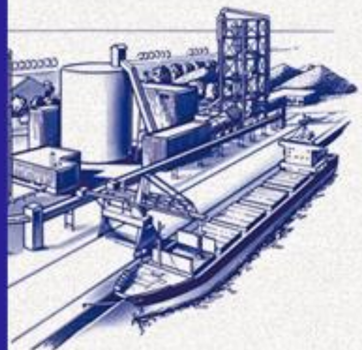
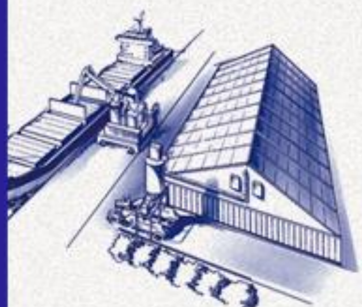




INTERCEM AMERICAS

Global cement trade flows and US imports

Ad Ligthart

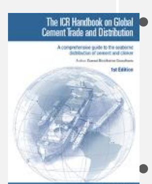
INTERCEM Americas, Houston, November 1, 2016

CEMENT DISTRIBUTION CONSULTANTS

Cement Distribution Consultants
an introduction

Market knowledge

- The global cement industry on Google Earth.
- The most comprehensive global database on waterside cement plants, waterside grinding plants and terminals.
- www.cementdistribution.com (a free and comprehensive website on cement trade and distribution).
- Authors of the Handbook on Global Cement Trade and Distribution.
- 34 Years experience.



Consulting

- The ability to advise customers on every aspect of cement and clinker trade and distribution including strategical, economical, logistical, technical and operational aspects as well as sourcing, shipping, facilities, handling systems, etc., etc.
- A clear vision on port and facility design that can adapt to changing trade and industry conditions.
- Projects realised on every continent.
- Currently consultant to the two largest cement terminals in the world.

Project / interim management

- Substantial experience in realising projects and managing complete logistical chains.
- Examples:
  - Setting up and managing the cement and fly ash supply to a large construction project including self-discharging cement carriers, floating terminal, etc.
  - Redevelopment of a large brown field bulk terminal.
  - Setting up a fly ash import operating
  - Resolving operational and managerial problems of a grinding facility.

CEMENT DISTRIBUTION CONSULTANTS

Contents of presentation

- Global trade flows 2015
- North American trade flows 2015 and 2016 H1
- A bit of history and a forecast
- The North American terminal situaton
- Final considerations

INTERCEM

CEMENT DISTRIBUTION CONSULTANTS

Global trade flows

Regional seaborne exports	49 mt	
Global seaborne exports	61 mt	
Waterborne domestic distribution	112 mt	(excl. China)
Total	222 mt	

2015 Global seaborne cement and clinker trade flows (est.)

CEMENT DISTRIBUTION CONSULTANTS

Global trade flows

CLINKER AND CEMENT TRADE BY WATER			
Clinker / cement type	Seaborne trade (Mt)		Inland water domestic trade (Mt)
	International	Domestic	
Clinker	43.9	9,4	4,7
Cement – Bulk	49,1	72,1	10.3
Cement – Bagged	17,0	11,5	3,7
Total	**110,0**	**93,0**	**18.7**

CEMENT DISTRIBUTION CONSULTANTS

Shipments by cargo type

Global trade flows

CLINKER AND CEMENT TRADE BY VESSEL TYPE				
Clinker / cement type	Bulk Carriers (Mt)		Self-disch. cement carriers (Mt)	Inland ships & water barges (Mt)*
	Large	Coastal		
Clinker	41,2	12,1	0	4,7
Cement – Bulk	12,7	11,5	97,0	10,3
Cement – Bagged	19,6	8,9	0	3,7
Total	**73,5**	**32,5**	**97,0**	**18,7**
** excluding China*				

CEMENT DISTRIBUTION CONSULTANTS

Clinker and cement trade by vessel type

Global trade flows

- A glut of exportable clinker and cement volumes has developed with a downward pressure on F.O.B prices
  - Economical slowdown in China with a substantial drop in cement consumption
  - Iran, Saudi Arabia, Indonesia (re) enter the market
  - Turkey, Vietnam, Pakistan keep adding capacity
  - Structural cement surpluses in South Europe, UAE, Thailand, etc.
- Shipping prices (despite substantial scrapping) are remaining very low
- Trade in cementitious materials is growing and becomes more global

CEMENT DISTRIBUTION CONSULTANTS

Global trade flows

- Changing import markets
  - North African import markets are in decline.
  - Large production capacity increases throughout the developing nations. The need for bagged cement imports declines. Government protection against these imports increases.
  - However, a large part of the production capacity increases have been grinding plants increasing clinker imports.
  - Political instability and low oil prices have had a negative effect on economic growth in several oil and gas producing countries with a strong downward pressure on cement consumption.
  - US cement imports are growing significantly.

CEMENT DISTRIBUTION CONSULTANTS

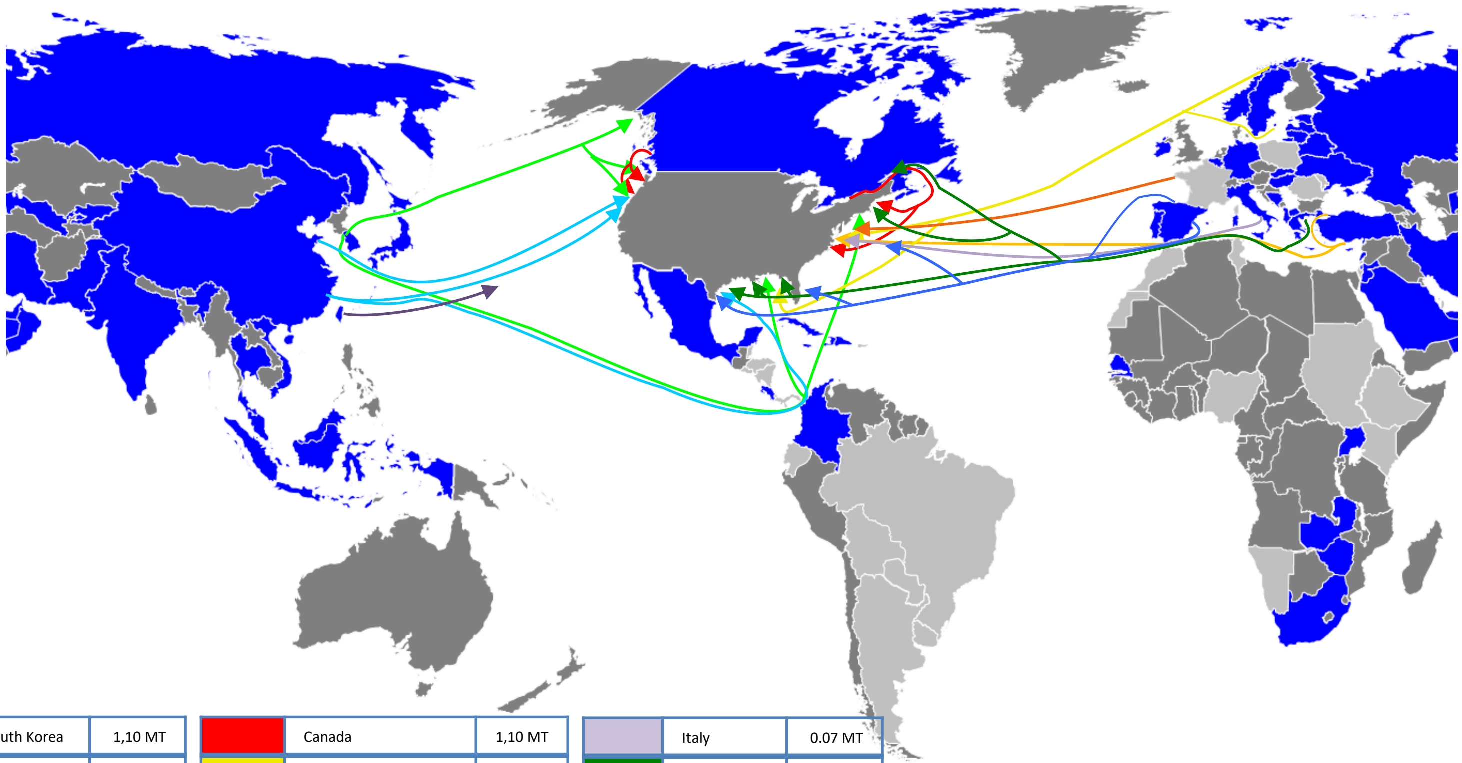
Global trade flows

Result 1): Overall trade volume in 2016 will be somewhat higher as 2015 but less bagged cement and more clinker and bulk cement trade.

Result 2): The long-term export availability of low priced cement and (especially) clinker, in combination with low shipping prices makes it uneconomical to build integrated cement plants in coastal areas wherever in the world. It is more economical to import. New coastal cement production facilities will be grinding plants (with blending capability).

North American seaborne trade flows 2015

Total US seaborne imports 7,75 MT



	South Korea	1,10 MT
	China	1.47 MT
	Taiwan	0.43 MT

	Canada	1,10 MT
	Scandinavian countries	0.68 MT
	France	0.08 MT
	Spain	0.37 MT

	Italy	0.07 MT
	Greece	1.66 MT
	Turkey	0.38 MT

Total Asia 3,00 MT

Total Canada 1,10 MT

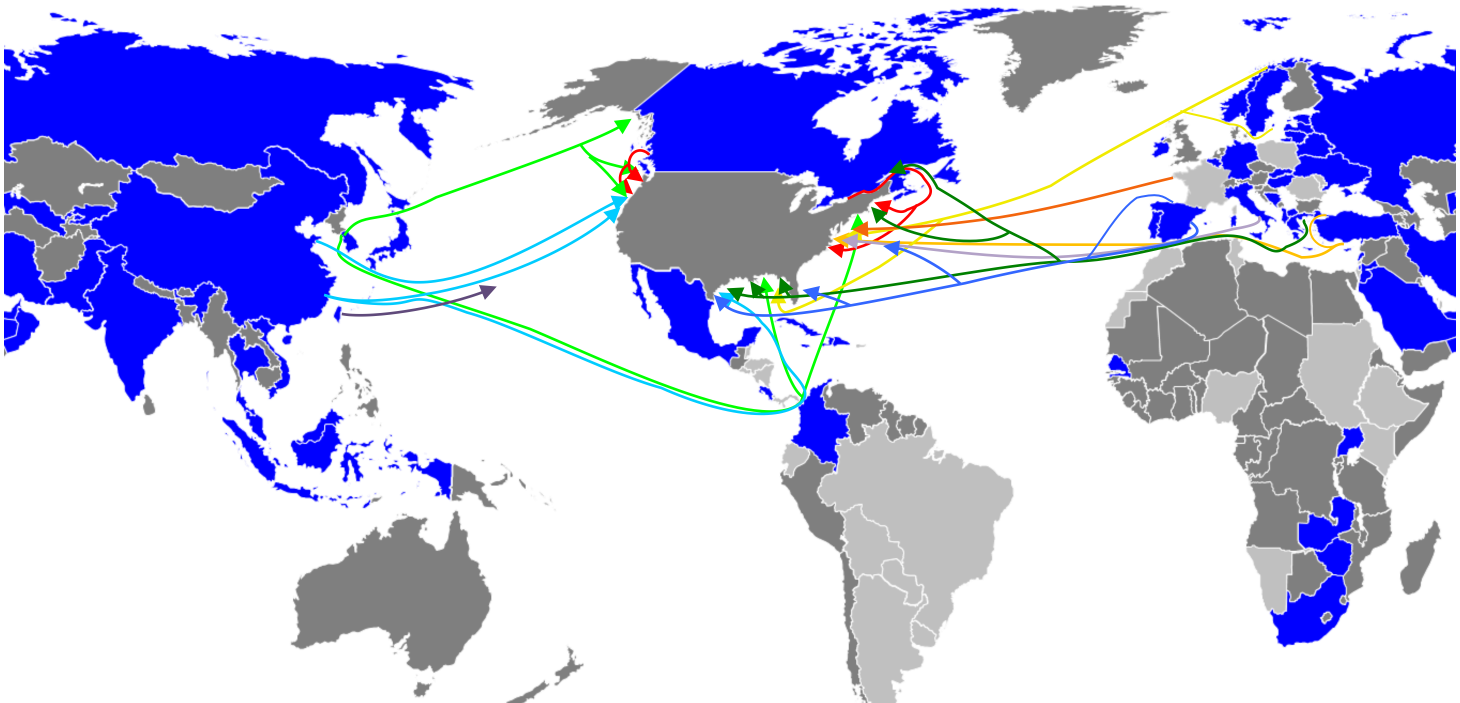
Total Europe 3,24

Total small volumes 0,23 MT (inc. South America.)

CEMENT DISTRIBUTION CONSULTANTS

North American seaborne trade flows 2016 H1

Total US seaborne imports 4.41 MT



	South Korea	260.650
	China	764.134
	Taiwan	195.000

Total Asia 1.22 MT

	Canada	500.615
	Scandinavian countries	257.006
	France	53.861
	Spain	427.040
	Portugal	33.704

Total Canada 0.50 MT

	Italy	71.588
	Greece	1.083.519
	Turkey	556.466T
	Bulgaria	80.482

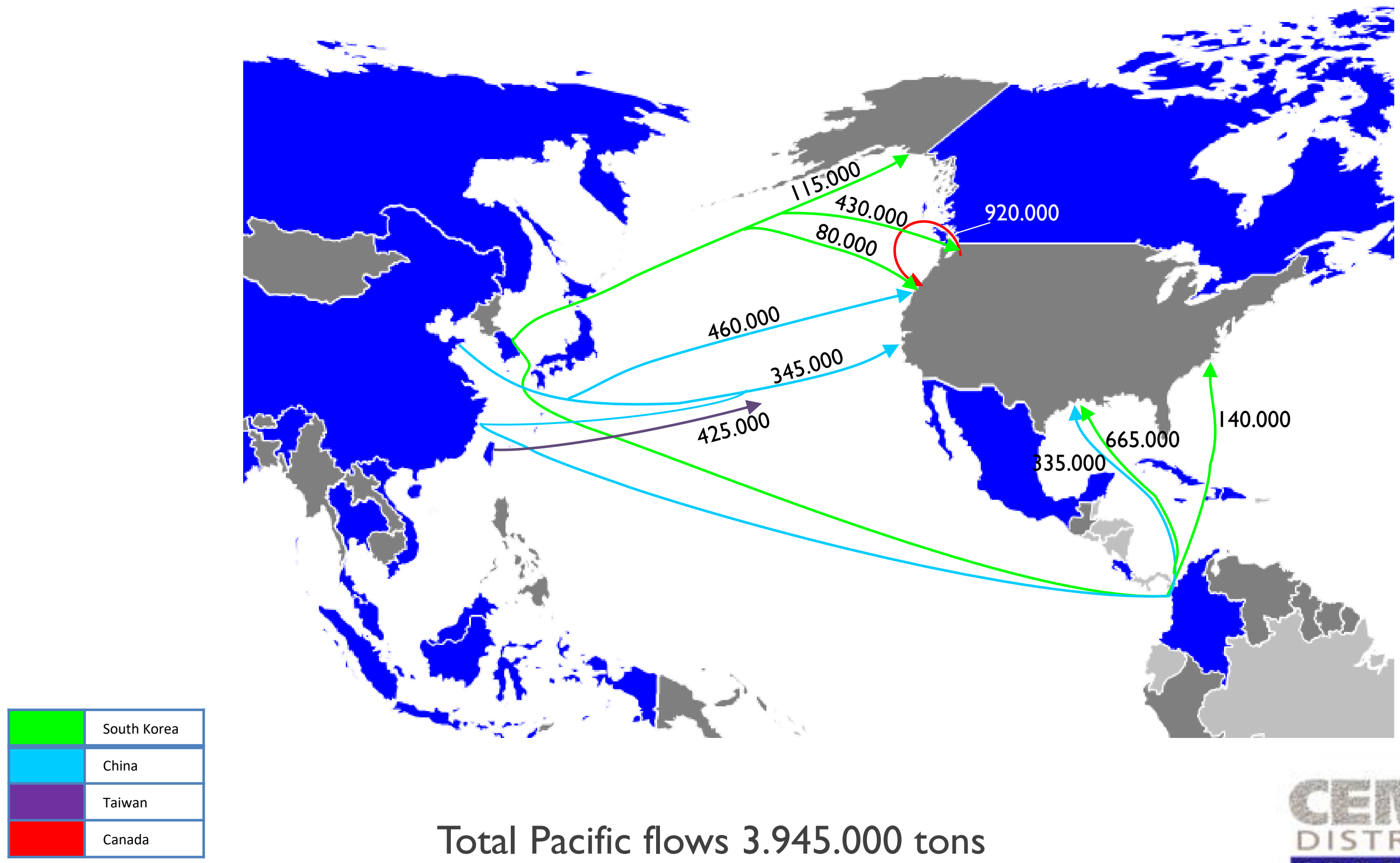
Total Europe 2.56

Total small volumes 0,13 MT (inc. South America.)

CEMENT DISTRIBUTION CONSULTANTS

North American cement flows (Pacific)

Trading volumes 2015

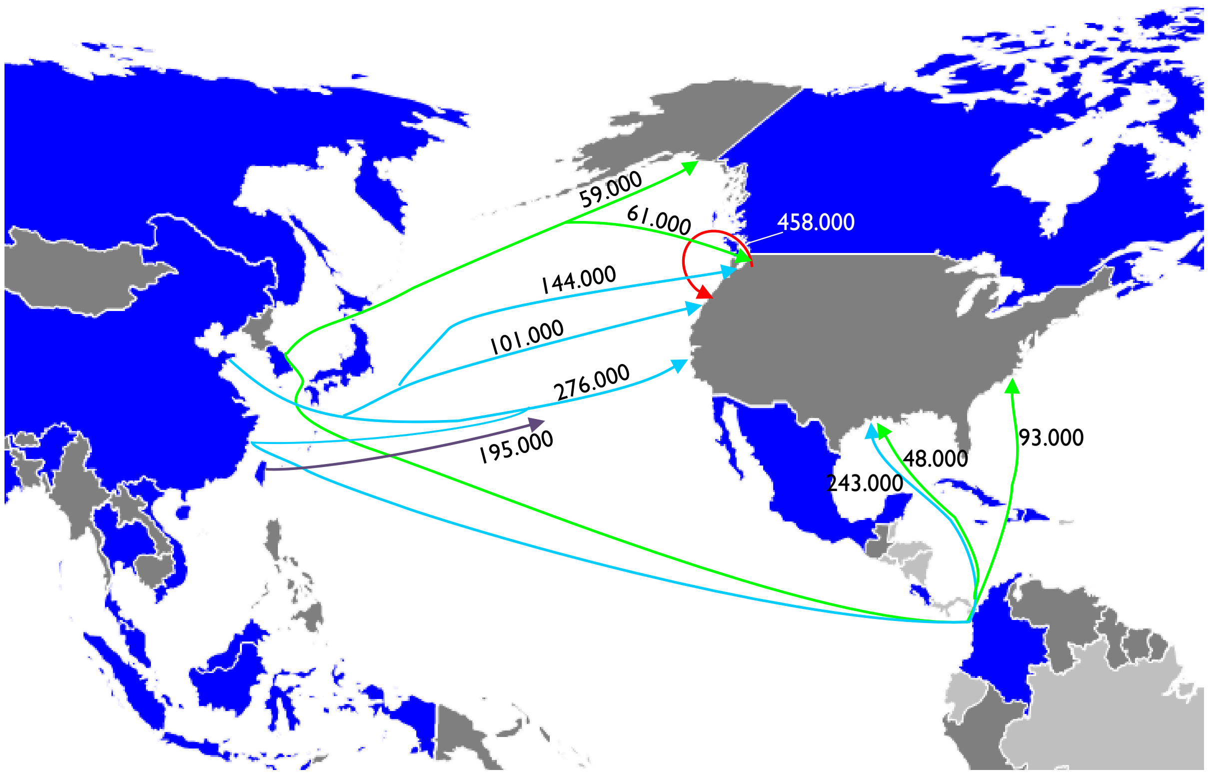


Total Pacific flows 3.945.000 tons

CEMENT DISTRIBUTION CONSULTANTS

North American cement flows (Pacific)

Trading volumes 2016 H1



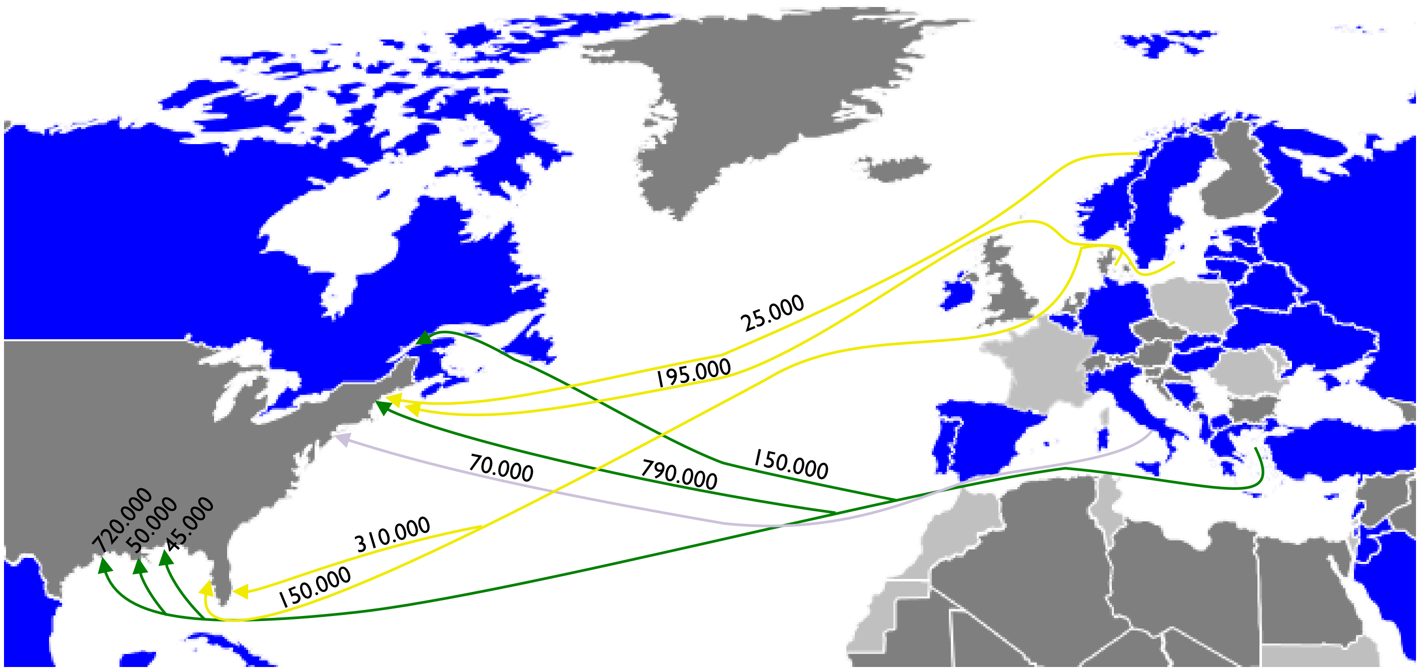
	South Korea
	China
	Taiwan
	Canada

Total Pacific flows 1.678.000 tons

CEMENT DISTRIBUTION CONSULTANTS

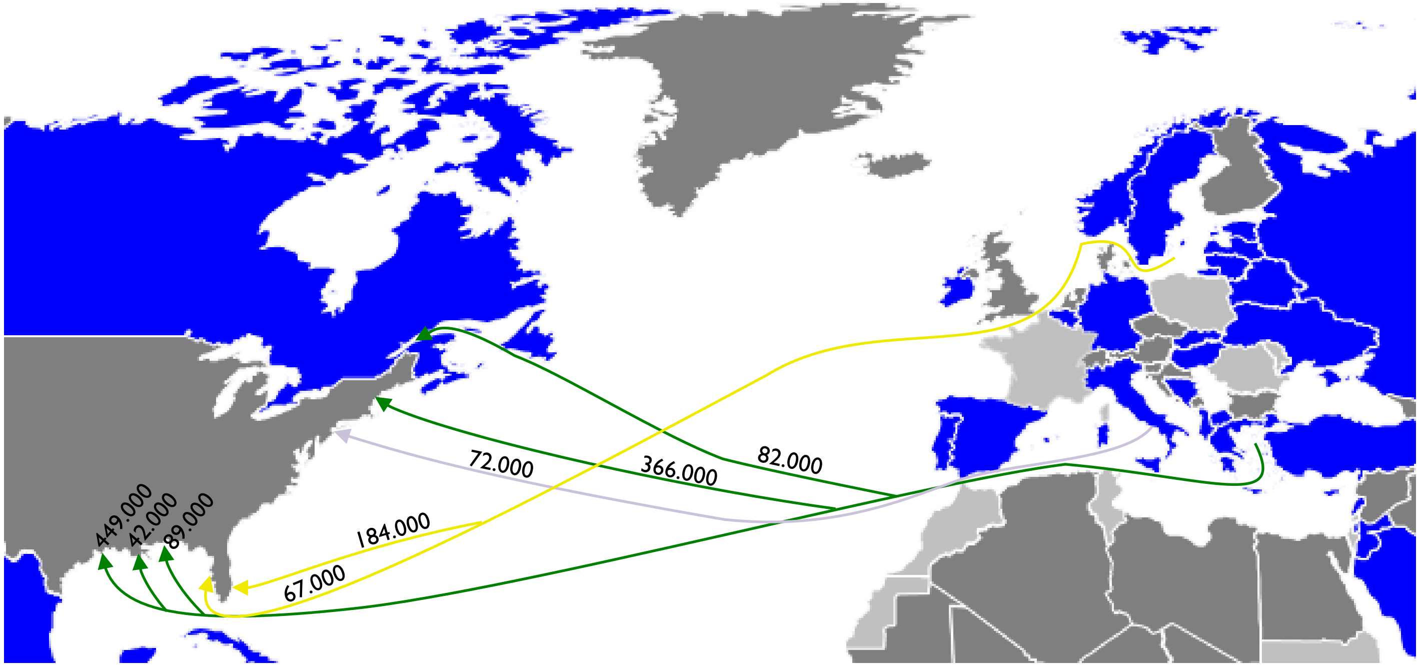
North American cement flows (Atlantic)

Trading volumes 2015



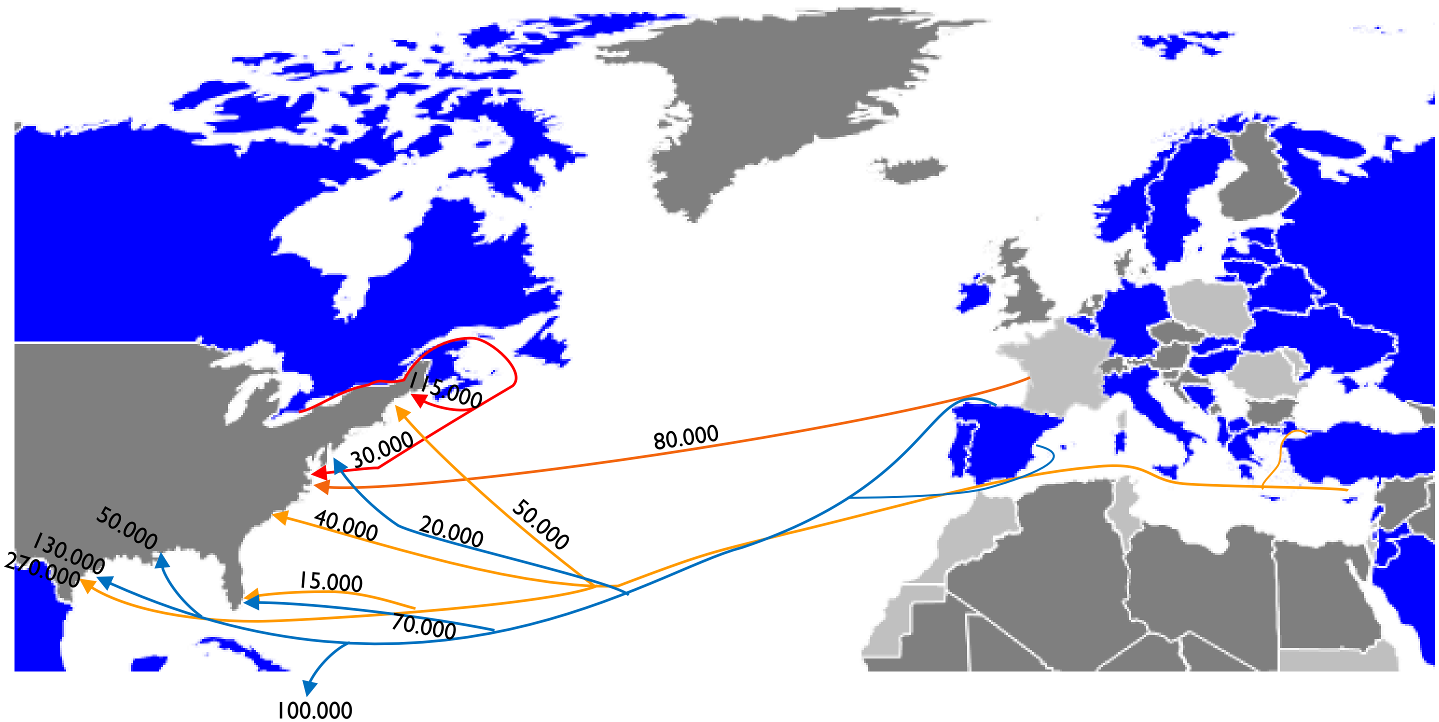
North American cement flows (Atlantic)

Trading volumes 2016 H1



North American cement flows (Atlantic)

Trading volumes 2015

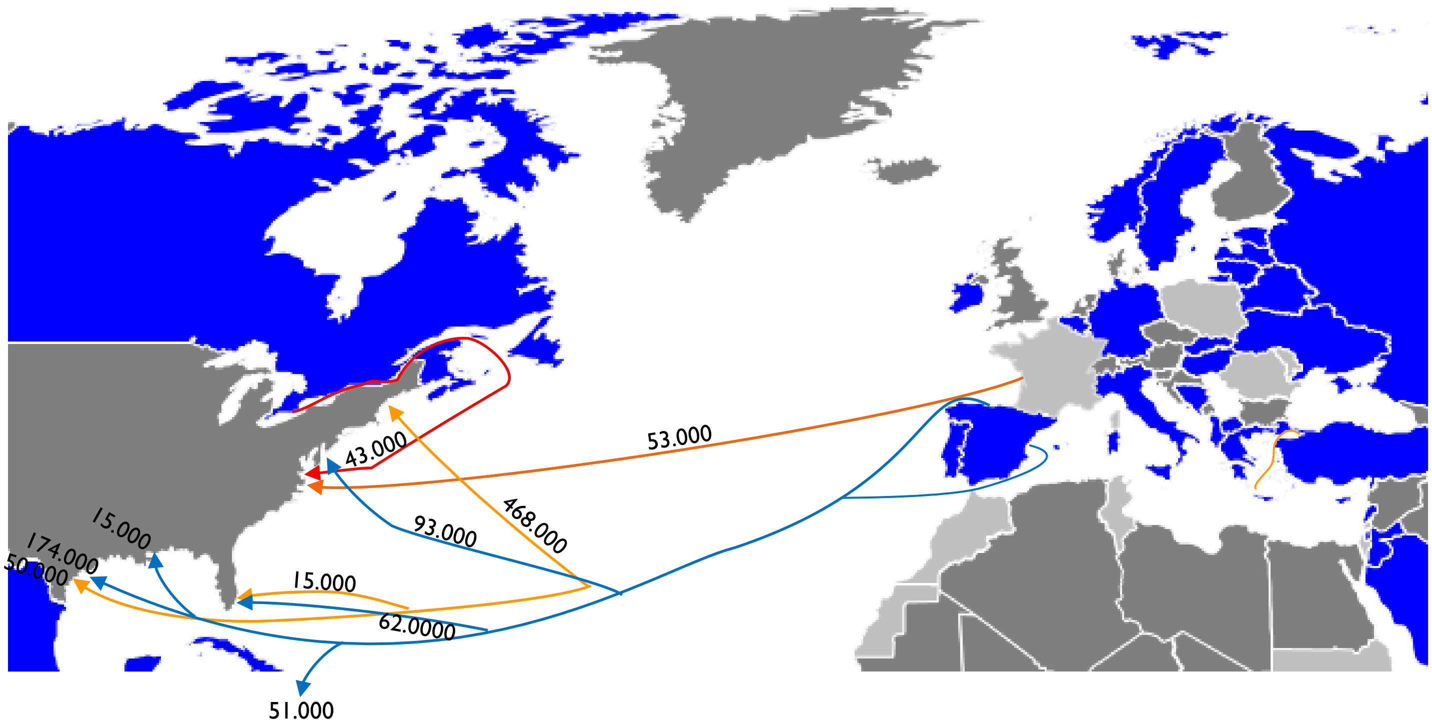


	Canada	0.15 MT
	Turkey	0.38 MT
	Spain	0.37 MT
	France	0.08 MT

CEMENT DISTRIBUTION CONSULTANTS

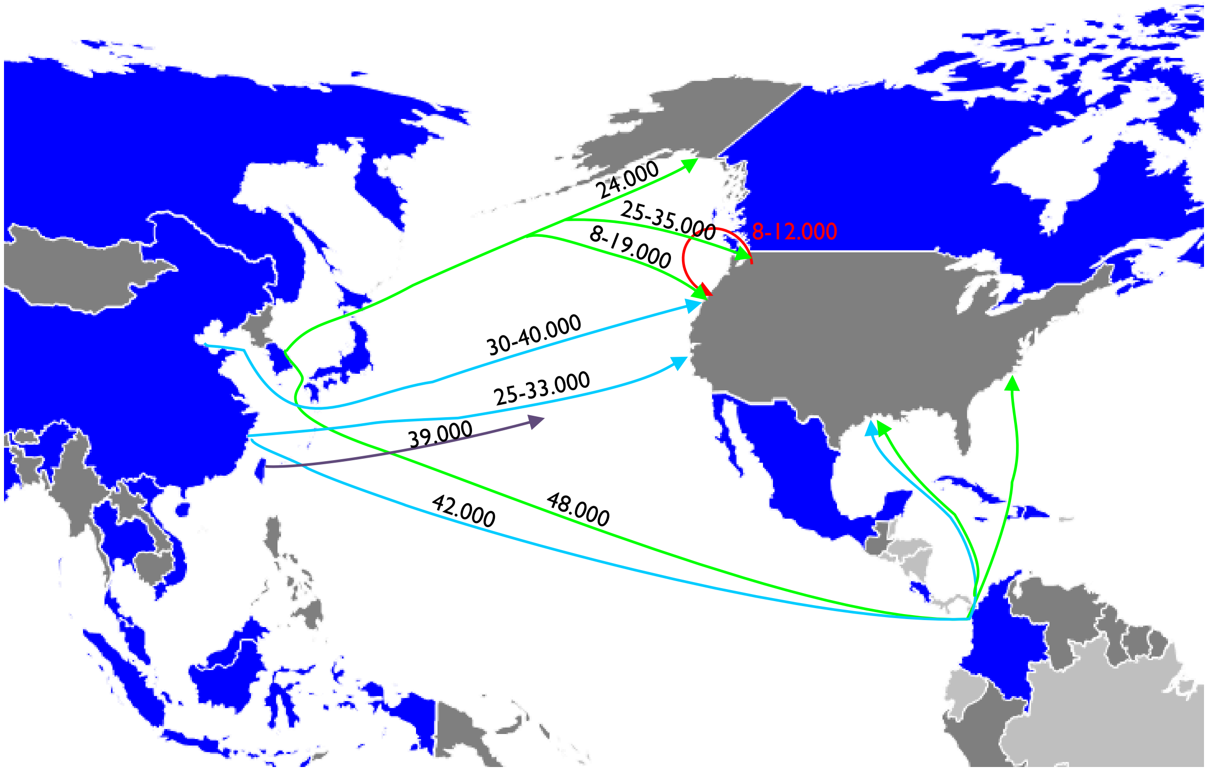
North American cement flows (Atlantic)

Trading volumes 2016 H1



Shipping (Pacific)

Typical cargo sizes

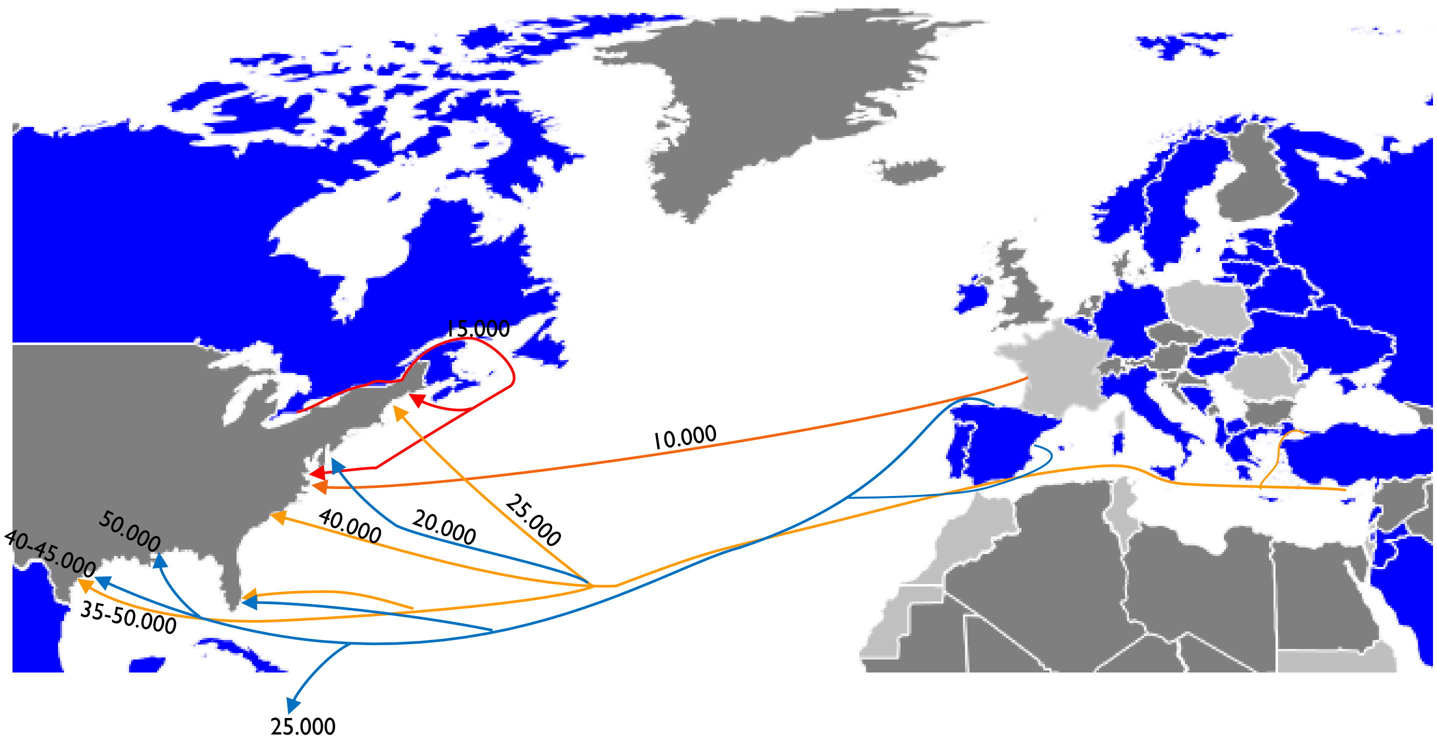


	South Korea
	China
	Taiwan
	Canada

All shipping on the Pacific side is by bulk carrier except from Canada which is by self-discharging barges.

Shipping (Atlantic)

Typical cargo sizes

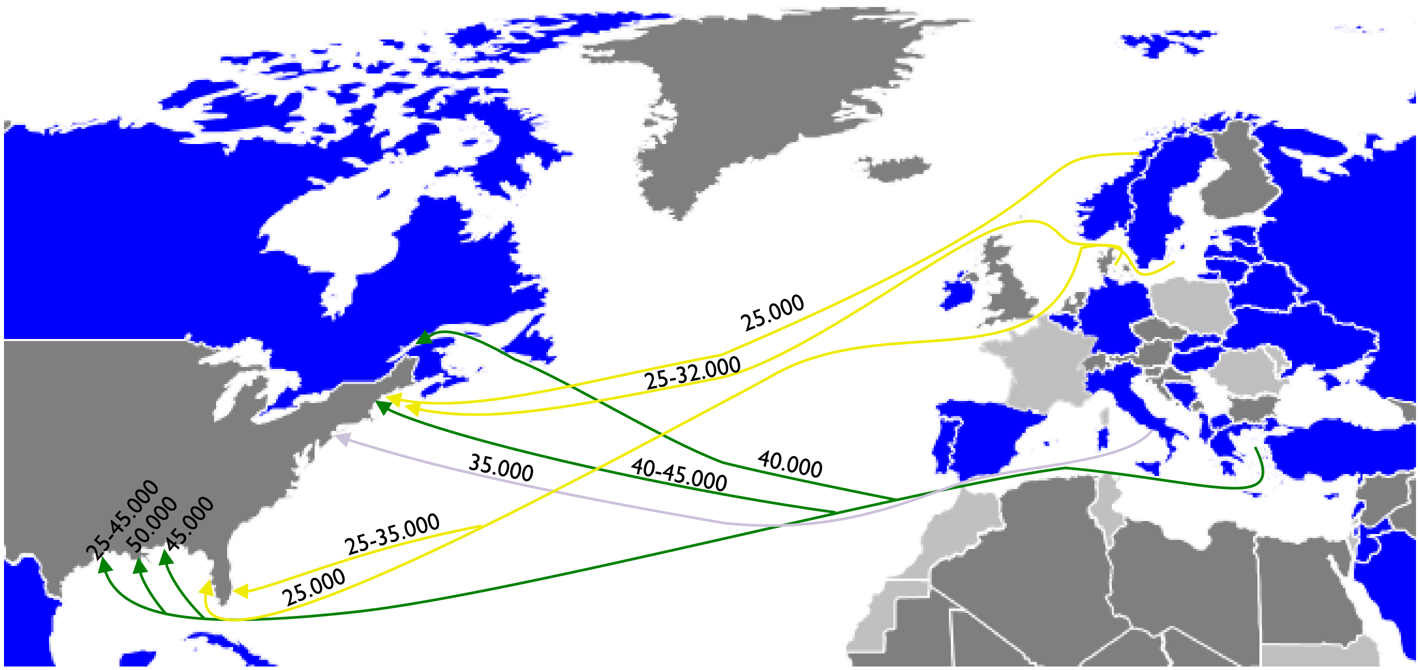


All shipping on the Atlantic side is by bulk carrier except from Canada which is by self-discharging barges and a few shipments from South America by self-discharging vessels.

CEMENT DISTRIBUTION CONSULTANTS

Shipping (Atlantic)

Typical cargo sizes



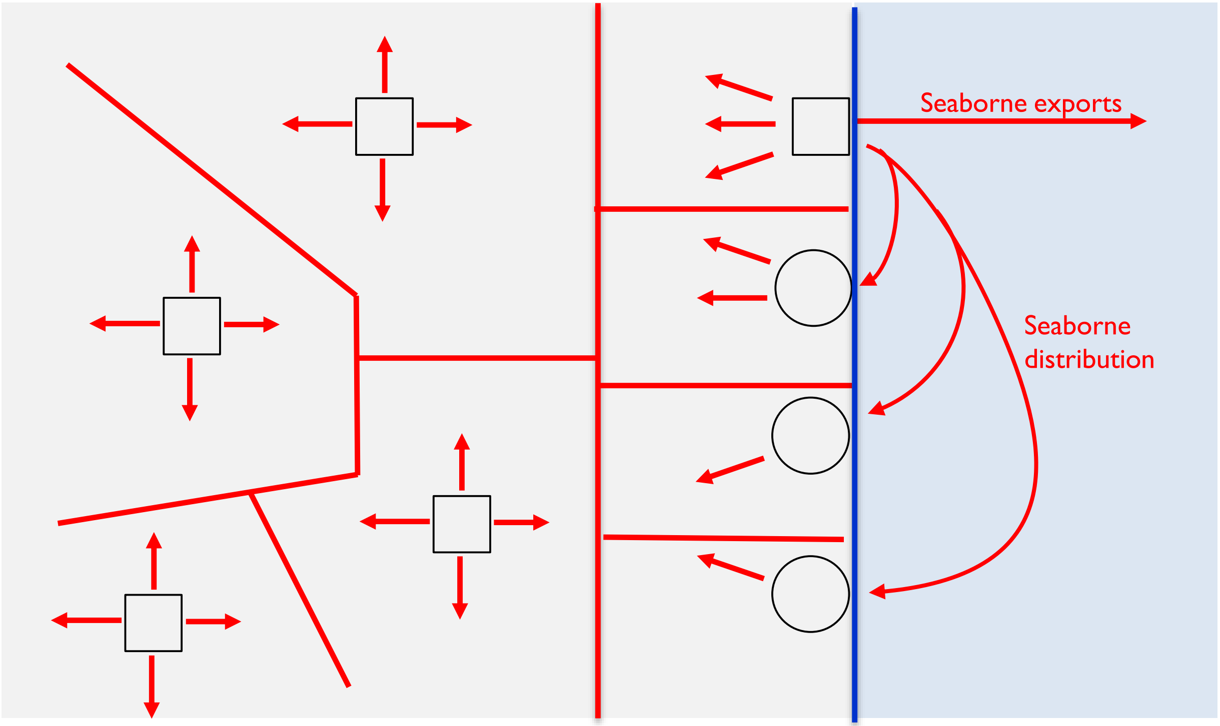
All shipping on the Atlantic side is by bulk carrier except from Canada which is by self-discharging barges and a few shipments from South America by self-discharging vessels.

CEMENT DISTRIBUTION CONSULTANTS

The US import terminal situation

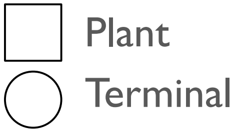
- What is the ownership situation?
- What happened during the crisis?
- How will seaborne imports be distributed over the US in the future?
- What about changes in shipping?
- South America has dried up as a supply basis. What are the consequences?
- How is the market for the cementitious materials developing?
- What is the best cement terminal concept for the US?

The economical mechanisms behind seaborne trade and distribution

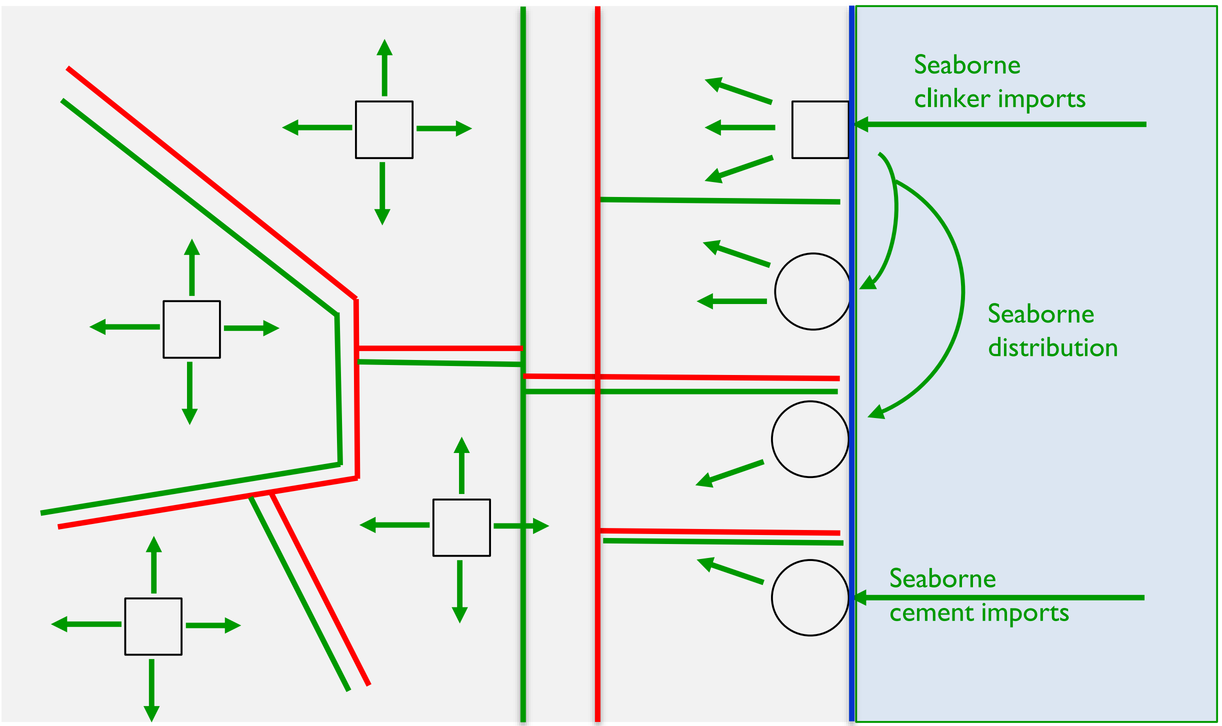


The use of coastal plants to balance entire regions

Market areas and cement flows in over supply situation.



The economical mechanisms behind seaborne trade and distribution



Market areas and cement flows in a shortage situation.

Plant
Terminal

The use of coastal plants to balance entire regions

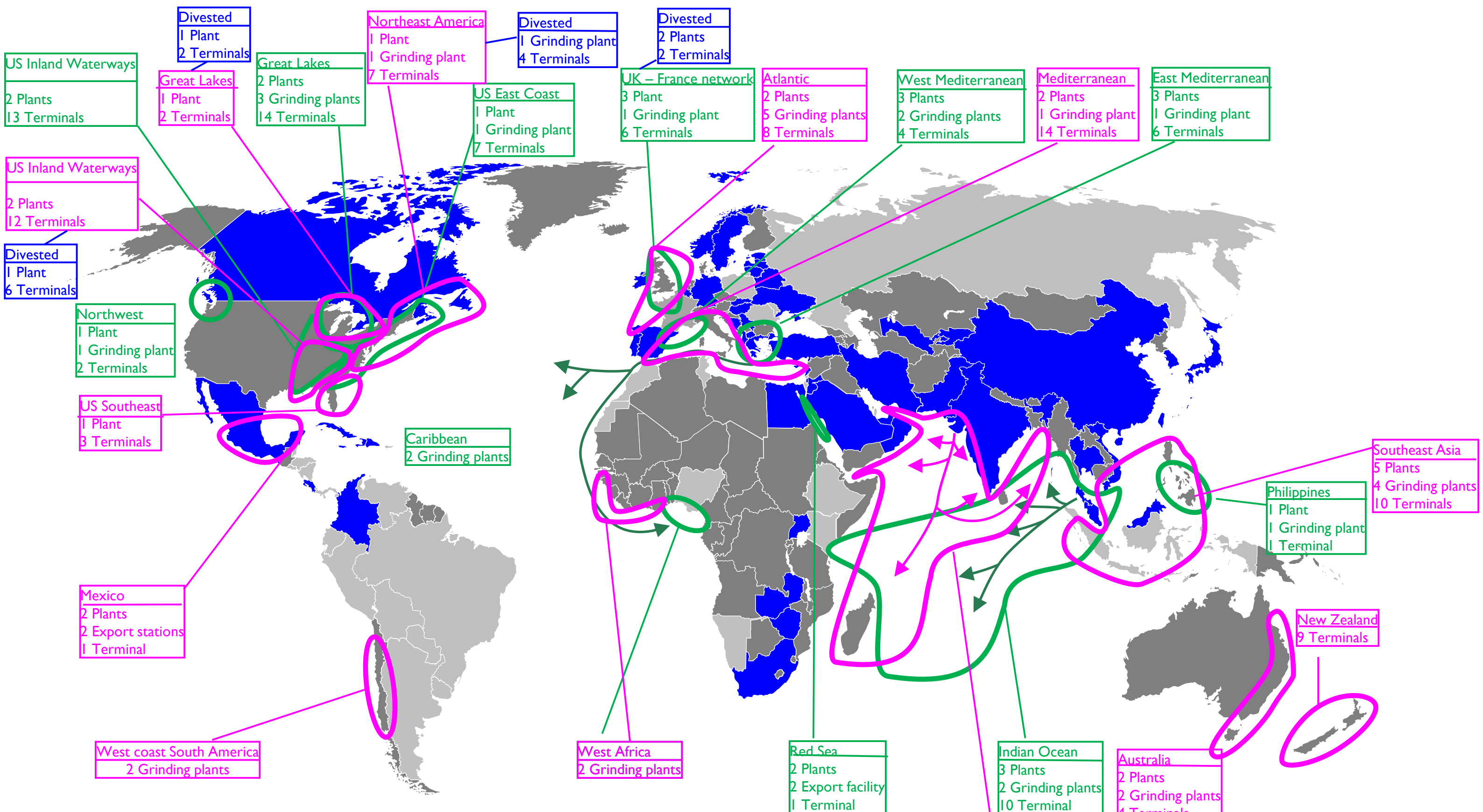
CEMENT DISTRIBUTION CONSULTANTS

The economical mechanisms behind seaborne trade and distribution

The combined LafargeHolcim global networks (shown on the next page), although the largest in the world, are far from optimal. There are large overlaps. In these regions often cement plants of either Lafarge or Holcim have been divested but the terminal facilities have been kept to protect the remaining plants from competitive imports. Overall utilisation of LafargeHolcim plant and distribution networks is low compared to industry averages.

In the US LafargeHolcim only has 3 terminals that are able to handle large bulkcarriers. The other terminals are for coastal distribution.

The economical mechanisms behind seaborne trade and distribution



LafargeHolcim combined trading and distribution networks

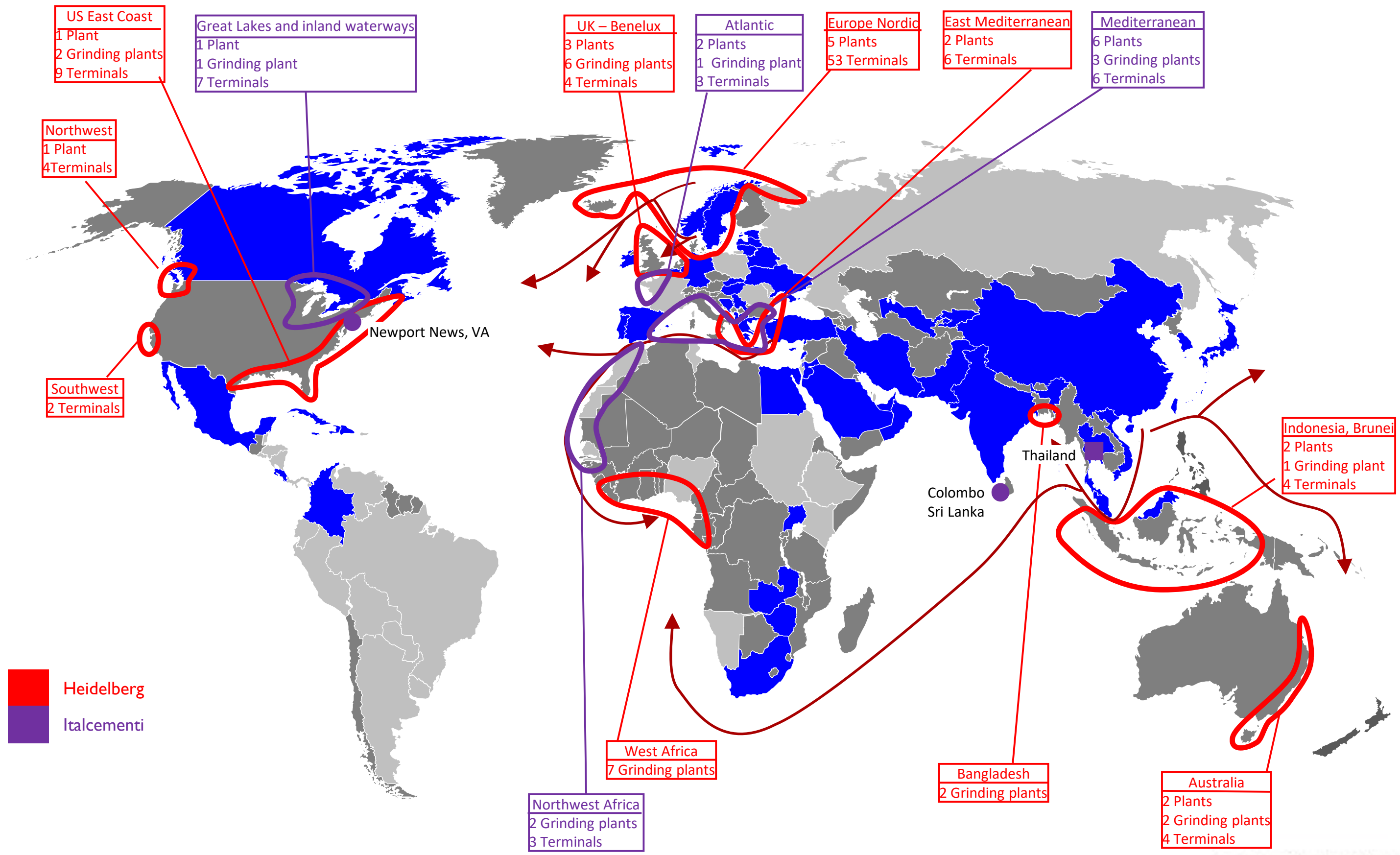
CEMENT DISTRIBUTION CONSULTANTS

The economical mechanisms behind seaborne trade and distribution

The combined Heidelberg / Italcementi networks complement each other and as such the new Heidelberg network has gained significantly in power and synergy possibilities.

The networks protect and enhance the key regions in which the new Heidelberg is active and the North American and Africa networks which are the largest growth areas are very well covered.

The economical mechanisms behind seaborne trade and distribution



Heidelberg / Italcementi combined trading and distribution networks

CEMENT DISTRIBUTION CONSULTANTS

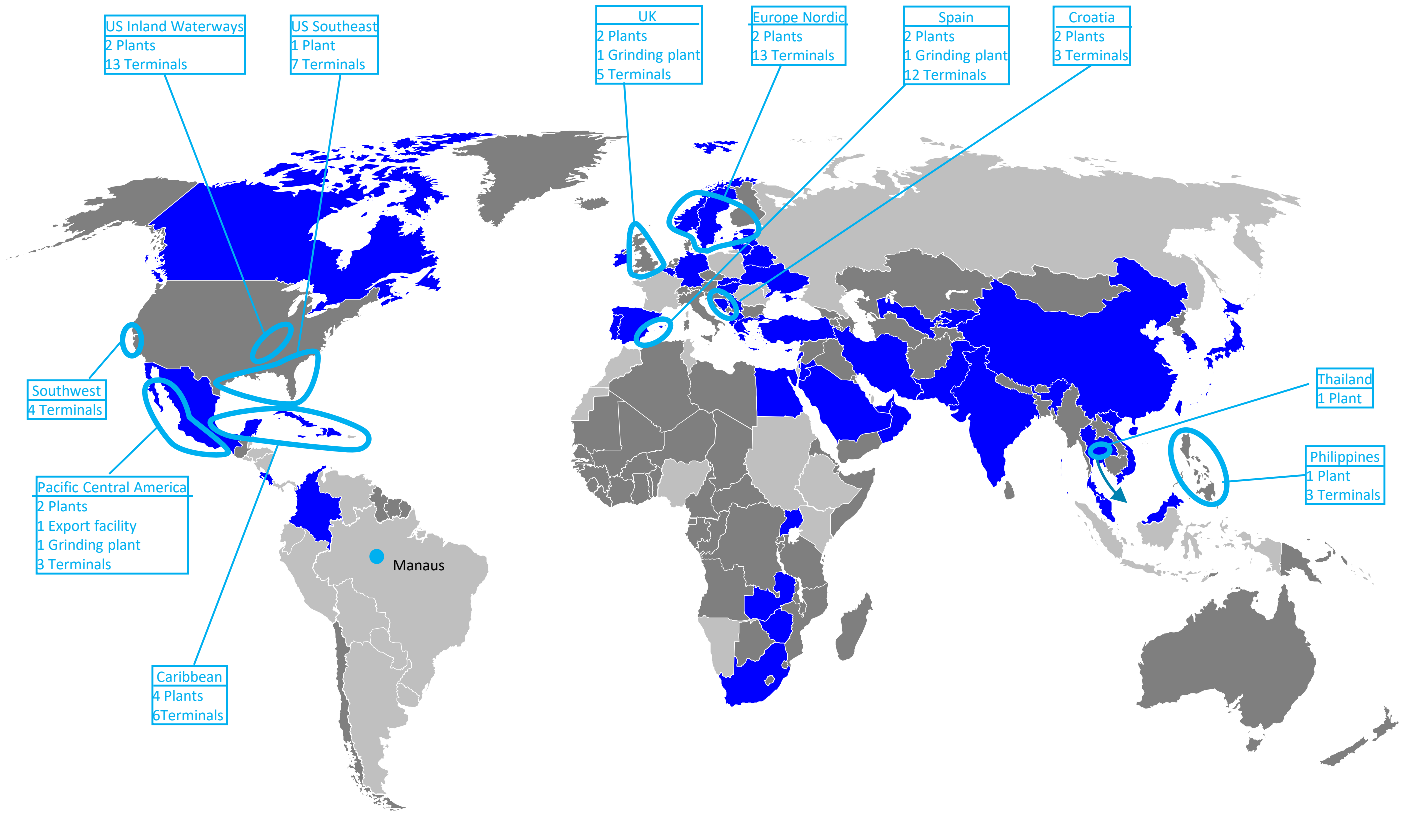
The global networks of the large multinationals

The global Cemex network is still quite strong. The individual networks protect and enhance the key regions in which Cemex is active.

The recent Cemex divestments are almost all isolated plants. Very few divestments have been made in its trade and distribution network and these were part of a rationalisation process.

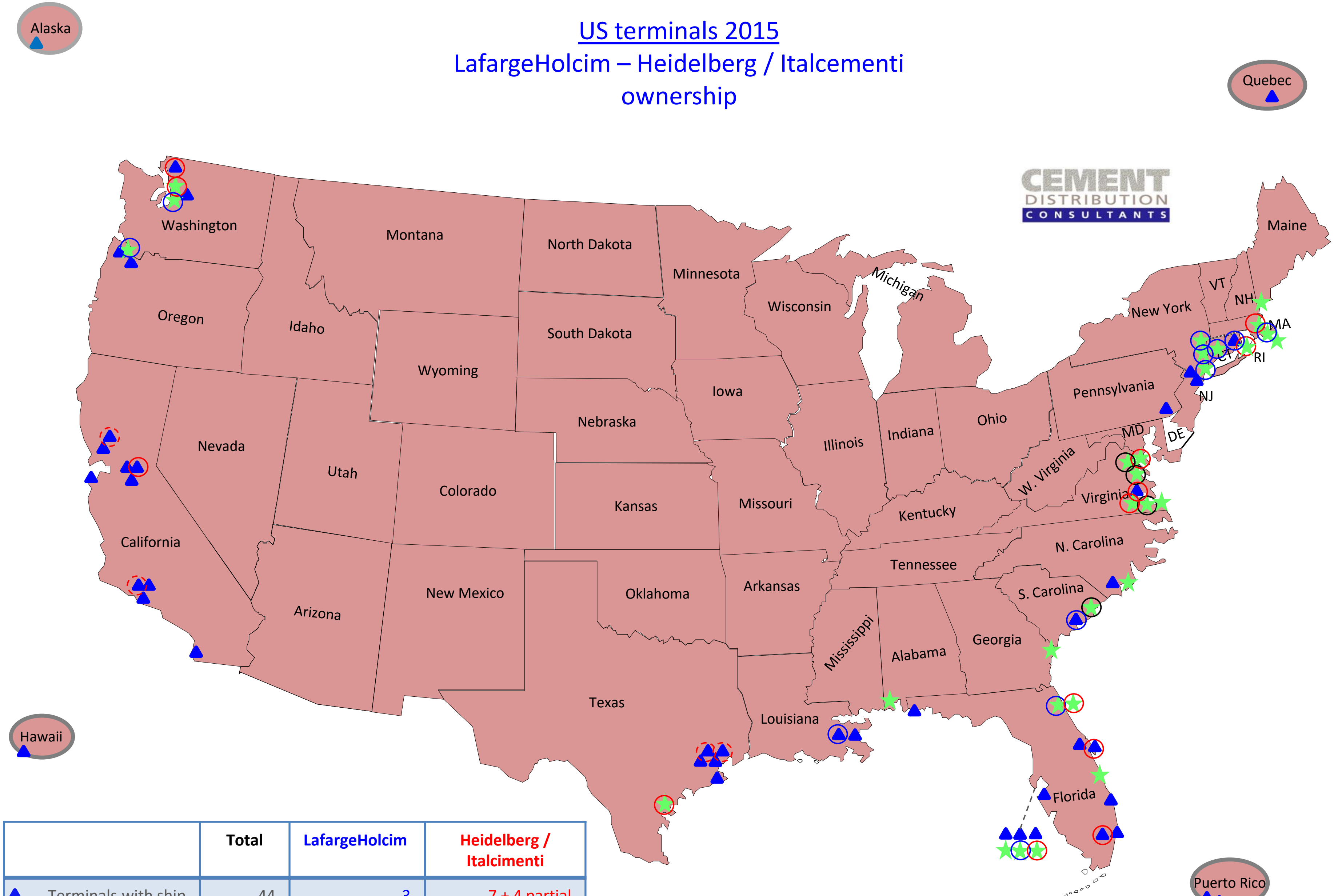
CEMENT DISTRIBUTION CONSULTANTS

The global networks of the large multinationals



Cemex trade and distribution network

US terminals 2015
LafargeHolcim – Heidelberg / Italcementi ownership



	Total	LafargeHolcim	Heidelberg / Italcementi
Terminals with ship unloading system	44	3	7 + 4 partial
Terminals without ship unloading system	28	13	7
Total	72	16	14 + 4 partial

The North America terminal ownership situation

- 28 cement producing companies with 118 plants. 46 Import terminals with a ship unloader

- The top five producers have 69 plants and 26 import terminals but in a very irregular way.

- 15 Cement producers with 34 plants have no import terminal.

- There are six import terminals that have no connection to a US cement producer but these have very different backgrounds.

- Note: 1) North America is US + Canada
  2) McInnis is included

CEMENT DISTRIBUTION CONSULTANTS

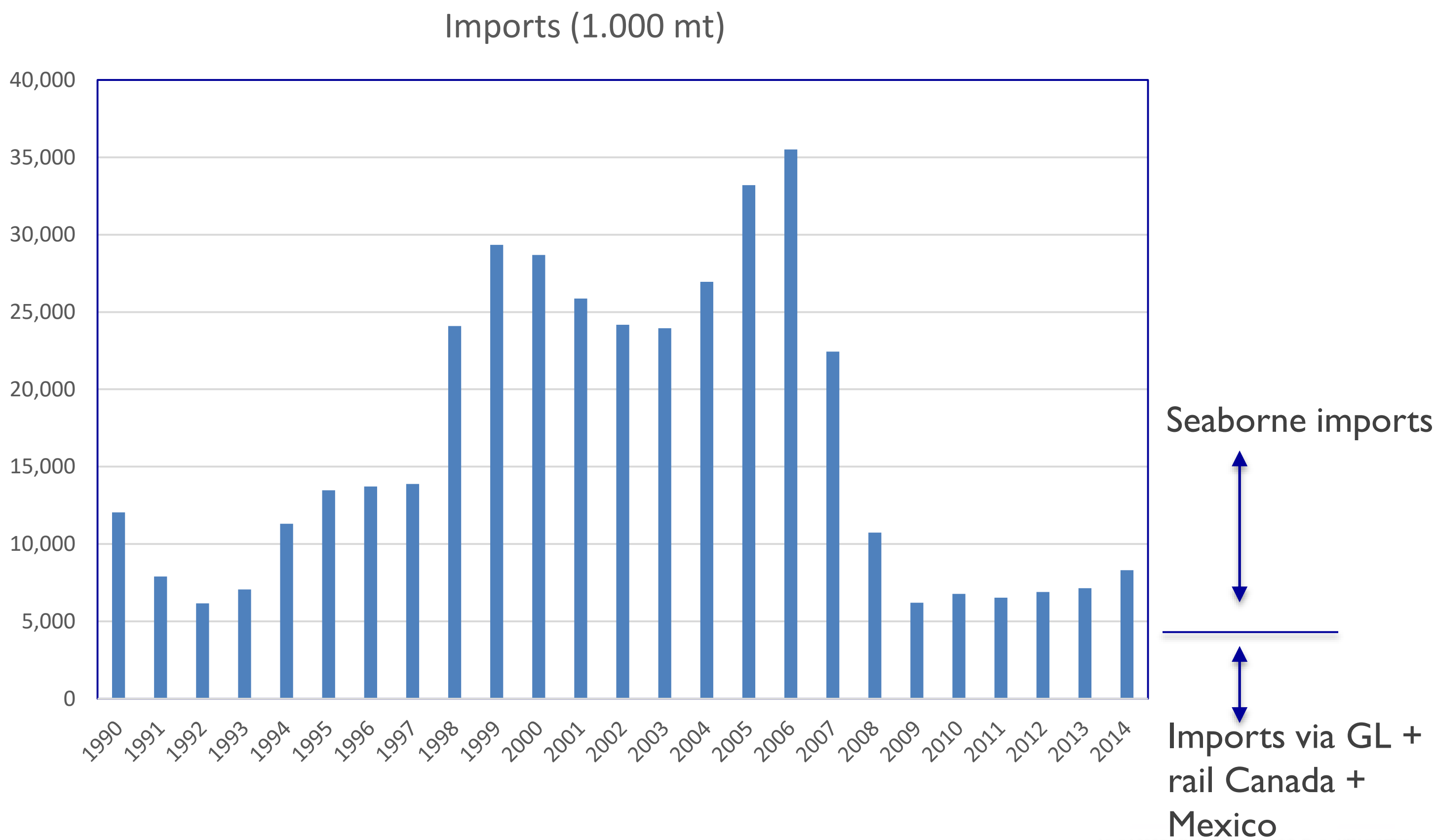
…and what is the current situation?

	Terminals with ship unloading system	Terminals receiving self discharging vessels	Total
US cement producer (multinational)	34	27	61
US cement producer (domestic owners)	5	1	5
"Independent" (not related to cement producers in the US)	6	0	6

Ownership situation of US terminals

CEMENT DISTRIBUTION CONSULTANTS

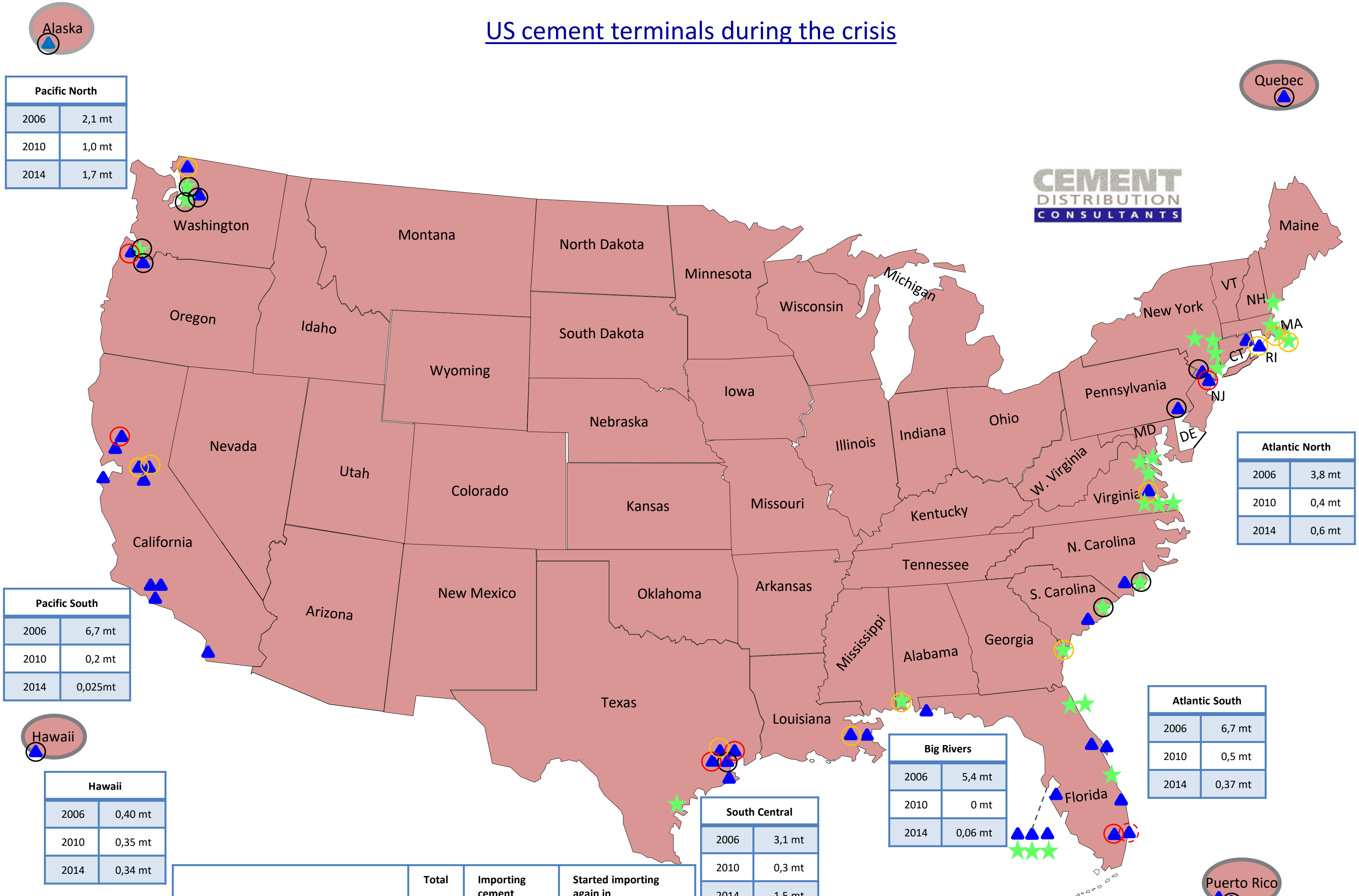
A bit of history of US cement imports



Source: Global Cement Report

CEMENT DISTRIBUTION CONSULTANTS

US cement terminals during the crisis



Pacific North	
2006	2,1 mt
2010	1,0 mt
2014	1,7 mt

Pacific South	
2006	6,7 mt
2010	0,2 mt
2014	0,025mt

Hawaii	
2006	0,40 mt
2010	0,35 mt
2014	0,34 mt

South Central	
2006	3,1 mt
2010	0,3 mt
2014	1,5 mt

Big Rivers	
2006	5,4 mt
2010	0 mt
2014	0,06 mt

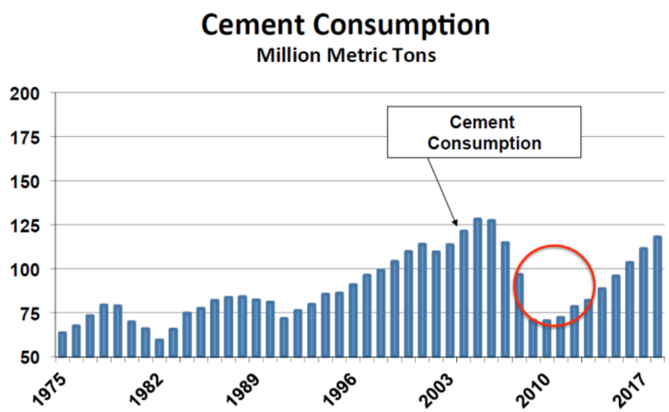
Atlantic South	
2006	6,7 mt
2010	0,5 mt
2014	0,37 mt

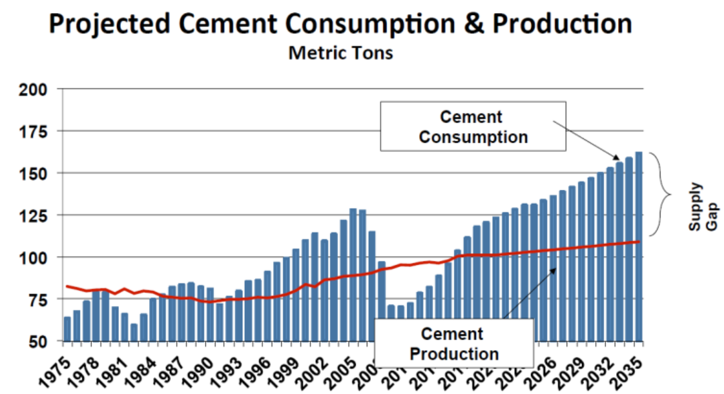
Atlantic North	
2006	3,8 mt
2010	0,4 mt
2014	0,6 mt

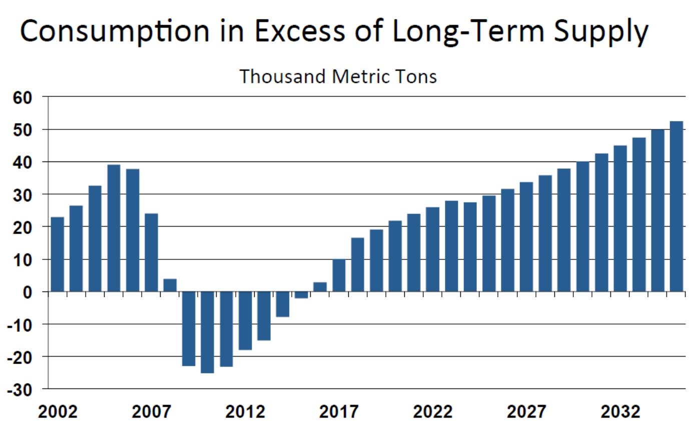
	Total	Importing cement during crisis	Started importing again in 2014	2015
Terminals with ship unloading system	44	8	7	6
Terminals receiving self-discharging vessels	28	5	0	3
Total	72	13	7	9

All other terminals have been involved in domestic distribution or have been mothballed

…and a look into the future

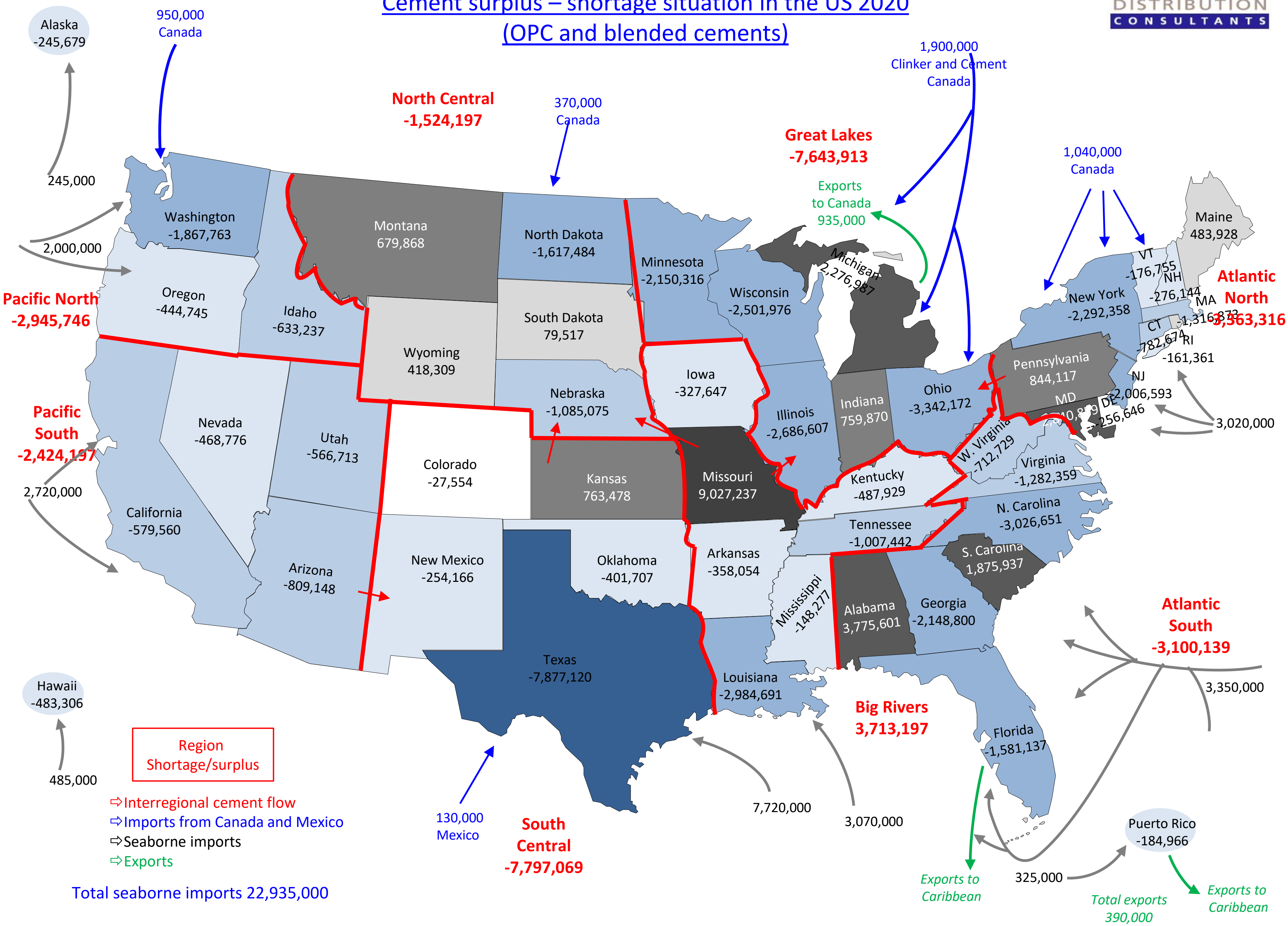




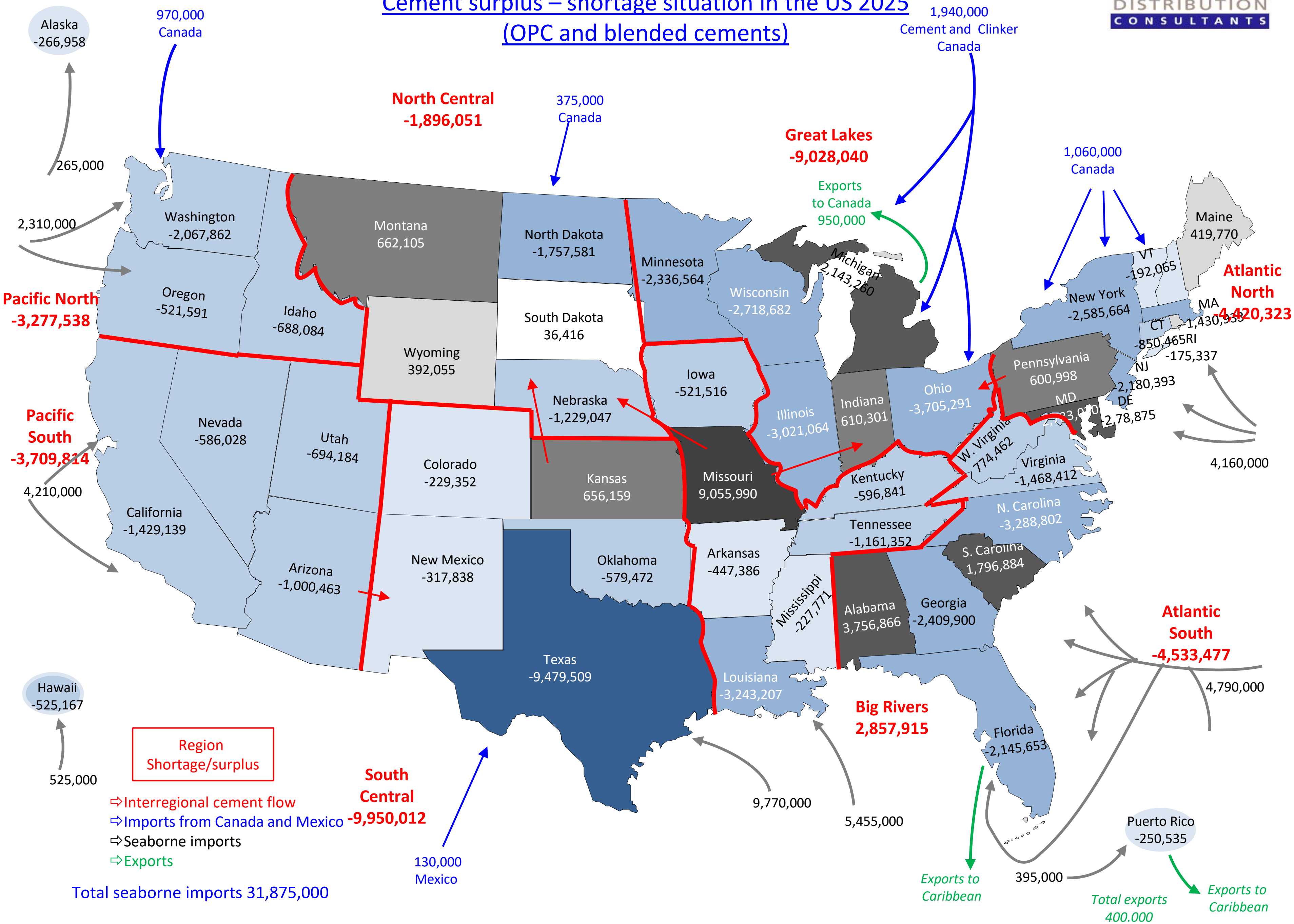


Source: PCA, Ed Sullivan, Intercem London 2015

Cement surplus – shortage situation in the US 2020 (OPC and blended cements)



Cement surplus – shortage situation in the US 2025 (OPC and blended cements)



How suitable are US terminals still after the crisis?

Storage size	Terminals with ship unloading system	Terminals without ship unloading system
< 45.000 mtons	7	24
45.000 – 70.000 mtons	30	4
≥ 70.000 mtons	7	0

CEMENT DISTRIBUTION CONSULTANTS

Storage capacity of US cement terminals

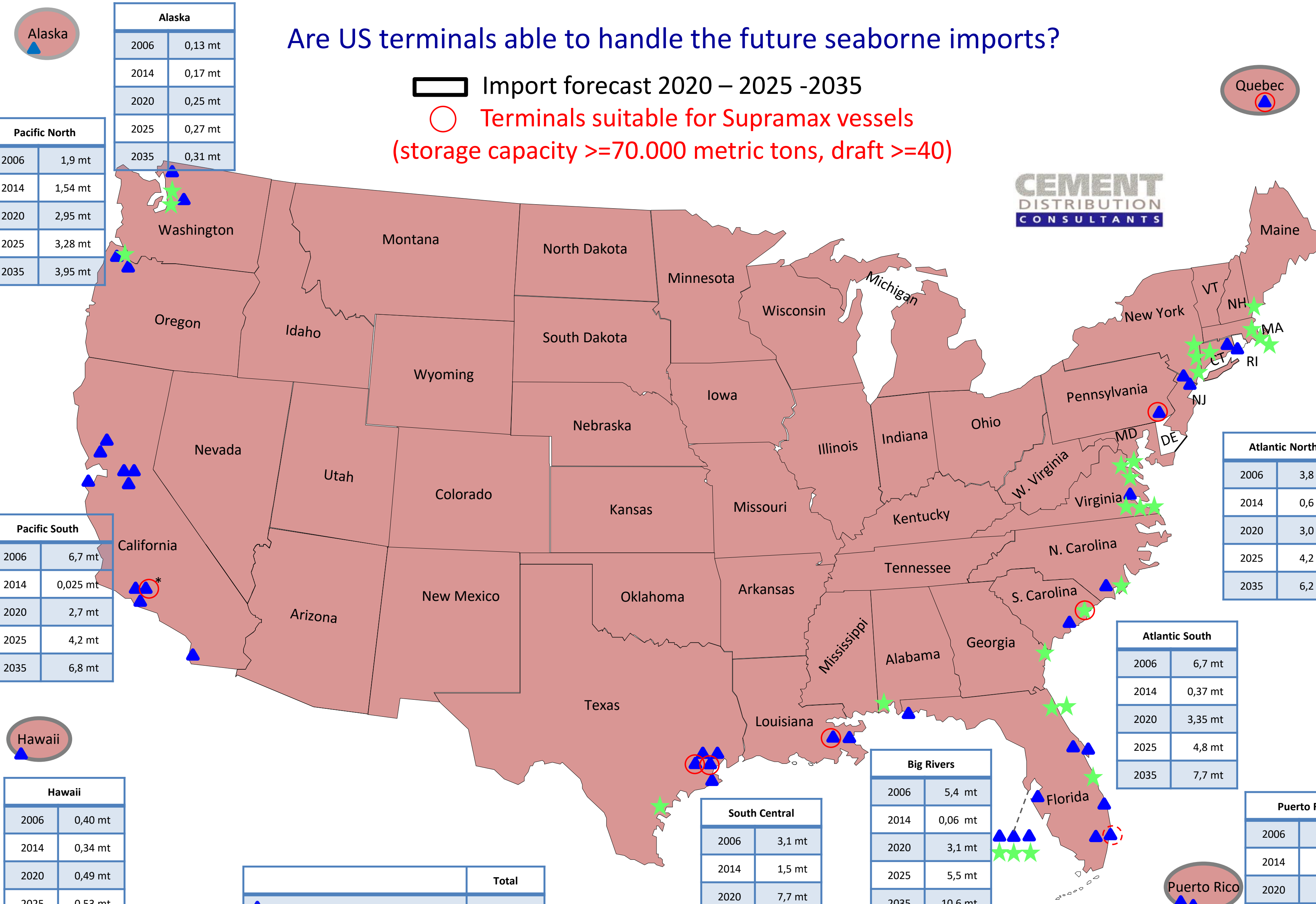
Are US terminals able to handle the future seaborne imports?

Import forecast 2020 – 2025 -2035

Terminals suitable for Supramax vessels

(storage capacity >=70.000 metric tons, draft >=40)

CEMENT DISTRIBUTION CONSULTANTS



Alaska	
2006	0,13 mt
2014	0,17 mt
2020	0,25 mt
2025	0,27 mt
2035	0,31 mt

Pacific North	
2006	1,9 mt
2014	1,54 mt
2020	2,95 mt
2025	3,28 mt
2035	3,95 mt

Pacific South	
2006	6,7 mt
2014	0,025 mt
2020	2,7 mt
2025	4,2 mt
2035	6,8 mt

Hawaii	
2006	0,40 mt
2014	0,34 mt
2020	0,49 mt
2025	0,53 mt
2035	0,61 mt

	Total
Terminals with ship unloading system	43
Terminals without ship unloading system	29
Total	72

South Central	
2006	3,1 mt
2014	1,5 mt
2020	7,7 mt
2025	9,8 mt
2035	14,1 mt

Big Rivers	
2006	5,4 mt
2014	0,06 mt
2020	3,1 mt
2025	5,5 mt
2035	10,6 mt

Atlantic South	
2006	6,7 mt
2014	0,37 mt
2020	3,35 mt
2025	4,8 mt
2035	7,7 mt

Atlantic North	
2006	3,8 mt
2014	0,6 mt
2020	3,0 mt
2025	4,2 mt
2035	6,2 mt

Puerto Rico	
2006	0,12 mt
2014	0,07 mt
2020	0,32 mt
2025	0,4 mt
2035	0,53 mt

South America as supply source has disappeared

- Venezuela cement industry has collapsed.
- Colombian cement production is needed for domestic use and Caribbean area.
- Mexico has some supply and has seaborne export facilities but seaborne exports will be small scale.

There are 11 terminals in the Gulf and Southeast coast that received cement in self-discharging ships from South America before the crisis. They are unsuitable to receive cement from large bulk carriers. One is now being supplied from Mexico and some from Europe by self-discharging cement carrier. From Europe this is not economical in the long run.

CEMENT DISTRIBUTION CONSULTANTS

Cementitious materials seaborne trade flows

GGBFS flows to North California

GBFS flow to grinding plants in New Orleans, Port Canaveral, Baltimore, Philadelphia (and across the Great Lakes)

Wet fly ash in 2015 Europe to Florida

Dry fly ash in 2016 Europe to Northeast US / Canada

The US is closing down coal fired power plants and will need to import substantial volumes of cementitious materials in the future. There are only two terminals in North America that have the capabilities to handle multiple materials in substantial volumes.

CEMENT DISTRIBUTION CONSULTANTS

What is the best cement terminal concept?

	Terminals with ship unloading system	Terminals receiving self discharging vessels
Before 1975	0	12
1975 – 1990	16	10
1991 – 1994 (downturn)	2	0
1995 – 2006	24	6
2007 – 2014 (crisis)	2	0

Of the 26 terminals with ship unloader built as from 1995 there are 22 built since 2000. These have been idle for a longer time than they have been in operation.

Even terminals of 30 years old have seen 10 years of almost zero seaborne imports.

Age of US cement terminals

CEMENT DISTRIBUTION CONSULTANTS

What is the best cement terminal concept?

Given the large fluctuations of US cement imports over the years new terminal concepts need to be based on the following requirements.

1) Flexibility
   - The cement terminal should be part of a multi product facility
   - The dock should be able to handle multiple materials (i.e. the cement unloading and conveying system should not block the dock). The cement storage facility should be in a location where it does not block other activities.
   - The terminals should be expandable to handle bigger ships and multiple types of cement / cementitious materials (large storage facilities that can be subdivided).

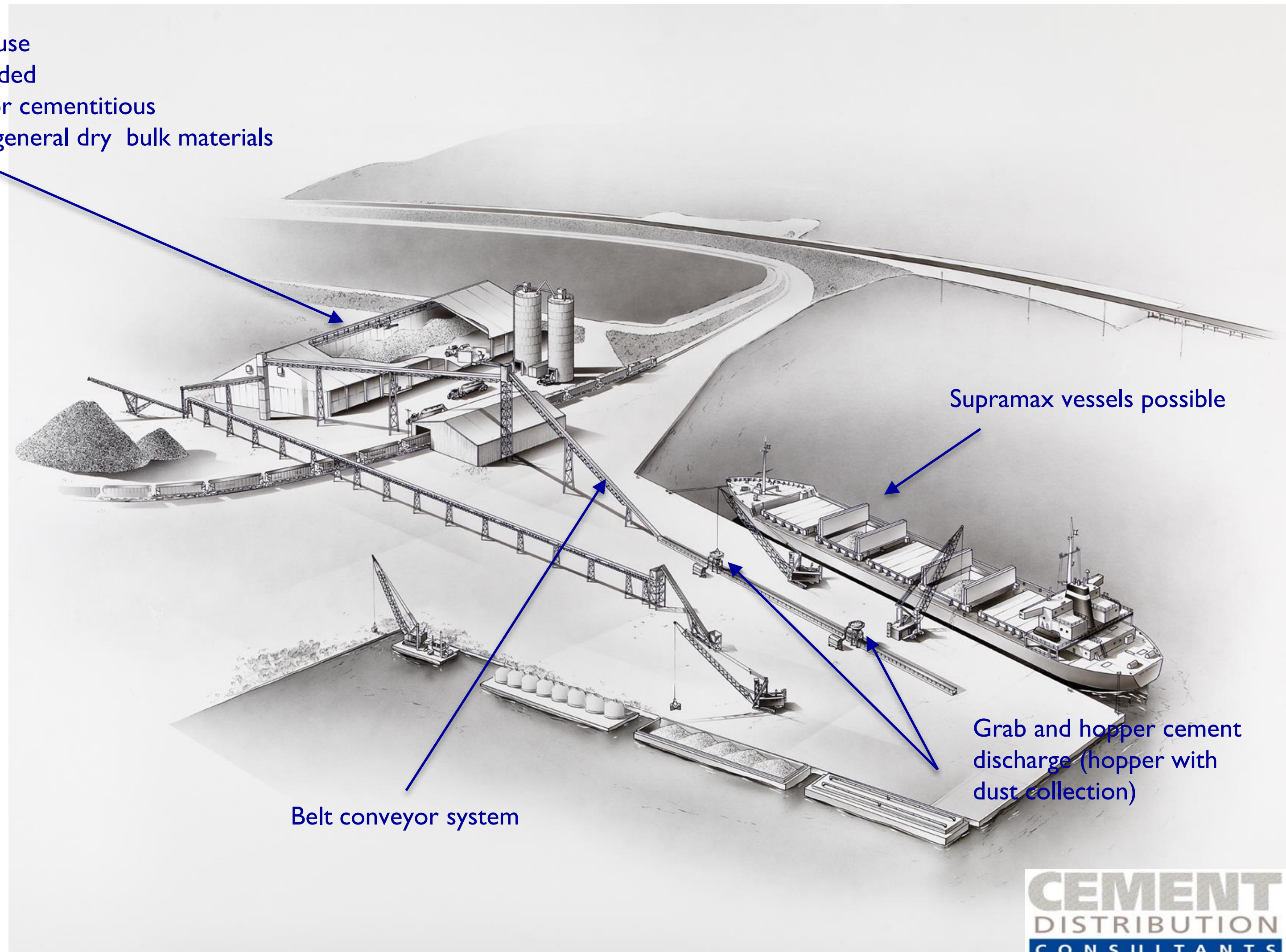
2) Short Return On Investment
   - Large but simple storage facilities (Flat storage or domes with floating fluidised floors (no piling)).
   - Make optimal use of existing infrastructure.
   - Simple, dock mobile, ship unloading and conveying systems.

3) Short realisation time
   - If possible use brownfield sites with existing (partial) permits
   - If possible use existing storage facility
   - If possible start with grab & hopper discharge.

CEMENT DISTRIBUTION CONSULTANTS

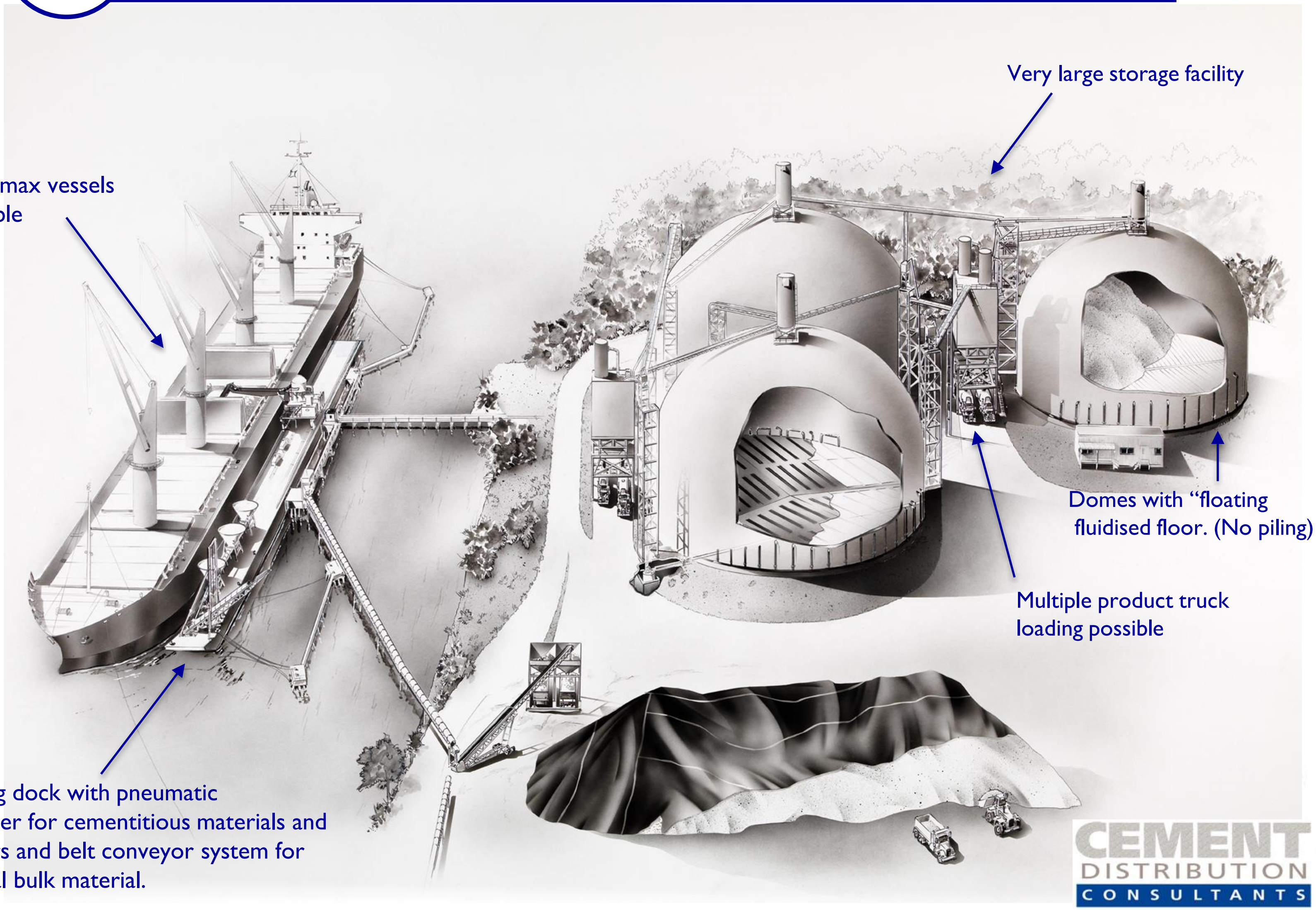
Terminal design concepts

Large flat warehouse
- Can be subdivided
- Can be used for cementitious materials and general dry bulk materials

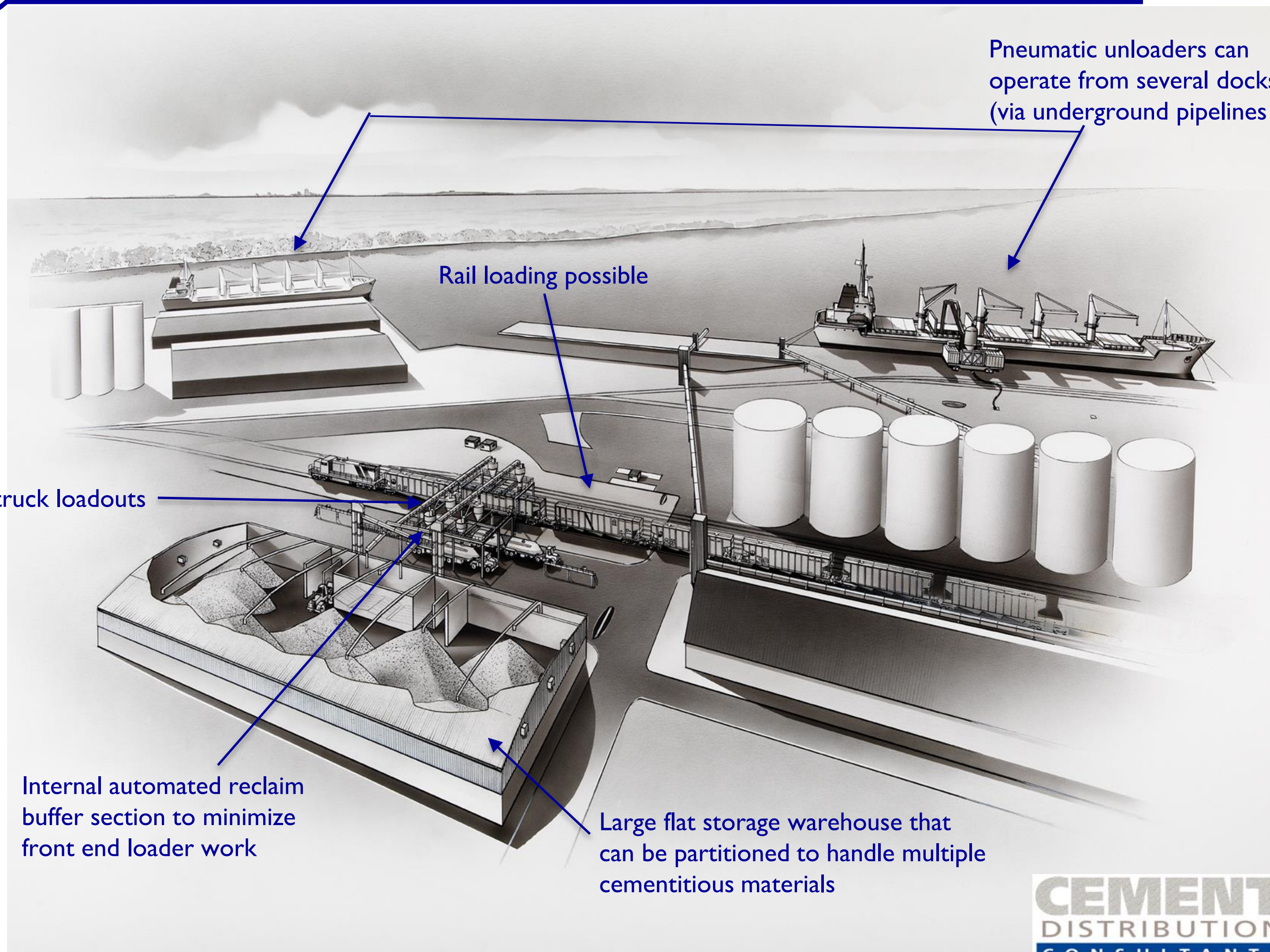


CEMENT DISTRIBUTION CONSULTANTS

Terminal design concepts



Terminal design concepts



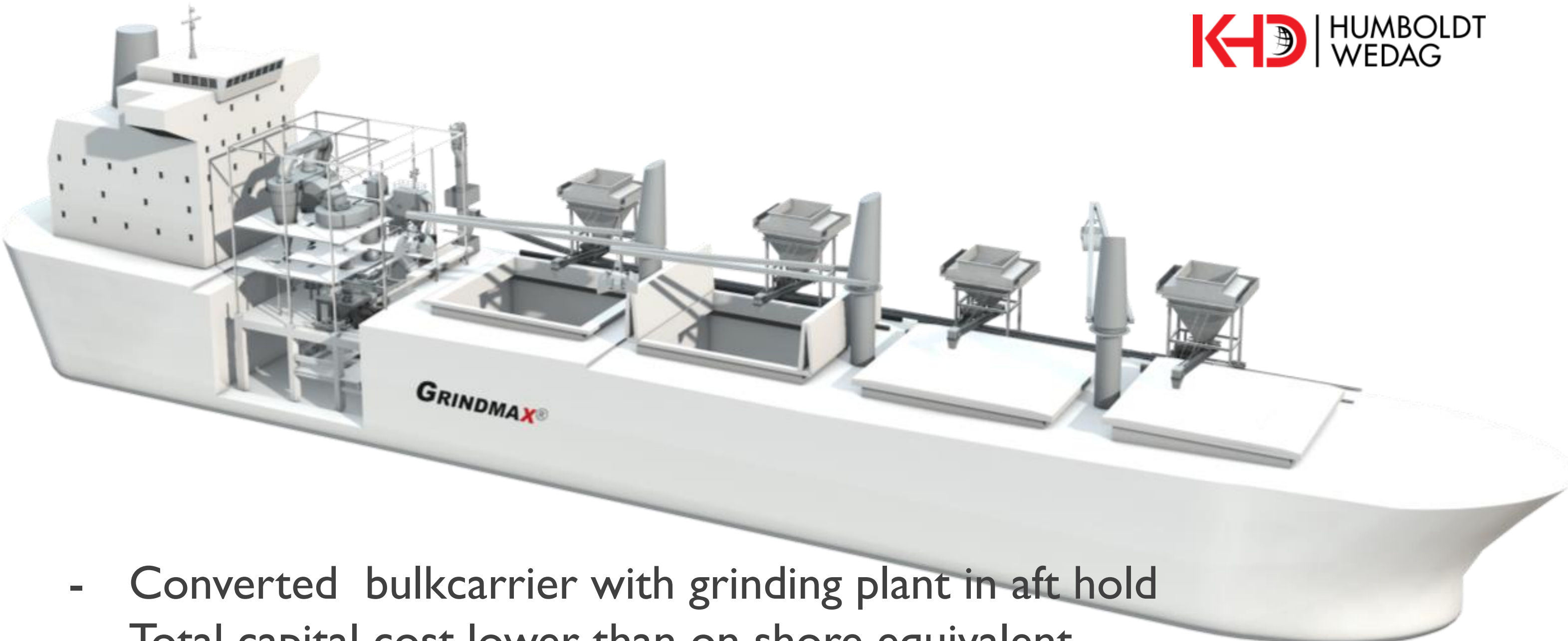
CEMENT DISTRIBUTION CONSULTANTS

Terminal design concepts

The "new" floating terminal
- Bulk only
- Located offshore (does not need a dock)
- Floating pipeline to shore (or onward distribution by barges)
- Can be moved to another locations relatively easy

CEMENT DISTRIBUTION CONSULTANTS

Clinker imports – Floating grinding plant



- Converted bulkcarrier with grinding plant in aft hold
- Total capital cost lower than on shore equivalent
- No land lease costs!
- Does not required a dock (either floating pipeline to shore or onward cement distribution by barges)

Clinker imports – mini grinding plants

- Clinker imports via general bulk port facilities or transhipment ship to barge on Mississippi
- Low capital cost containerised mini plants 100.000 – 300.000 tpy
- Located at remote industrial sites with relatively low permit requirements

Final considerations

Will new terminals be required in North America?

In 2006 over 30 million metric tons were imported by sea into the US (and a little into Canada). During the crisis many terminals were mothballed or used solely for domestic distribution. By simply reopening these terminals for imports there should be sufficient import capacity again.

BUT!

The imports will be distributed differently! (About half of US future seaborne imports are expected to go via the Gulf).

The supply from South America has largely dried up and that makes many small terminals in the south that received their cement in self-discharging ships unsuitable.

The ownership situation of US terminals suitable to receive large bulkcarriers is completely out of line with US plant ownership. If al cement producers want to keep their market share new import facilities will be required.

CEMENT DISTRIBUTION CONSULTANTS

Final considerations

There are relatively few US terminals that are suitable for Supramax vessels. This makes them less than optimal when shipping prices will go up again. In the coming years terminal upgrades or new terminals are required in this respect.

Demand in North America for cementitious materials will grow whilst domestic supply is becoming more difficult. This means more imports of cementitious materials which requires multi product import terminals with large and flexible storage facilities. At present only two facilities have this capability.

Some of the terminals that were closed during the crisis will not come back.

There is a glut of low priced cement and clinker available for export around the globe and shipping prices are also low. This is foreseen to stay for several years. With ex plant cement prices in the US set to go up the incentive to set up new import facilities by independent ready-mix companies and traders is very high.

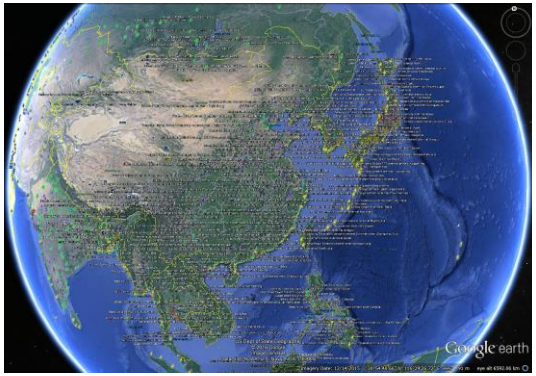
CEMENT DISTRIBUTION CONSULTANTS

Final considerations

The US used to be a difficult market to enter due to the long periods and high costs required to realise a large bulk cement import facility (permits). This is now less of an obstruction.

- Clinker imports
    1. (Using existing, permitted general bulk handling terminals and "mini" grinding plants outside the port.
    2. Using a large floating grinding plan
- Using the Mississippi / Missouri waterway system or the St. Lawrence seaway.
- Adopting a more simple and more flexible approach to new terminals.

The most comprehensive facilities database in the world!

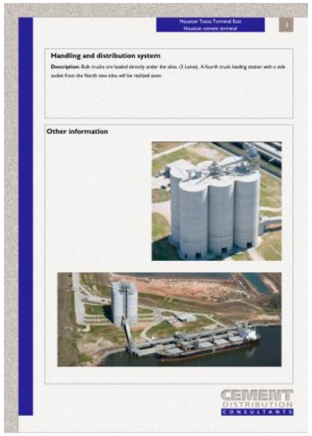


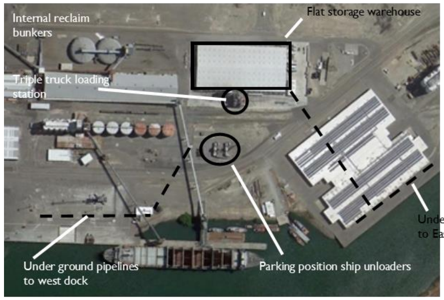
Extensive Database. Since 1999 Cement Distribution Consultants has built a very large database on integrated cement plants, grinding plants, terminals (ship, barge, rail and truck), coal fired power plants and other fly ash related facilities, blast furnaces and other (G)GBFS related facilities and sources of natural pozzolans. All these facilities have been marked on Google Earth.

Over 1400 facilities mapped. Cement Distribution Consultants facility database has close to 1400 facilities involved in seaborne and waterborne trade and distribution of cement, clinker, (G)GBFS and fly ash. For each facility a datasheet is available with the key characteristics and includes the Google Earth place mark and photos.


North America SE
Houston Texas Terminal East
Houston cement terminal
General description of facility
Location


Houston Texas Terminal East
Houston cement terminal
Technical description of facility
Dock situation
Storage facility


Houston Texas Terminal East
Houston cement terminal
Handling and distribution system
Other information



CEMENT DISTRIBUTION CONSULTANTS

THANK YOU

adligthart@cementdistribution.com

Please check out our new website with many presentations and articles

www.cementdistribution.com

CEMENT DISTRIBUTION CONSULTANTS