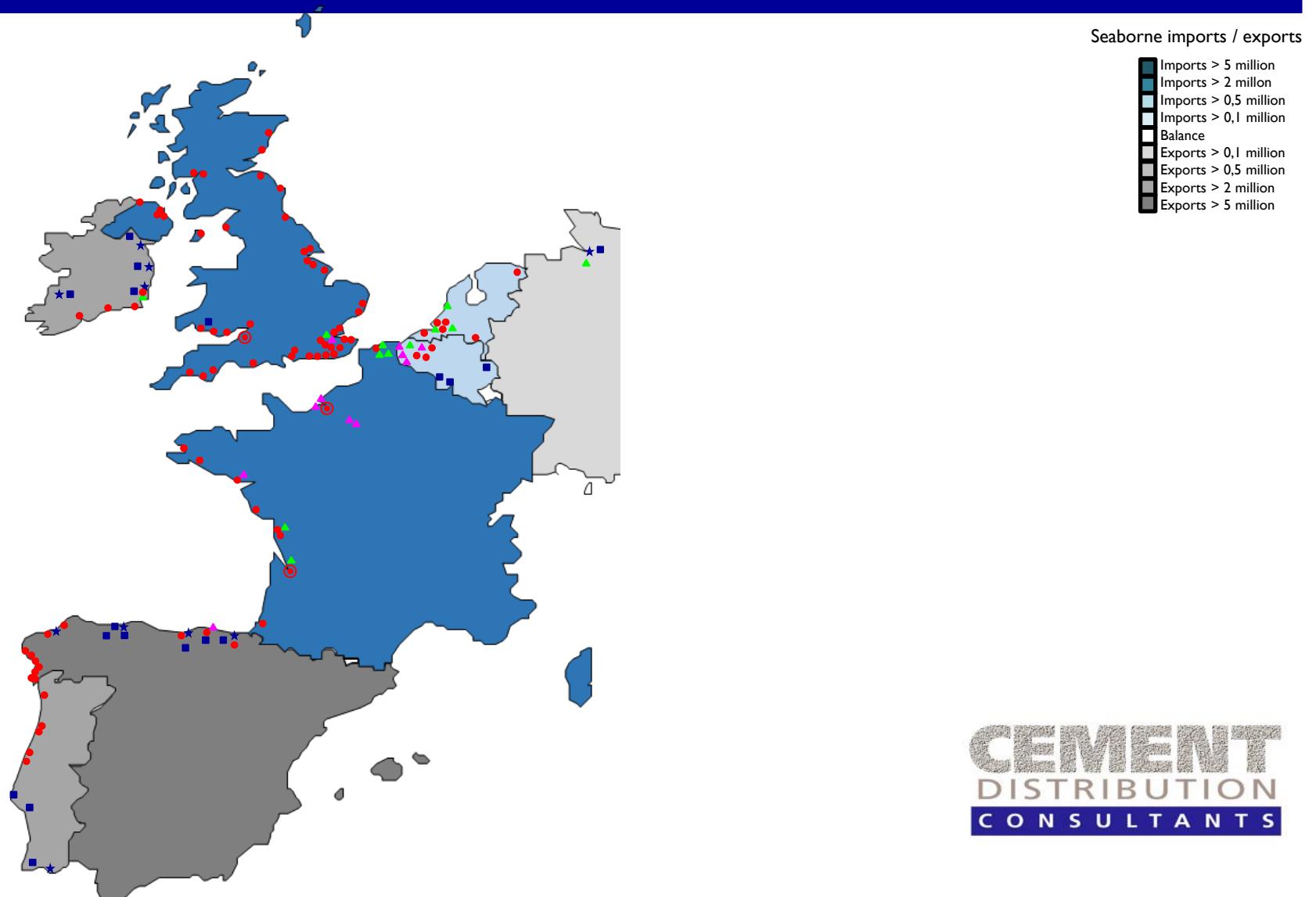
- Facilities involved in  
seaborne transport
- Cement plant
  - ★ Loading facility
  - ▲ Grinding plant GGBFS
  - ▲ Grinding plant clinker
  - Terminal coastal vessels
  - Terminal Handysize or larger



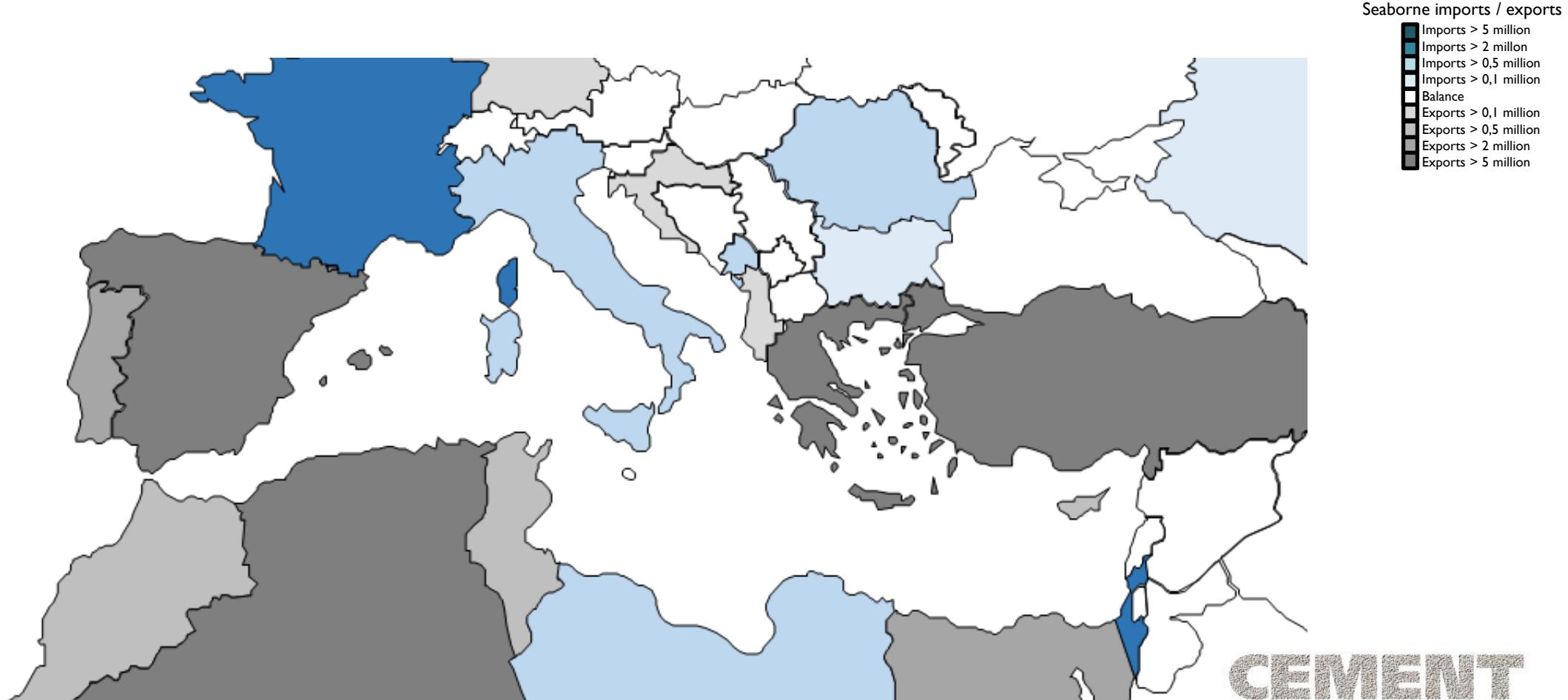
Nordic Europe has very significant coastal trading and distribution networks (90 small terminals) which includes increasing PFA movements, but it lacks large import terminals.

## Europe Atlantic cement trade and distribution facilities

The Europe Atlantic area consists of 91 terminals for coastal trade and distribution (as well as 26 grinding plants). There are only a few large terminals that can receive Handysize vessels. These do not seem suitable as fly ash receiving and distribution hubs.



## Europe Mediterranean cement trade and distribution



The Mediterranean area has 97 small import and distribution terminals as well as 39 coastal grinding plants and 64 cement plants involved in cement exports and distribution (and clinker exports). It has no large import terminals but is a very large export base to West Africa and the Americas as well as regional trade and distribution.

## Overall characteristics of European seaborne trade and distribution of cement and cementitious materials

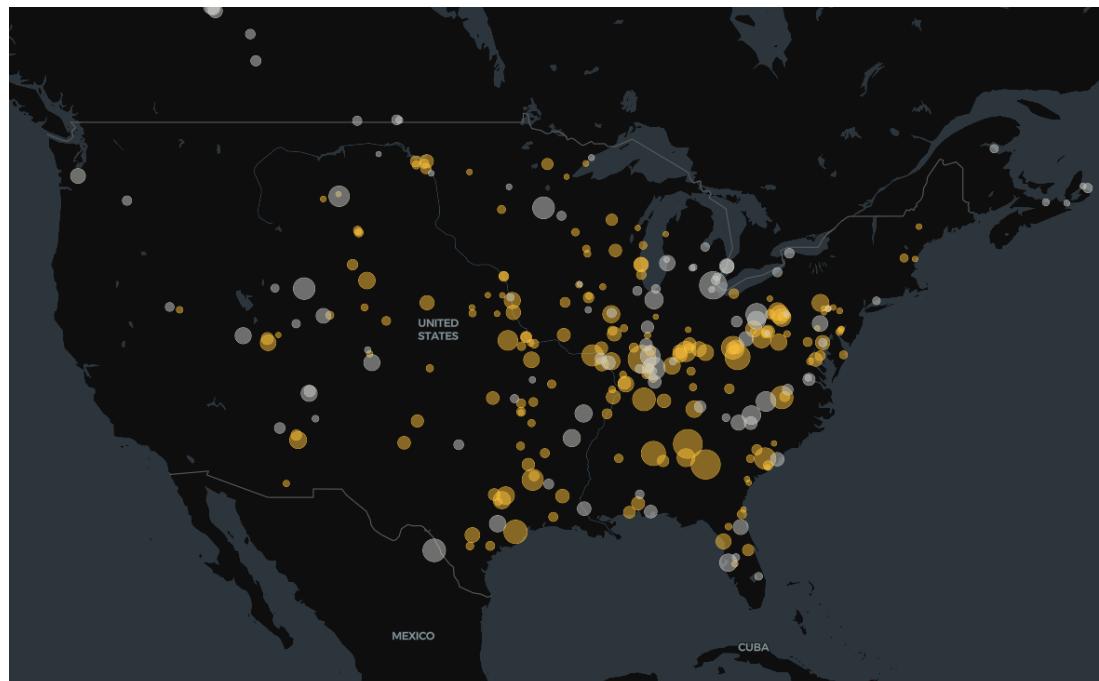
Europe has a very dense coastal trade and distribution system for cement and cementitious materials. Cementitious materials have been the rapid growing segment of this. In addition, large volumes of fly ash are moved by inland waterways. Shipping is provided both by self-discharging vessels and regular cargo vessels unloaded by specialised (mobile) unloaders.

When the fly ash supply in West Europe is closed down replacement options would be supplies from Turkey and Indonesia (which would require several large “hub” terminals to connect to the existing coastal networks), possible reclaim and beneficiation from ash ponds (probably not easy to connect to seaborne movements) and natural pozzolans from f.e. Iceland.

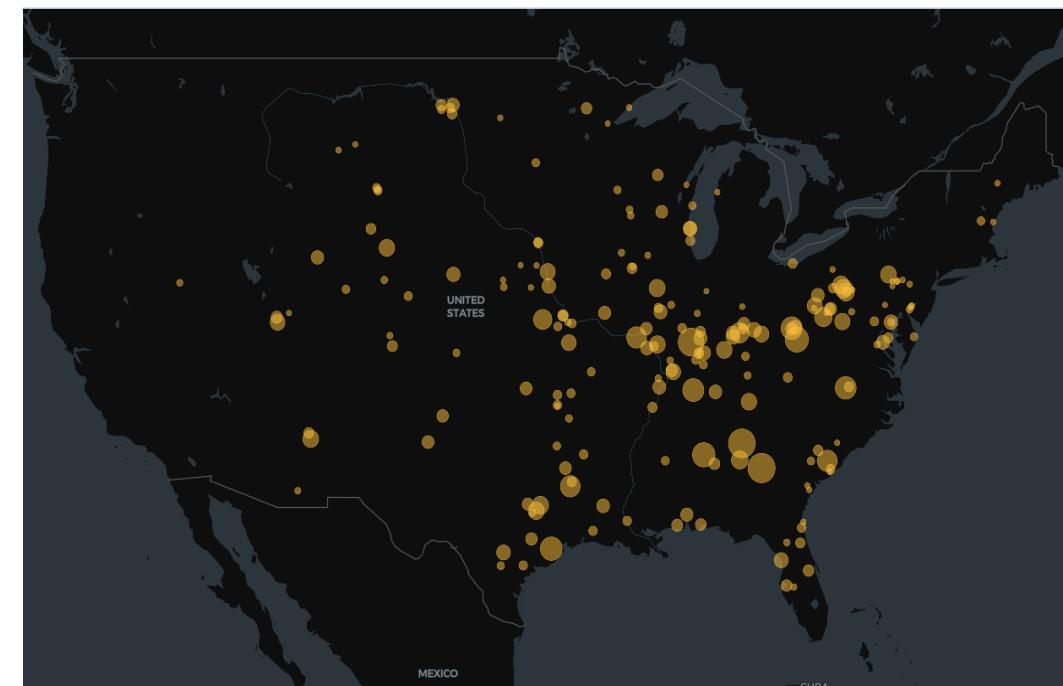


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## North America PFA supply base



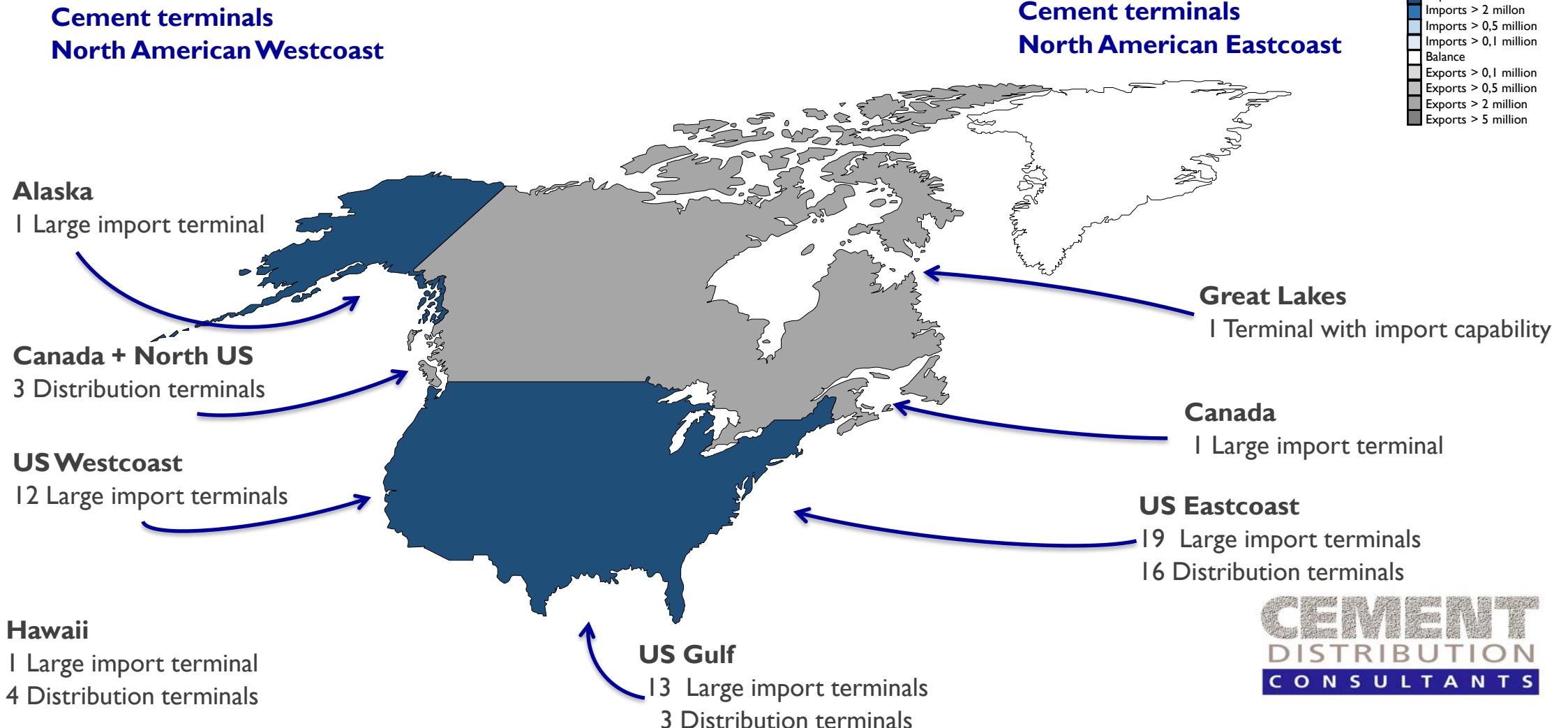
2019 Situation



Forecast

What is noticeable is the absence of coal fired powerplants on the West Coast and a diminishing capability to supply the Westcoast with PFA by rail from the Midwest. On the East side of the US there still is significant PFA supply and a very large additional volume in ash ponds. Even with this there will be significant import demand for PFA on both coasts

# North America cement terminals



## North America cement terminals



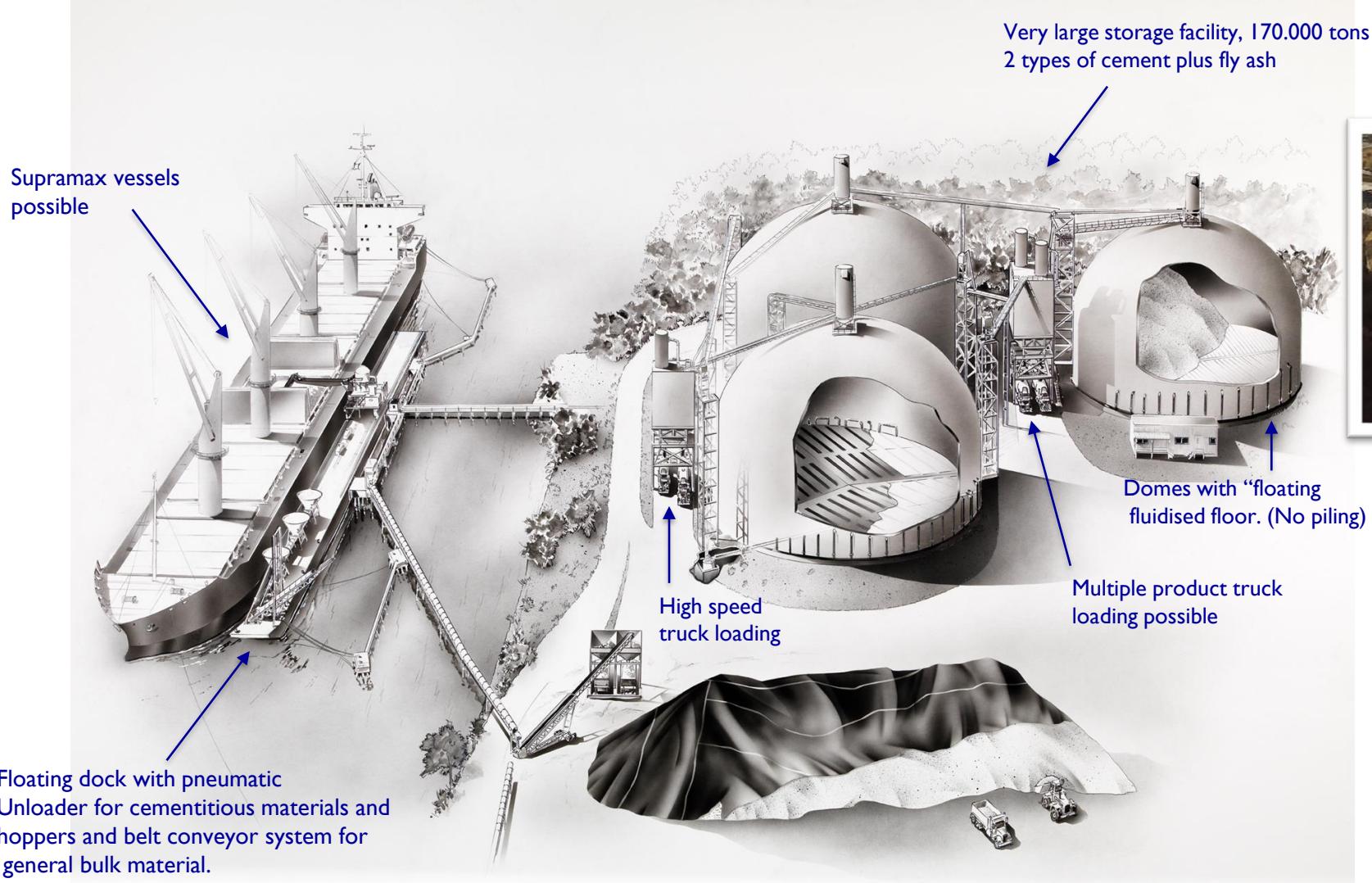
Although the US has significant volumes of ashes in ash ponds that can be reclaimed and beneficiated it most probably will be more economical for large markets on both West and East coast to import PFA using existing cement terminals of which there are many.

These terminals typically have ship unloaders for Handymax size vessels, are basically suitable for one product only, and have a storage capacity of about 60.000 tons.

Key issue of course is the ownership situation. Most terminals in North America are owned by the cement producers and PFA is not a current profit center for the cement industry. Building new terminals takes time. There are a few “super terminals” though that are independent and have significant logistical capabilities.

# Super terminals

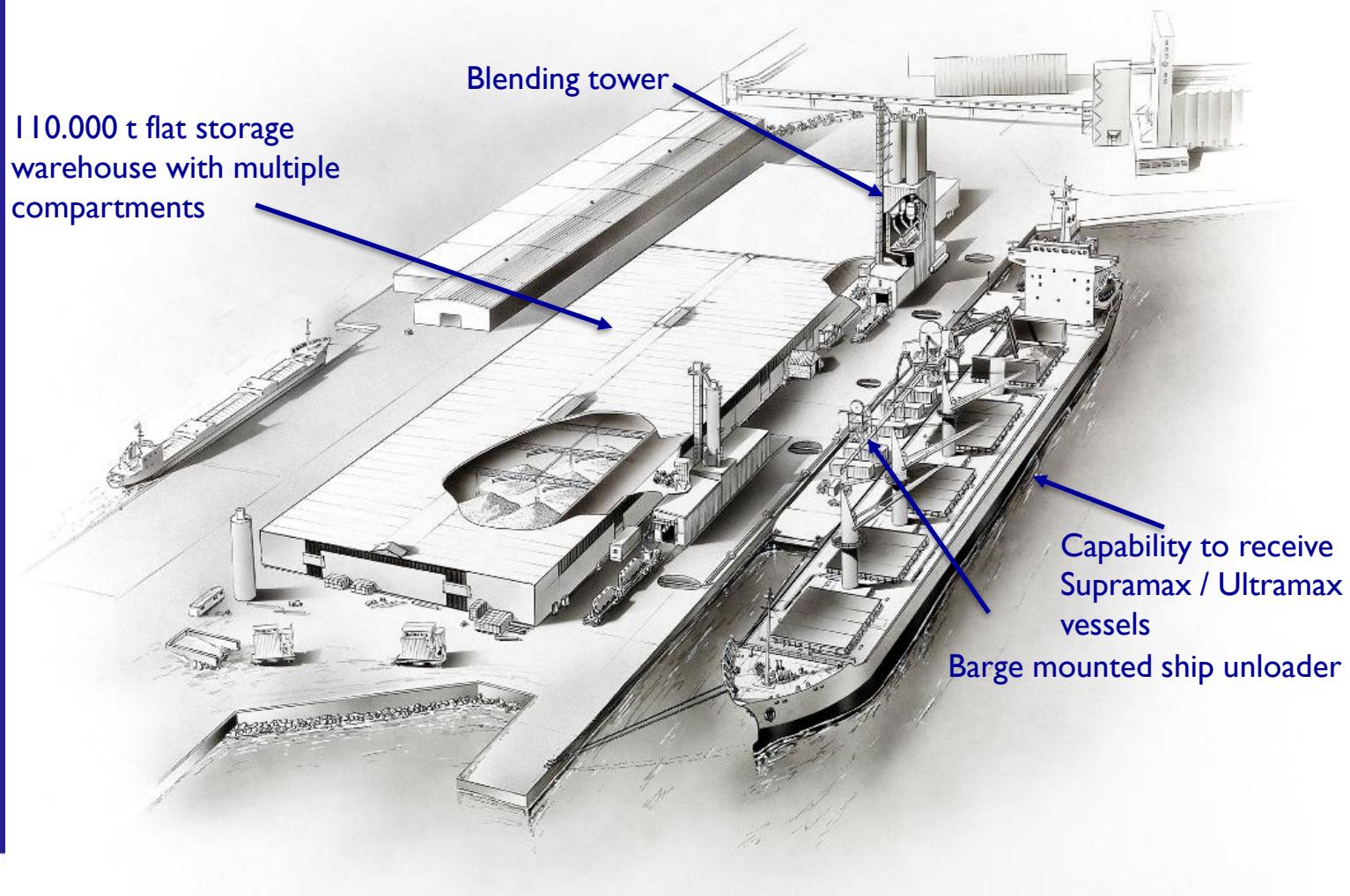
## Riverside Construction Materials, Philadelphia



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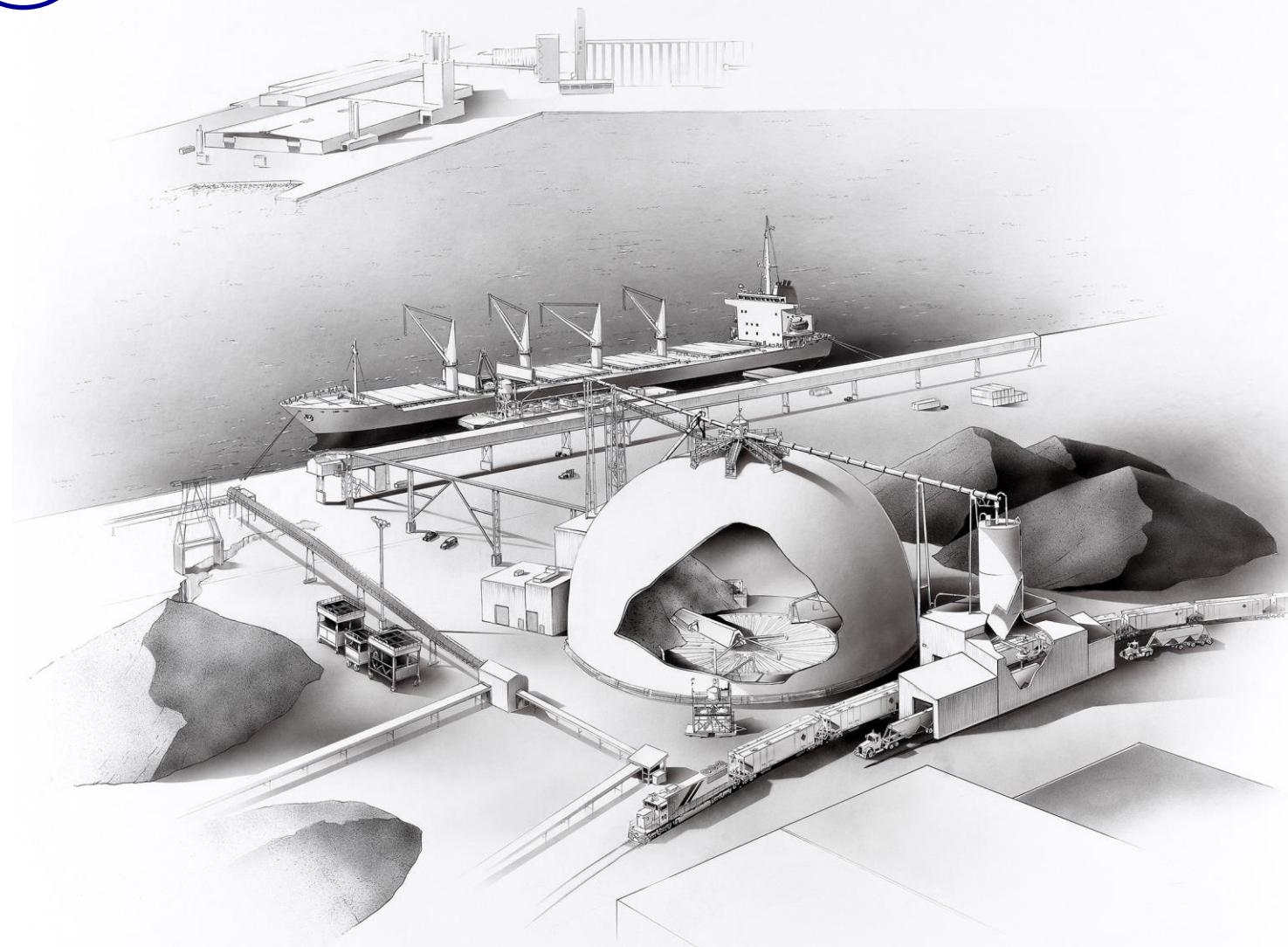
# Super terminals

Beton Provincial, Quebec



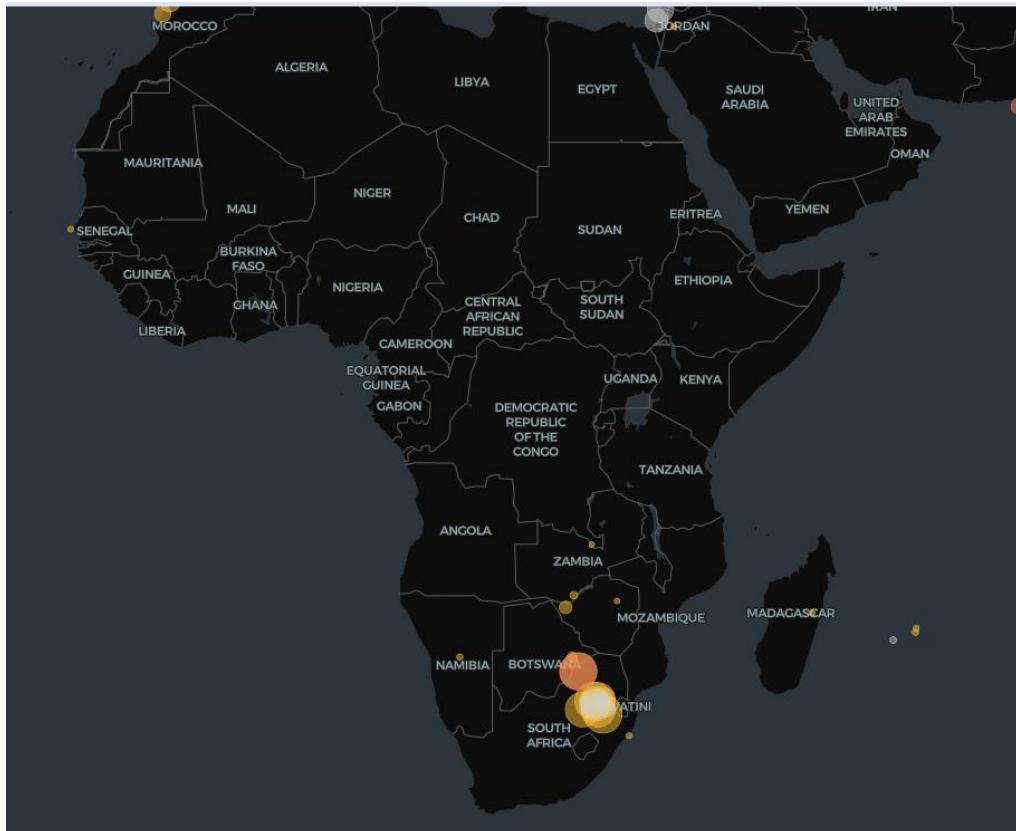
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## Super terminals



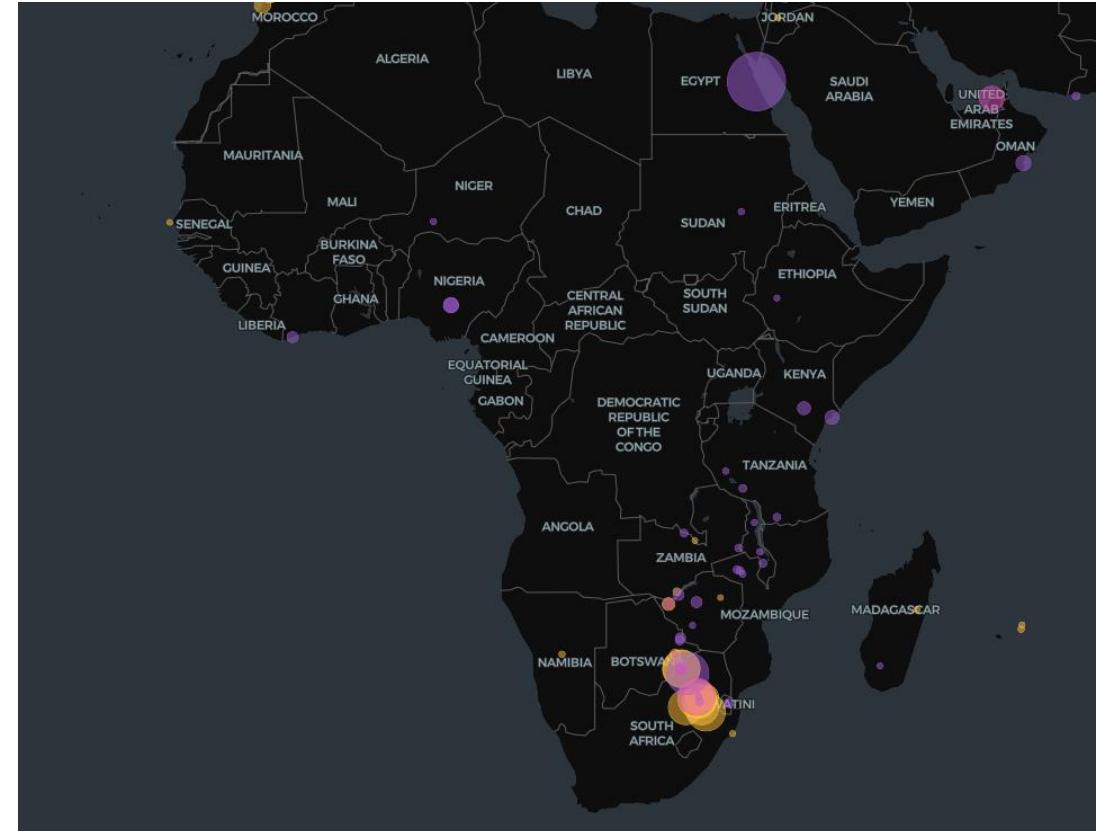
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## Africa PFA supply situation



2019 Situation

Africa has very few coal fired power plants and those that exist are too far from the coast to be available for seaborne transport.



Forecast

## Africa cement terminal situation

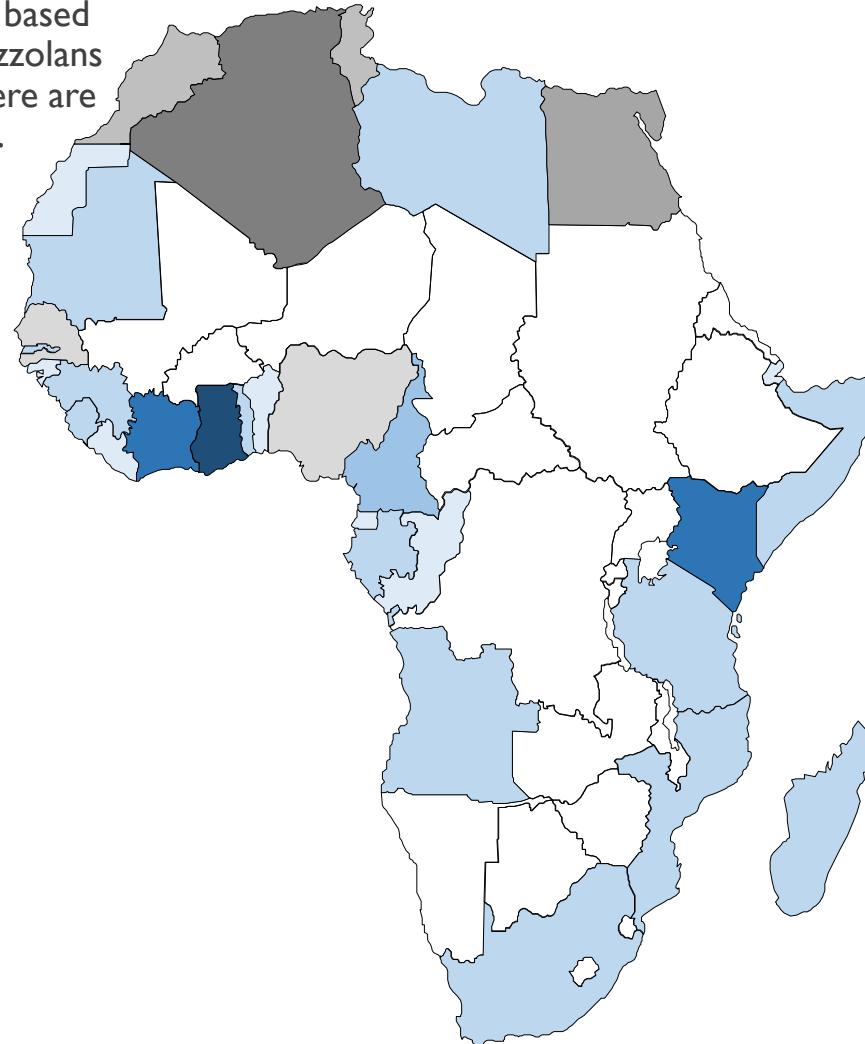
African cement production is for a large part based on grinding plants importing clinker. Local pozzolans are used to blend cement to 32,5 quality. There are no import terminals capable to handle fly ash.

### West Africa

has 52 coastal grinding plants receiving clinker by sea.

There are 6 cement plants that have seaborne export capability.

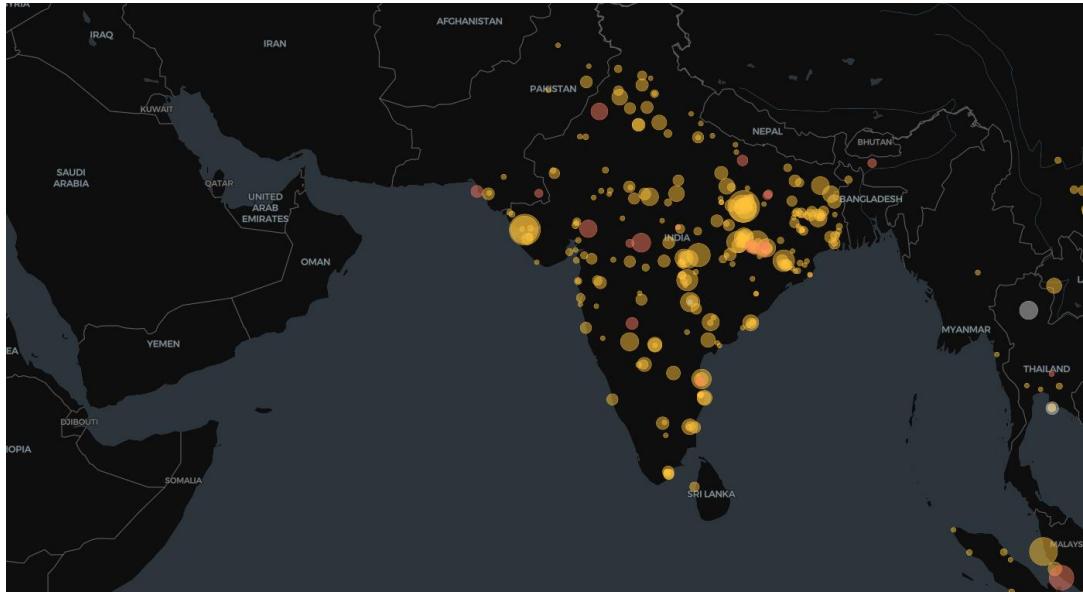
There are only 3 bulk cement import terminals



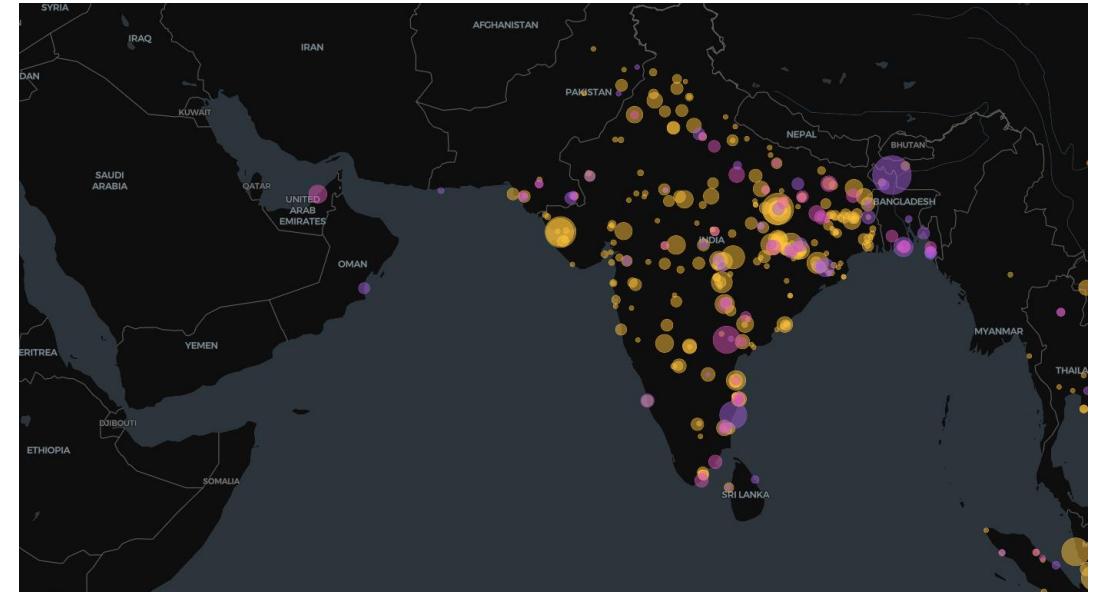
### East Africa

has more integrated cement plants but still has 25 grinding plants receiving clinker by sea.

## Indian Ocean PFA supply situation



2019 Situation



Forecast

India has a vast surplus of PFA available for seaborne exports with about 15 large powerplants at (or close to) deep water ports and many on the rivers in the northeast. It has regional markets with a lot of potential. In addition, it has the capability to become a fly ash supplier to the world if it realizes large ship loading facilities.

# Indian PFA export capabilities



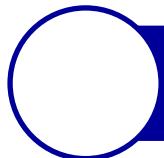
Fly ash exports to Bangladesh in general cargo vessels



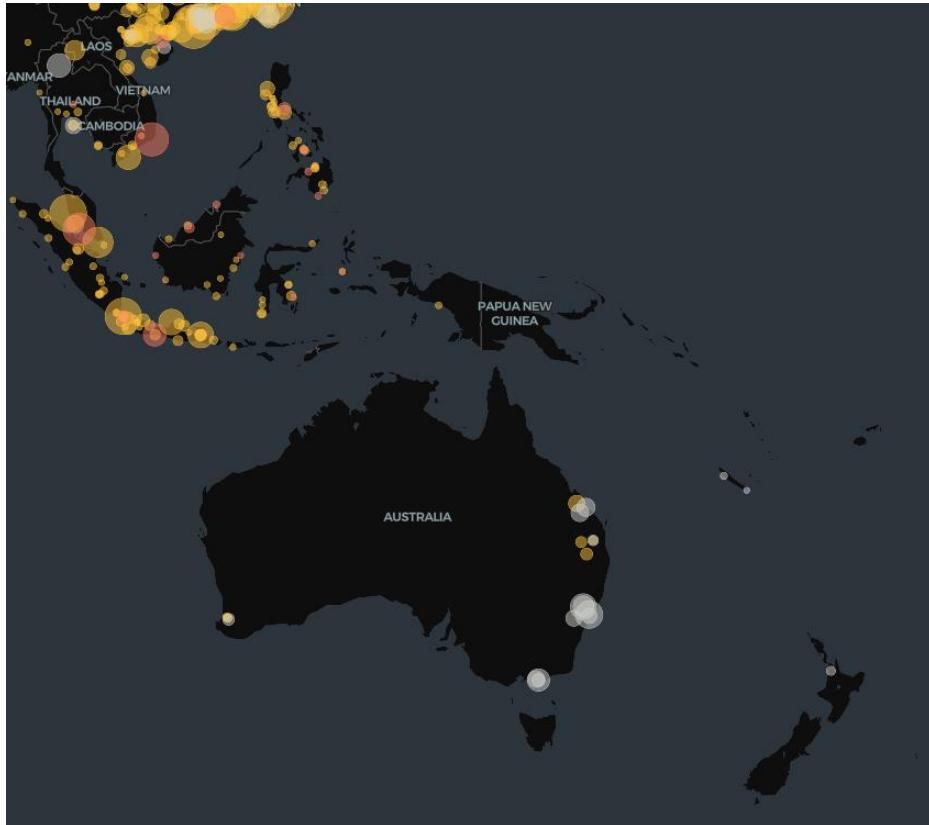
Fly ash exports to Arab countries in big bags in containers



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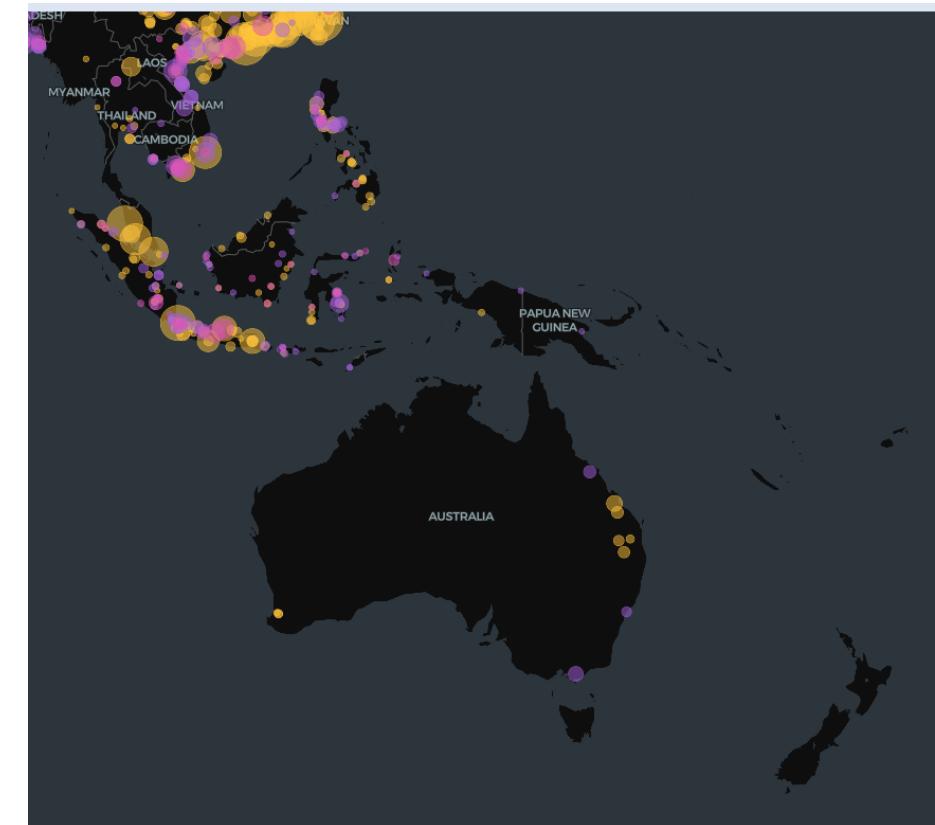


## SE Asia Australia PFA supply situation



2019 Situation

A clear picture. A PFA shortage in Australia and an oversupply in S.E.Asia with (in principle) sufficient suitable terminals to support PFA trade and regional distribution.

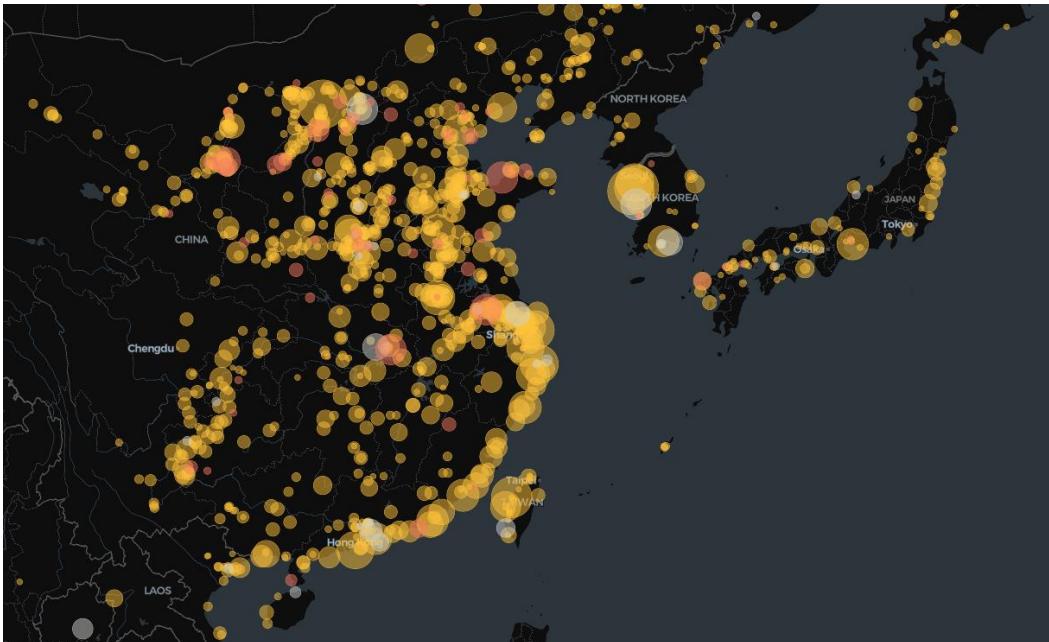


Forecast

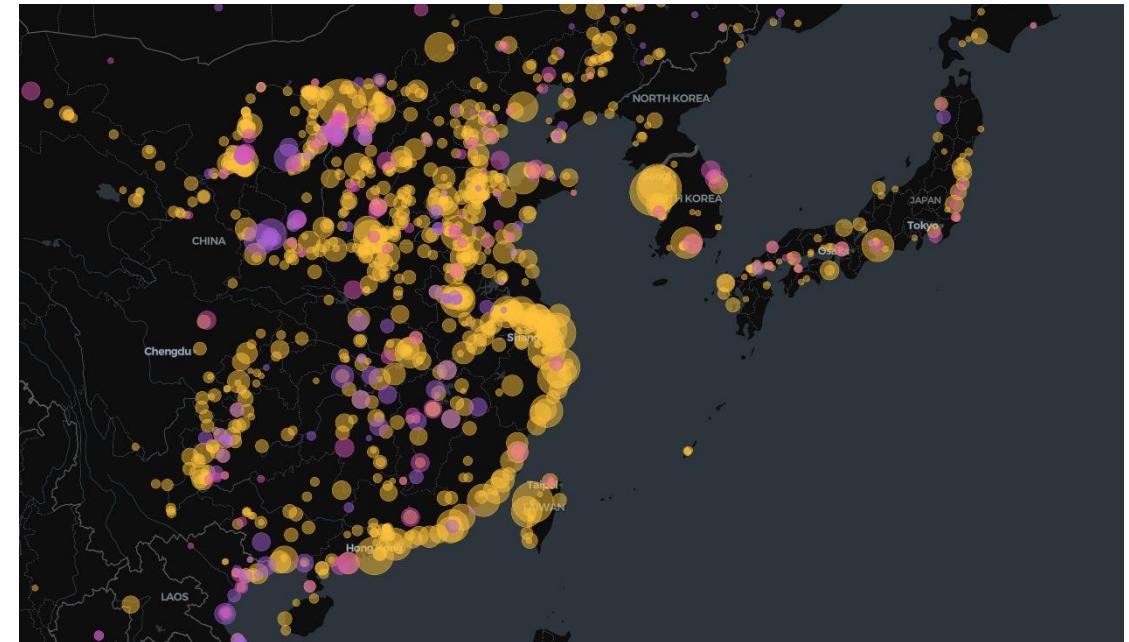
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Source: Carbonbrief.org

## East Asia PFA supply base



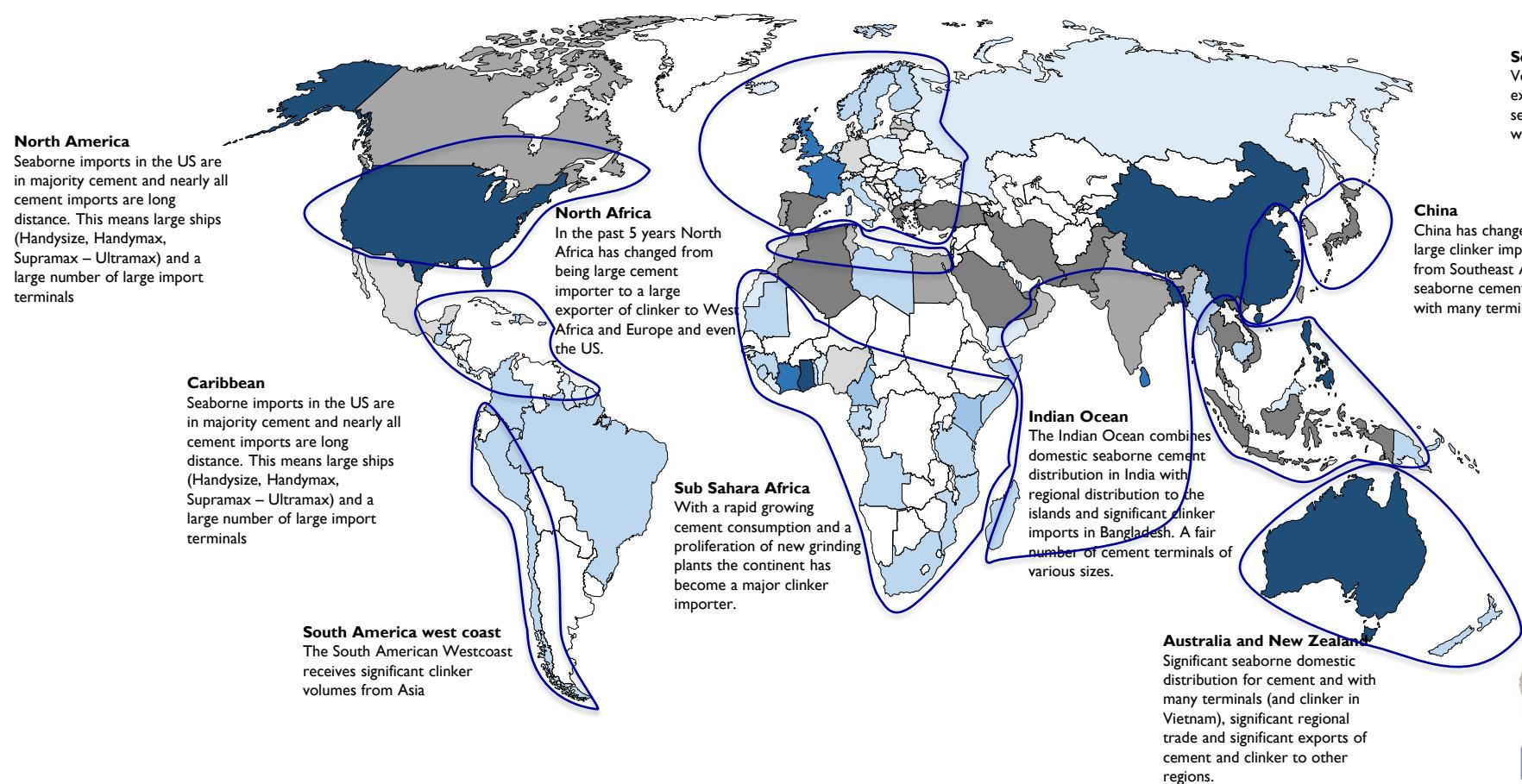
2019 Situation



Forecast

East Asia produces enormous volumes of PFA but also consumes it. There is very significant coastal distribution making use of the existing hundreds of cement terminals. There are only limited exports.

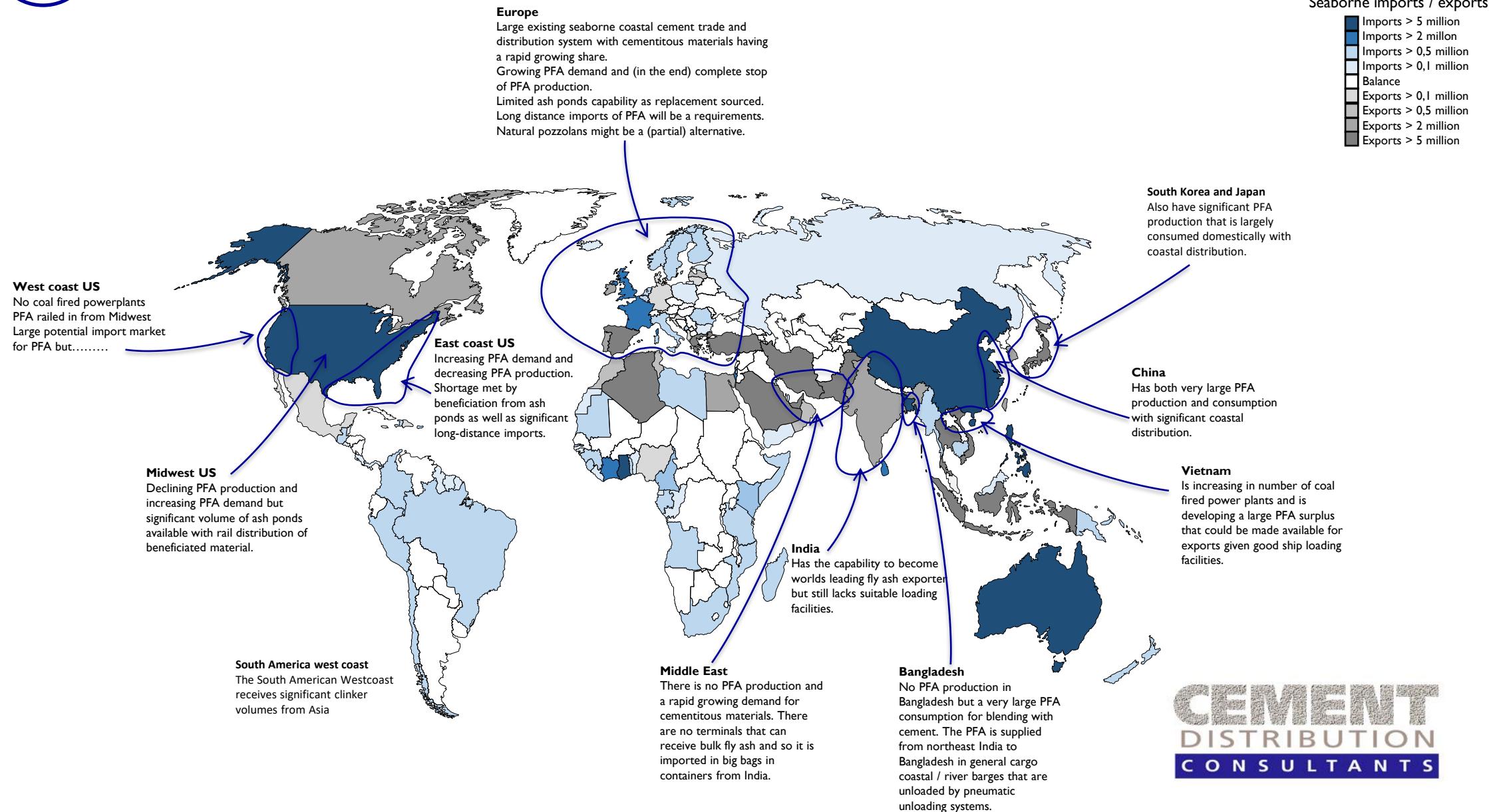
# Characteristics of global cement and clinker trade



Seaborne imports / exports

- Imports > 5 million
- Imports > 2 million
- Imports > 0,5 million
- Imports > 0,1 million
- Balance
- Exports > 0,1 million
- Exports > 0,5 million
- Exports > 2 million
- Exports > 5 million

# Characteristics of current global seaborne ash trade





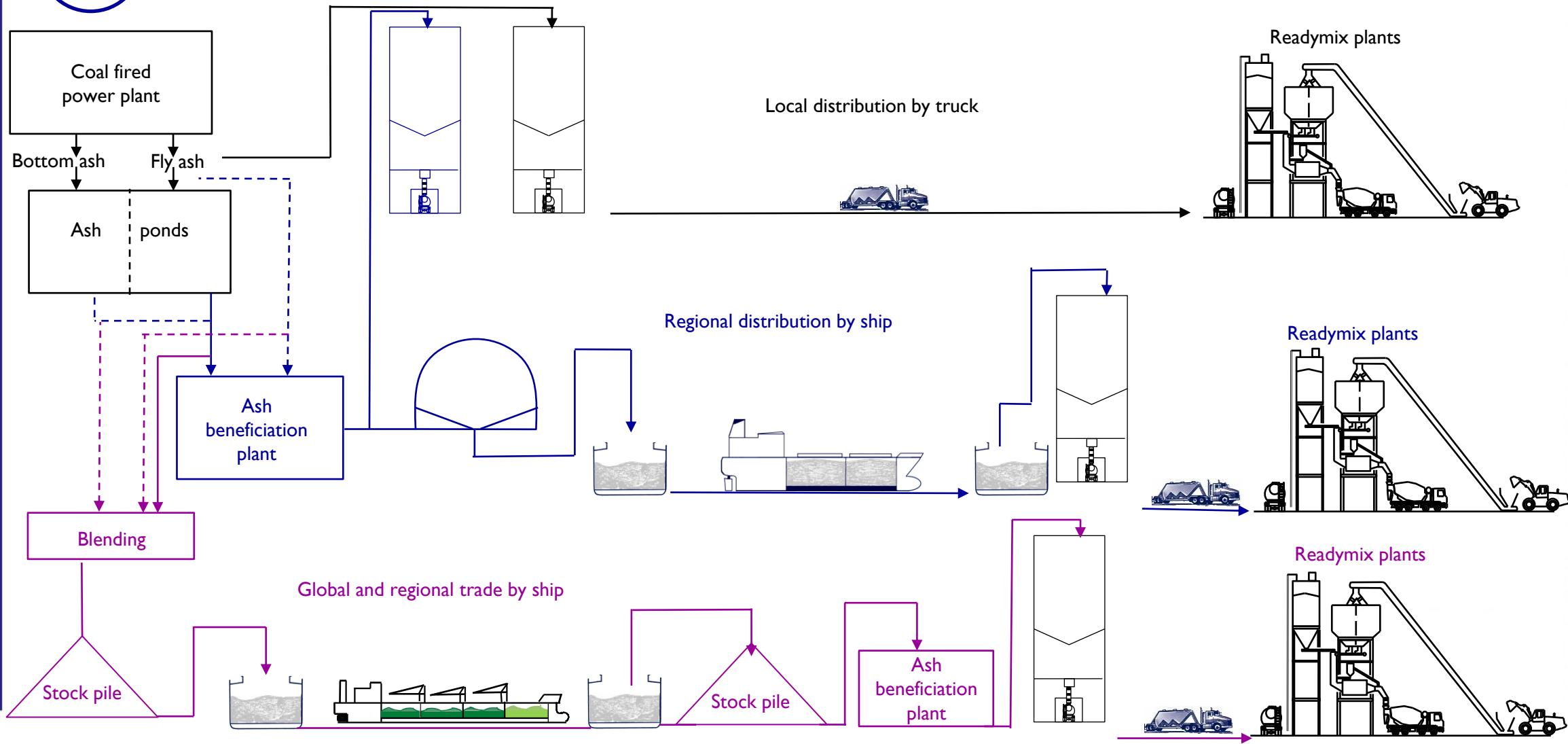
Beneficiated fly ash and natural pozzolans

## Logistics beneficiated fly ash

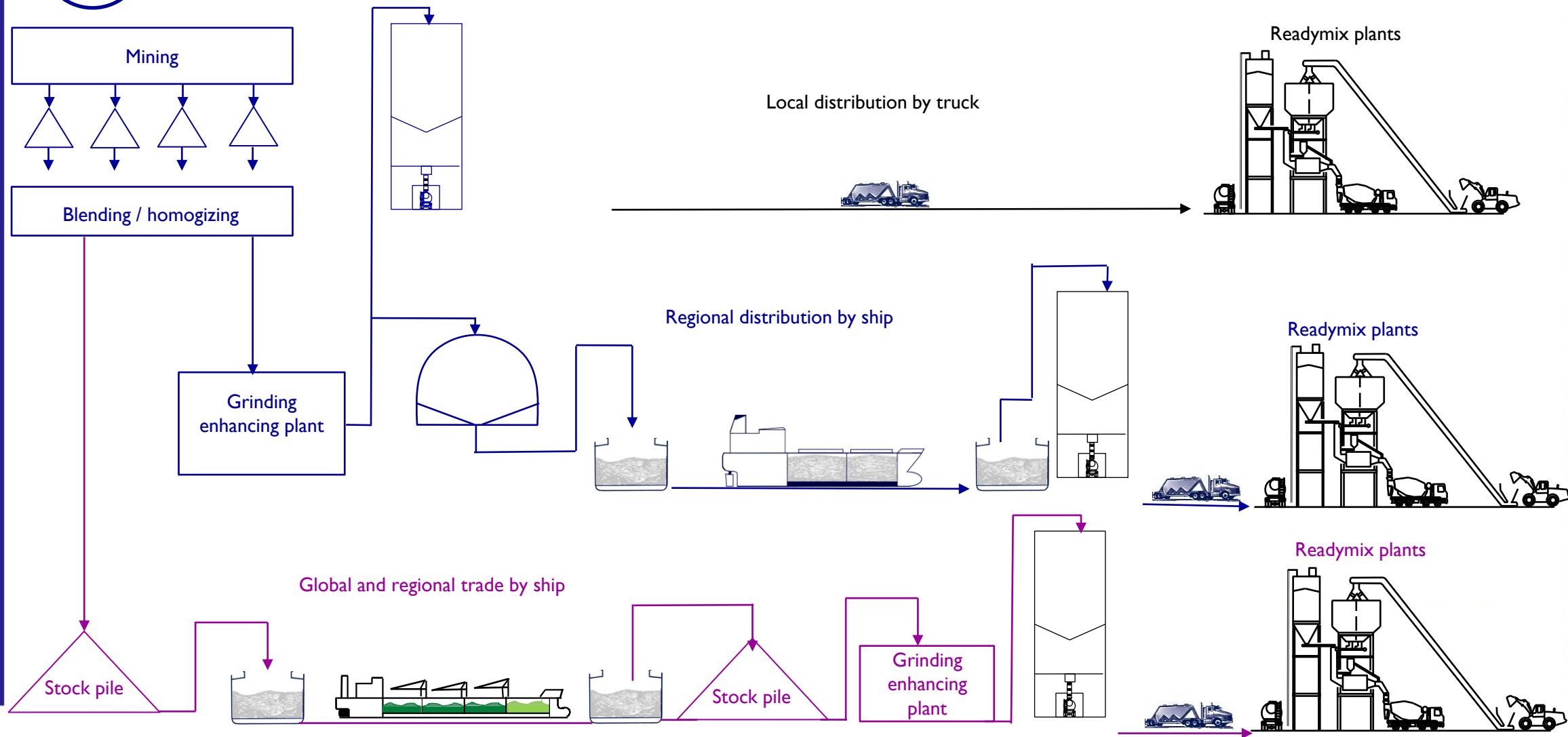
A huge volume of coal ash is available for reclaim and beneficiation in the ash ponds of coal fired power plants.



# Logistics beneficiated fly ash



# Logistics natural pozzolans





## Final considerations

## Final considerations

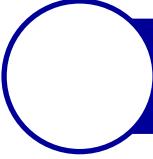
Seaborne ash trade has been growing with double digit percentages in recent years and demand looks set to keep growing. The supply side is the key to success of the trade but the use of the current global cement terminal infrastructure is of large importance too.

With the war in Ukraine and the resulting energy crisis many coal fired powerplants that were scheduled to close will remain in operation (and some even reopened) at least another 3-4 years. Especially in Europe this means that a fly ash shortage has turned into a fly ash surplus and Europe's short distance coastal PFA trade and distribution can still meet the growing demand.

Longer term though, West Europe will be without coal fired power plants (same as for Australia) and in the US the number of coal fired powerplant will rapidly decrease. The resulting shortage of PFA can be mitigated in 3 different ways.

1. Reclaiming and beneficiating ash from existing ash ponds.
2. Long distance PFA supply from countries such as India and Vietnam (and for Europe, more closely, Turkey).
3. Natural Pozzolans (Volcanic ashes) which, similar to ashes from ash ponds, require processing.

The preference for each option will depend on the combination of processing and logistical costs. Long distance PFA supply has no processing costs, but the logistical costs are quite high as large loading facilities and large import terminals are required. When reclaiming and beneficiating ash from ash ponds and for natural pozzolans, the distance to the markets will be much shorter with lower logistical costs, but the processing costs will have to be added.



## Final considerations

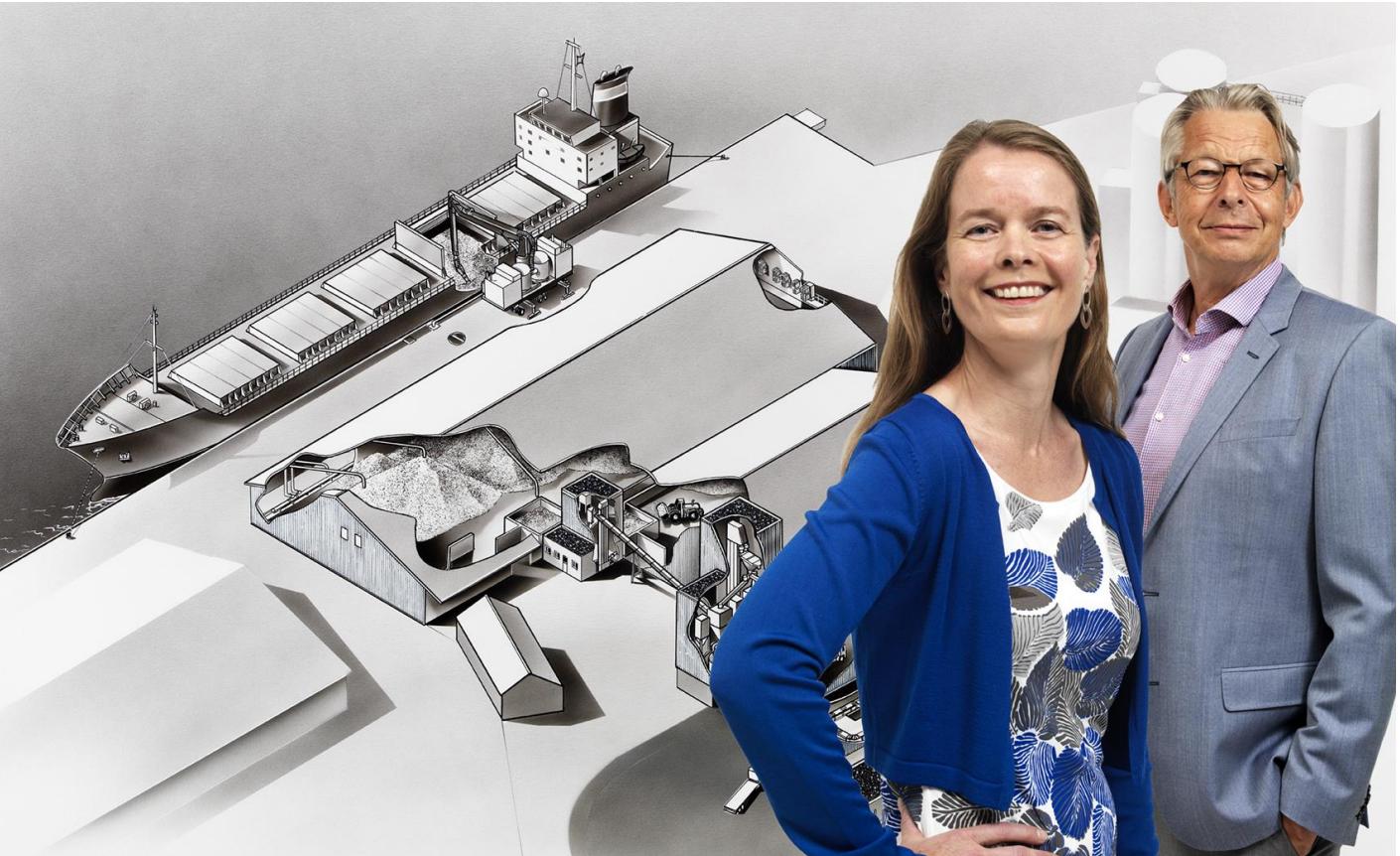
For the US this will mean that away from the coast the preferred source will be beneficiated fly ash from ash ponds, distributed by truck and rail. For large markets on the east and west coasts long distance PFA supply looks to be the best option, but this will need to involve large existing cement terminals. These terminals are available, but most are owned by US cement manufacturers and PFA is not a profit centre for the cement industry. There are independents however and some cement manufacturers might switch the use of their terminals to keep control over fly ash imports in their markets.

Europe has its very extensive coastal trade and distribution networks for cement and cementitious materials. As yet it is incapable to receive long distance sourced PFA on a significant scale. What will be required for this are very large hub terminals. But who will do this??? Some countries, like the UK, have large ash ponds from which material can be reclaimed and beneficiated and possibly distributed by existing networks. Not to be forgotten are natural pozzolans. Iceland could supply Europe with very large volumes for decades.

It should be noted that untreated ashes from ash ponds and unprocessed natural pozzolans can be transported at a significant lower cost than the processed product. It would be best to have the beneficiation or processing plant as close as possible to the markets. For ash from ash ponds this might be difficult as it is considered to be a waste material to which all kinds of export restrictions apply. For natural pozzolans however, this would not be the case.



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# THANK YOU !