NAVIGATING A CHANGING CLIMATE

Position Paper of the PIANC Think Climate Coalition

NAVIGATING A CHANGING CLIMATE

Position Paper of the PIANC Think Climate Coalition

November 2015

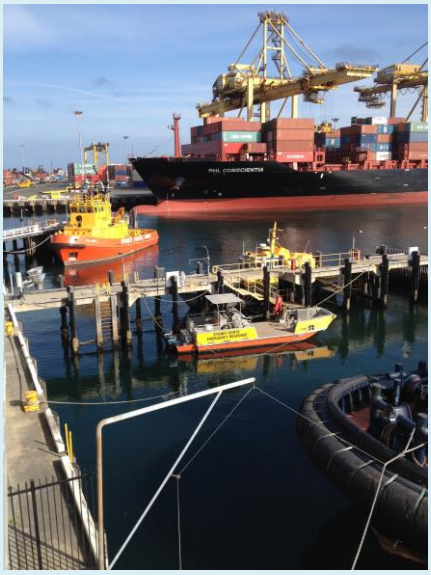
Summary

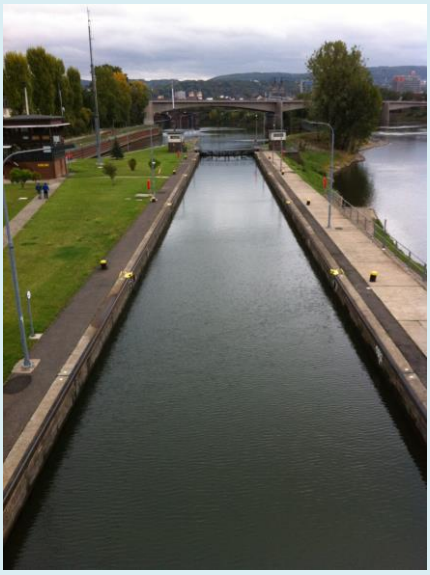
Through an unprecedented collaboration, the partners in PIANC's Think Climate coalition have committed to work together to help the inland and maritime navigation infrastructure sector respond to climate change. By furthering understanding, providing targeted technical support, and building capacity, the coalition's 'Navigating a Changing Climate' initiative will encourage the owners, operators and users of waterborne transport infrastructure:

- to reduce greenhouse gas emissions and shift to low carbon maritime and inland navigation infrastructure, and
- to act urgently to strengthen resilience and improve preparedness to adapt to the changing climate.

Waterborne transport, both maritime and inland, is an essential enabler to human society. It is also one of the most energy-efficient and environmentally sound means of meeting global transport needs although more can be done to reduce greenhouse gas emissions. Whereas recent years have seen considerable efforts by the International Maritime Organization (IMO) under the United Nations Framework Convention on Climate Change to reach agreement on a global approach to reduce greenhouse gas emissions from international shipping, much less attention has been paid to the infrastructure that supports waterborne transport. **Our initiative is designed to address this gap**.

Waterborne transport needs ports, harbours and marinas, along with locks, docks, quays, wharves, jetties, embankments, pontoons, marinas, dredged channels, breakwaters and many other types of navigation infrastructure





Photos courtesy of Jan Brooke

Added Value

Individually, each partner in PIANC's Think Climate coalition has a mandate that includes raising awareness, building capacity and providing technical support to its membership. By bringing together the key global and regional associations with interests in inland and maritime waterborne transport infrastructure, PIANC's Think Climate coalition specifically aims to add value: by broadening effort, scaling-up activity, and reaching out to an extended audience around the world. Working on a 'stronger together' basis, the coalition will provide a one-stop-shop for information and technical support, enabling participants to understand each other's needs and encouraging them to act – urgently and together – to reduce infrastructure-related emissions, to improve resilience, and to adapt inland and maritime navigation infrastructure to the effects of a changing climate.

Partners

The following international and regional associations have already joined as partners in PIANC's Think Climate coalition. Together, these associations reach more than 250,000 individuals from a variety of state and non-state organisations. Other international associations have expressed an interest in becoming involved, so we are confident the coalition will grow.

- The World Association for Waterborne Transport Infrastructure (PIANC)
- International Association of Ports and Harbors (IAPH)
- International Harbour Masters' Association (IHMA)
- International Maritime Pilots' Association (IMPA)
- International Bulk Terminals Association (IBTA),
  a coalition of the International Dry Bulk Terminals Group and
  the Coal Export Terminal Operators Association
- Smart Freight Centre (SFC)
- European Dredging Association (EuDA)

In preparation for the 21st session of the Conference of the Parties to the UN Framework Convention on Climate Change (COP21) the Think Climate coalition partners are collaborating on an initiative entitled 'Navigating a Changing Climate: Towards Sustainable Waterborne Transport Infrastructure'. The coalition will provide a focal point, building on existing activities such as PIANC's *Working with Nature*[1] initiative, the IAPH World Ports Climate Initiative[2] and the Smart Freight Centre's Global Logistics Emissions Council[3] along with other initiatives; highlighting new opportunities; providing a platform for discussion; and driving implementation and action across the inland and maritime navigation infrastructure sector.

Our Vision

The multi-stakeholder partners in PIANC's Think Climate coalition share a single vision. We want to see a responsible, well-informed and innovative sector where the owners, operators and users of inland and maritime waterborne transport infrastructure in all countries:

- are aware of the issues associated with navigating a changing climate, and of the need to act now
- have access to existing and new, sector-specific technical and institutional resources aimed at facilitating climate change mitigation and adaptation
- have developed the capacity to make timely and effective decisions on mitigation and adaptation options, and
- collaborate with others within and beyond the sector to identify and deliver integrated, resilient and sustainable solutions, with an emphasis on *Working with Nature*.

[1] See http://www.pianc.org/workingwithnature.php
[2] See http://wpci.iaphworldports.org/
[3] See http://www.smartfreightcentre.org/glec/what-is-glec

Our Mission

In support of this vision, the partners in PIANC's Think Climate coalition will cooperate:

- to improve sector-wide awareness of climate change; of the challenges waterborne transport infrastructure will face; and of potential solutions or opportunities
- to create and facilitate knowledge networks, promoting the sharing of experience and good practice between state and non-state stakeholders at international, regional and national levels
- to develop or facilitate the preparation of technical good practice guidance, training opportunities and web-based resources
- to provide a coordinated, global focal point: a 'centre of excellence' intended to support the owners, operators and users of inland and maritime navigation infrastructure in building the capacity needed to navigate a changing climate.

Coalition Supporters

The value of the coalition's work, and the effectiveness of its products, both increase as visibility of the Navigating a Changing Climate initiative increases. Other organisations in the waterborne transport infrastructure sector are therefore being encouraged to sign up as supporters of the Think Climate coalition[4]. The coalition simply asks that supporters commit to our objectives. In return, they will receive regular updates on the activities of the coalition including notice of relevant events (conferences, workshops, webinars and training) and of new technical publications.

Supporter associations and organisations will play an important role in dissemination and will therefore make an essential contribution to the achievement of the Think Climate coalition's vision.

Registered supporters to date include:

- Society of International Gas Tanker and Terminal Operators (SIGTTO)
- SedNet (the European Sediment Network)
- North Queensland Bulk Ports Corporation (NQBP)
- PIANC UK
- Institut français des sciences et technologies des transports, de l'aménagement et des réseaux (IFSTTAR)
- Compagnie Nationale du Rhône (CNR)
- Bremenports GmbH & Co. KG
- Port of Antwerp
- Cerama
- Ports Australia

[4] http://www.pianc.org/thinkclimate.php

Why Act?

"We can't see CO_2. It is an invisible threat, but a very real one. It means hotter global temperatures, more extreme weather events like heatwaves and floods, melting ice, rising sea levels and increased acidity of the oceans. This is happening now and we are moving into uncharted territory at a frightening speed".

Michel Jarraud, Secretary-General World Meteorological Organisation, 9th November 2015[5]

Navigating a Changing Climate: Mitigation

All sectors must play their part in climate change mitigation. The waterborne transport infrastructure sector is no exception. Port and waterway infrastructure and operations typically account for only a very small proportion[6] of the total greenhouse gas emissions associated with the shipment of a particular consignment. The most significant proportion by far is associated with the sea voyage, and a varying amount with connecting transport. It is nonetheless important that the owners, operators and users of waterborne transport infrastructure take steps to minimise the emissions associated with their activities if they are to contribute to the 'less-than-2-degrees' pathway. The associations represented on the coalition recognise the importance – and the urgency – of implementing effective mitigation measures and of moving towards low carbon infrastructure. Coalition members further acknowledge the need for innovation alongside conventional emissions-reduction measures: for example initiatives aimed at improving integration to increase energy efficiency[7] or at creating carbon sinks in coastal areas[8] by *Working with Nature*. As with other sectors, such innovation has the potential to bring associated social, employment and economic opportunities.

Navigating a Changing Climate: Adaptation

Even if the COP21 meetings in Paris in December 2015 reach agreement on limiting warming to less than two degrees, climate scientists are in general agreement that we are already locked in to further change. If we fail to achieve the two-degrees goal, things will get worse still. The Think Climate coalition partners believe that it is time to stop using uncertainty as an excuse for inaction. Even if there is disagreement on what is causing the change, change is happening. Adaptation of inland and maritime navigation infrastructure is vital, and the time to act is now.

In addition to contributing to mitigation, it is therefore essential that the sector acts to strengthen resilience, to coordinate globally and act locally to adapt waterborne transport infrastructure and the operations that depend on it to the changing climate; and to reduce vulnerabilities to more frequent extreme events. The principles of *Working with Nature* are equally if not more relevant when options to improve resilience and to adapt to climate change are being considered.

---

[5] https://www.wmo.int/media/content/greenhouse-gas-concentrations-hit-yet-another-record

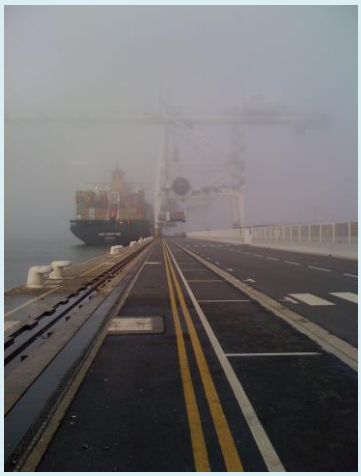
[6] See, for example, the following presentation indicating that <1% of the total CO_2 emissions associated with the movement of a single container from China to Scotland derive from port-related activities: http://www.fta.co.uk/export/sites/fta/_galleries/downloads/international_supply_chain/presentation_decarbonising_the_maritime_supply_chain.pdf

[7] For example, the World Ports Climate Initiative 'intermodal transport' project http://wpci.iaphworldports.org/project-in-progress/index.html

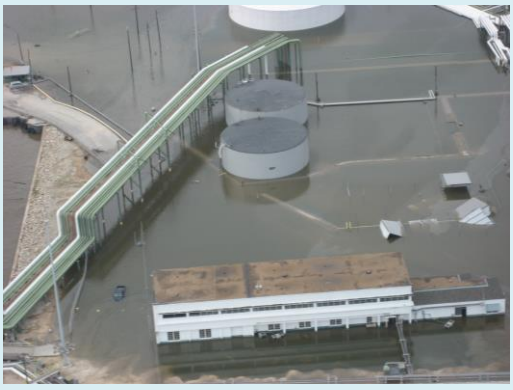
[8] For example, Carbon Offsetting? Blue Carbon Provides Opportunities for the Dredging Industry in WODCON XX - The Art of Dredging - June 2013, Belgium. Van der Klis P, Sansoglou P, Mink F.

Waterborne transport infrastructure management and use can be vulnerable to sea level rise, storms, wind damage, flooding and other effects. The frequency and magnitude of many extreme weather events is expected to increase as climate changes.

Photo courtesy of Aidan Fleming, Port of Cork, Ireland



Photos courtesy ofJan Brooke

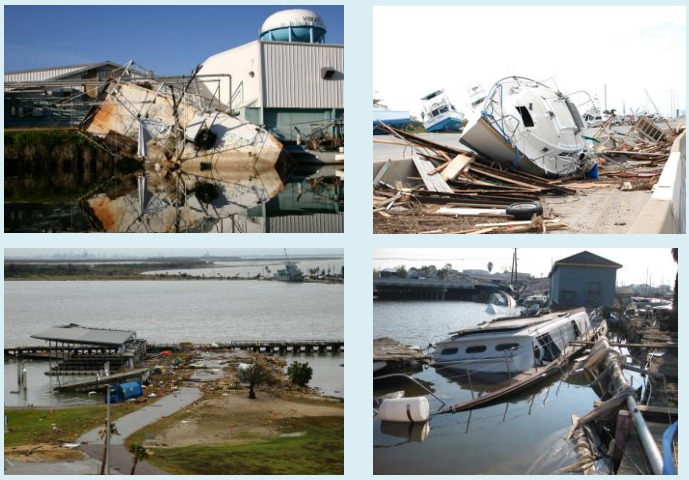


Photos courtesy of U.S. Army Corps of Engineers Galveston District

Efficient adaptation will often involve modifying existing physical infrastructure. New infrastructure design will have to accommodate the changing climate whilst also taking steps to avoid becoming locked-in to high carbon futures. Many operational activities, maintenance regimes and management practices will need to be adapted to cope with changes in ambient (mean or seasonal) conditions or more frequent extreme events or both. Other practices will need to be fundamentally changed. In some situations conventional designs or operational solutions may no longer be sustainable. Climate change is therefore a key driver for innovation across the maritime and inland navigation infrastructure sector.

Climate change effects will vary regionally and often locally; change will not be equally distributed and the most profound effects may be felt in countries that are least well-resourced to adapt. The following table highlights some of the main areas in which measures to improve resilience or other adaptation action may be needed according to current projections.

Maritime navigation infrastructure may need to adapt to:	Inland navigation infrastructure may need to adapt to:
Increases in the frequency or severity of flooding due to sea level rise and/or changes in precipitation	Increases in the frequency or severity of flooding or low flows/drought due to changes in precipitation characteristics
Increased frequency of extreme wind, wave or storm conditions potentially exacerbated by sea level rise, affecting the frequency and duration of periods of disruption of operations and requiring improved infrastructure resilience	Variations in estuarial or river current strengths, affecting the frequency and duration of periods of navigation disruption and requiring improved infrastructure resilience
Changes in sediment transport, erosion and accretion affecting navigable depth, or beach, foreshore or built infrastructure integrity	Changes in sediment transport, erosion and accretion affecting navigable depth or built infrastructure integrity
Potential for changes in fog characteristics or other visibility issues	Changes in seasonal precipitation with potential consequences for water supply or storage affecting lock operations
Increases in air and water temperature or changes in ocean chemistry, inter alia leading to changes in characteristic species with consequences for infrastructure integrity or for operations and maintenance (e.g. the spread of non-indigenous or invasive species, or the distribution of target species for commercial fishing, angling or wildlife watching)	Increasing air and water temperature inter alia leading to changes in characteristic species with consequences for river bank integrity; algae or water weed growth; and the spread of non-indigenous or invasive species
Changes in ice cover with potential consequences for navigation infrastructure provision or demand	Changes in icing and snowmelt characteristics affecting both flow and infrastructure integrity



Damage to waterborne transport infrastructure after Hurricane Ike. Photos courtesy of U.S. Army Corps of Engineers Galveston District

Storm damage, Port of Taranaki, New Zealand. Photo courtesy of Peter Atkinson

Key Principles Guiding Action

The new Sustainable Development Goals adopted by the UN General Assembly in September 2015 include a goal to 'take urgent action to combat climate change and its impacts' *inter alia* through strengthening resilience and adaptive capacity, and improving education, awareness and institutional capacity. The December 2015 COP21 discussions will similarly focus on adaptation to a greater extent than has previously been the case at these Conferences.

Reflecting on how the waterborne transport infrastructure sector can navigate the changing climate in an efficient and effective way, our coalition believes that delivery of the UN goal should incorporate four key principles within climate change mitigation and adaptation decision-making: sustainability, resilience, integration and *Working with Nature*.

Sustainability (S): a sustainable system is one where functions are adaptively managed in a way that meets contemporary needs while ensuring those functions are protected so as to be able to meet future needs. Many sustainability initiatives have been undertaken by PIANC concerning *inter alia* life cycle management and environmental issues for both maritime and inland navigation infrastructure. Dredging sustainability issues have similarly been addressed within PIANC, often working together with other associations and stakeholders, and PIANC and IAPH have been actively and jointly involved in promoting the Green Ports initiative.

Resilience (R): the concept of resilience has several meanings. In the waterborne transport infrastructure sector, attention to date has mainly been focused on how structures respond to forces associated with major risks or hazards. In a wider climate change context, resilience should also include designing infrastructure systems that can be adapted to sustain function following disturbance events, and to recover quickly and effectively from such events. Depending upon the local effects of climate change, attention may need to be paid to the effects of storms, floods, low flow conditions and drought amongst others. In this regard, PIANC's ongoing Working Group 178, in which many of the coalition partners are participating, will provide some initial good practice guidance for the wider waterborne transport infrastructure sector and it is intended that more detailed PIANC guidance on strengthening infrastructure resilience will follow.

Integration (I): an integrated system considers the relevant interconnectivities between biophysical, engineered, economic and societal systems and functions. Integrated transport networks and intermodality are already a key consideration for seaports and inland ports, IAPH's intermodal transport project being just one example. However climate change projections mean that a broader interpretation - including integration across sectors - will be beneficial. For example, some measures to improve the resilience of waterborne transport infrastructure might also meet flood protection needs and deliver natural environment or fisheries objectives. Integrated approaches not only achieve sustainable multiple purposes but also realise economies of scale, and will therefore be important in all countries irrespective of their level of development and resource availability.

Working with Nature (W): Thinking about and applying the foregoing principles of sustainability, resilience and integration in fact means adhering to the PIANC *Working with Nature* philosophy. This philosophy has been developed by PIANC in order to ensure that the natural environment is taken into account in the earliest stages of an initiative or project, considering ecosystem services and the role of physical processes alongside logistical and economic issues. The approach allows win-win solutions to be identified, often through collaboration with stakeholders. Technical guidance on implementing the *Working with Nature* philosophy is currently being elaborated by PIANC for publication in late 2016.

An innovative approach to the beneficial re-use of navigation dredged material at Horseshoe Bend[9] on the Atchafalaya River in the state of Louisiana, USA, relied on natural processes transporting and depositing the sediment to create an island of significant wildlife value. As this island has evolved, multiple other benefits have been realised. The newly established vegetation promotes carbon sequestration, in turn offsetting some of the emissions associated with dredging. In addition, the island has formed a natural 'training wall', facilitating self-scour in the navigation channel and thus significantly reducing local dredging requirements and hence related emissions.

"During the early stages of the project, everyone's attention was focused on engineering uncertainties. This preoccupation made initial surveying of the island's rich floral and faunal communities that much more amazing. But greater benefits were hidden in and around the island. Soil horizons expressed biogeochemical signatures atypical of traditional dredge-and-fill sites, and the physical presence of the island allowed for development of a stable channel. Thus, it became apparent that obvious macro-benefits were outweighed by the island's complementary roles in sequestering carbon in its soils and reducing dredging requirements and emissions."

Jeff Corbino, Project Manager, U.S. Army Corps of Engineers, New Orleans District, New Orleans, Louisiana, USA

The Horseshoe Bend project provides an excellent example of how applying the Working with Nature philosophy within the USACE 'Engineering with Nature'[10] Program can help promote a sustainable solution, improving natural resilience at the same time as delivering significant net carbon savings. Photography by Wings of Anglers, courtesy of Great Lakes Dredge and Dock.

Towards a Plan for Action: to Paris and Beyond

The provision of expert guidance, recommendations and technical advice, together with actions to keep the international community connected, are PIANC's two primary objectives. Other organisations represented on the coalition similarly have a mandate to prepare and promote guidance and/or to facilitate effective communication and dissemination. By working together, the members of PIANC's Think Climate coalition are therefore well placed:

- to raise awareness of the implications of the changing climate
- to contribute to building mitigation and adaptation capacity throughout the sector, taking particular account of the technical cooperation needs of developing countries, and
- to provide and promote guidance on strengthening both physical and institutional resilience and on climate change adaptation.

Whilst an interest in or dependence on inland or maritime waterborne transport infrastructure is a common thread, individual members of the coalition partner associations have different interests, different responsibilities, different ways of working and different levels of awareness when it comes to climate change mitigation and adaptation. Our Road Map and Action Plan recognise and accommodate these differences, ensuring not only that existing initiatives can be consolidated, disseminated or scaled-up as appropriate, but that the future needs of the wider sector will be identified, new actions promoted to address gaps, and progress in delivering and disseminating new resources monitored. The 'Navigating a Changing Climate' Road Map (overleaf) summarises the objectives and agreed actions that will be promoted by the Think Climate coalition partners to support the owners, operators and users of waterborne transport infrastructure in the period to 2020.

[9] Suedel,B. et al (2015). Creating Horseshoe Bend Island, Atchafalaya, Louisiana. Terra and Aqua. Number 140. September 2015.
[10] http://el.erdc.usace.army.mil/ewn/

Navigating a Changing Climate: Road Map

2015	Objectives	Actions	Underway by	2020 and beyond
Some exceptions, but **typically low levels of awareness; uncertainty** leading to **inaction**				
	1. Expand network; identify new coalition partners and supporters; raise awareness	Work together to: 1a. Increase the number of Think Climate partner associations and supporter organisations 1b. Promote the work of the Think Climate coalition 1c. Create a new website to connect the sector and facilitate sharing of experiences 1d. Organise two new international conferences on the theme 'Navigating a Changing Climate' 1e. Organise or facilitate at least 25 climate change workshops 1f. Prepare and promote webinars and web-based tools 1g. Undertake a gap analysis to understand the wider needs of the waterborne transport infrastructure sector	 2015 2015 2015 2016 2015 2016 2016	
	2. Reduce greenhouse gas emissions; promote shift to low carbon infrastructure	Work together to: 2a. Promote awareness of and scale up relevant IAPH World Ports Climate Initiative activities 2b. Promote uptake of the GLEC framework for emissions calculations 2c. Raise awareness of and promote Blue Carbon pilot studies 2d. Raise awareness of relevant partner initiatives to reduce emissions from vessels 2e. Prepare and disseminate technical guidance on carbon management for port and navigation infrastructure projects 2f. Establish an effective means of documenting and monitoring emissions from dredging and infrastructure construction projects 2g. Facilitate the preparation of new technical guidance on mitigation and offsetting measures and low carbon alternatives 2h. Facilitate the development and delivery of training and capacity building in relation to emissions reduction options	 2016 2016 2016 2016 2015 2017 2016 2017	
	3. Improve preparedness; strengthen resilience; adapt	Work together to: 3a. Prepare and disseminate technical guidance on climate change adaptation for inland and maritime navigation infrastructure 3b. Update PIANC's Task Group 3 report Climate Change and Navigation 3c. Improve awareness of the implications of climate change for operational practices and supporting infrastructure 3d. Raise awareness of existing technical guidance on risk assessment and on climate proofing waterborne transport infrastructure 3e. Facilitate the preparation of new technical guidance on navigation infrastructure adaptation and strengthening resilience 3f. Facilitate the development and delivery of training and capacity building on adaptation options for navigation infrastructure	 2015 2016 2016 2016 2016 2016	
	4. Work with Nature; seek integrated and sustainable solutions	Work together to: 4a. Promote awareness of and scale up relevant *Working with Nature* activities 4b. Continue to build knowledge and practical experience of Building with Nature and Engineering with Nature solutions 4c. Promote the adoption of sustainable, integrated solutions for shippers and supply chains such as those advocated by SFC 4d. Promote the adoption of intermodal transport principles such as those promoted by the WPCI Intermodal Transport Initiative 4e. Disseminate information about integrated initiatives such as Early Contractor Involvement	 2015 2016 2015 2015 2015	
				An **informed waterborne transport infrastructure sector, aware** of the issues; with **access to relevant knowledge resources;** making informed **mitigation** and **adaptation decisions; collaborating** with others**; Working with Nature;** delivering **integrated** and **sustainable solutions**

PIANC General Secretariat
Boulevard du Roi Albert II 20, B. 3
1000 Brussels – Belgium

www.pianc.org
VAT BE 408-287-945
ISBN 978-2-87223-230-7