



Action Plan of the PIANC Think Climate Coalition



THINK CLIMATE: LEARN, MONITOR, REVIEW, UNDERSTAND, PREPARE, CHOOSE, CHANGE



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Revision 1 - October 2016

Summary

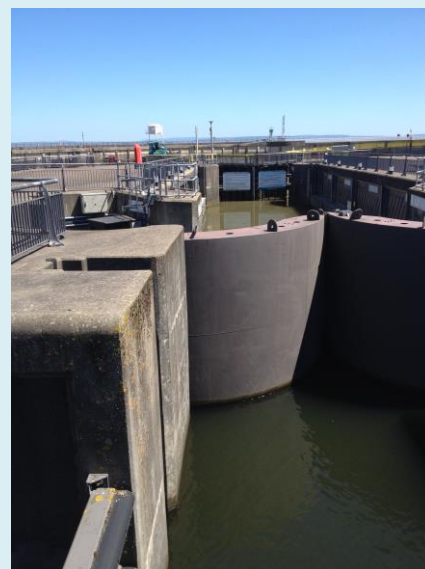
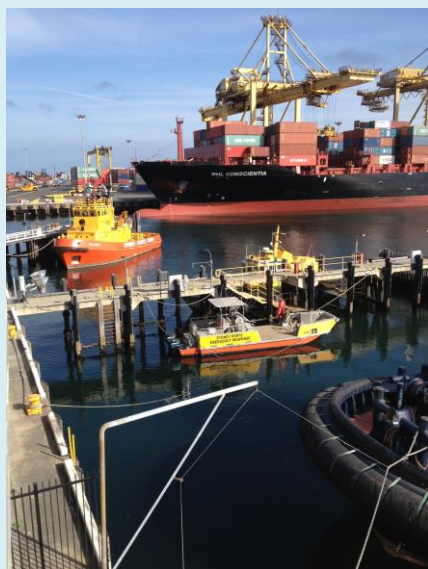
Through an unprecedented collaboration, the partners in PIANC's Think Climate coalition have committed to work together to help the inland and maritime navigation infrastructure sector respond to climate change. By furthering understanding, providing targeted technical support, and building capacity, 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.**

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Waterborne transport relies on 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 the 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 representing the full range of owners, operators and users in an unprecedented collaboration, 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 aims to provide a one-stop-shop for information and technical support, enabling participants to understand each others' needs and encouraging them to act together to reduce infrastructure-related emissions, to improve resilience, and to adapt waterborne transport infrastructure to the effects of a changing climate.

Partners

The following international and regional associations are partners in PIANC's Think Climate coalition. Together, they represent more than 310,000 individuals from a variety of state and non-state organisations. More information about the coalition partners is available on the Navigating a Changing Climate website at [J1] <http://navclimate.pianc.org/about/think-climate-coalition>.

- 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
- Inland Waterways International (IWI)
- Institute of Marine Engineering, Science & Technology (IMarEST)
- European Dredging Association (EuDA)
- European Sea Ports Organisation (ESPO)
- Smart Freight Centre (SFC)



In the lead-up to the 21st session of the Conference of the Parties to the UN Framework Convention on Climate Change (COP21) meetings in 2015, PIANC set up the Think Climate coalition to collaborate on an initiative entitled 'Navigating a Changing Climate: Towards Sustainable Waterborne Transport Infrastructure'. The coalition aimed to provide a focal point for action, building on existing activities such as PIANC's *Working with Nature*¹ initiative, the IAPH World Ports Climate Initiative² and the Smart Freight Centre's Global Logistics Emissions Council³ amongst many others; highlighting new opportunities; providing a platform for discussion; and driving innovation and implementation across the inland and maritime navigation infrastructure sector.

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 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*.

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. 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.

Organisations that have already registered as supporters are listed on the Navigating a Changing Climate website along with information about how to become a supporter.

See: <http://navclimate.pianc.org/supporters>.

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Why Act?

"We can't see CO₂. 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 2015⁴

Navigating a Changing Climate: Mitigation

All sectors must play their part in climate change mitigation by reducing greenhouse gas emissions. The waterborne transport infrastructure sector is no exception. Port and waterway infrastructure and operations typically account for only a very small proportion⁵ 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 Think Climate 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 efficiency⁶ or at creating carbon sinks in coastal areas⁷ by *Working with Nature*. As with other sectors, such innovation has the potential to bring associated social, employment and economic opportunities.

"Entry into force of the Paris Agreement on climate change should unleash an unprecedented wave of global low-carbon investment as countries look to step up action on decarbonisation".

The ENDS Report, October 2016.

Navigating a Changing Climate: Adaptation

The agreement reached at the COP21 meetings in Paris in December 2015 to limit warming to less than two degrees represented a significant step for the international community. Notwithstanding this agreement, however, climate scientists are in general agreement that the world is already locked in to further change in key climate parameters. If we fail to achieve the less than two degrees goal, things will get worse still.

⁴ <https://www.wmo.int/media/content/greenhouse-gas-concentrations-hit-yet-another-record>

⁵ See, for example, the following presentation indicating that <1% of the total CO₂ 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

⁶ For example, the World Ports Climate Initiative 'intermodal transport' project <http://wpci.iaphworldports.org/project-in-progress/index.html>

⁷ 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.

"Although the Paris Agreement is a hugely positive step forward, we must not forget that capping global temperature rise at 2°C will still present massive challenges ... The danger we must guard against is complacency, or the notion that somehow Paris has got adapting to climate change sorted. It hasn't, and we must still adapt to the extreme weather that accompanies a 2°C global rise in temperature".

Mike Keil, Severn Trent Water, July 2016

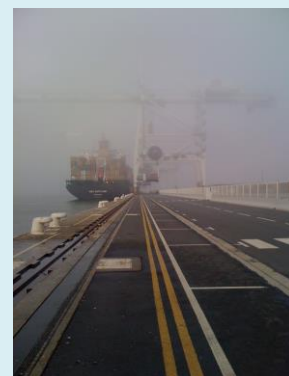
The Think Climate coalition partners believe that it is time to stop using uncertainty as a reason for inaction. Scientific evidence is unequivocal: the climate is changing⁸. Adaptation of navigation infrastructure is vital, and the time to act is now.

In addition to contributing to mitigation, it is therefore vital for the sector to coordinate globally and act locally to adapt waterborne transport infrastructure and the operations that depend on it to the changing climate; and to strengthen resilience – in turn reducing the vulnerability of the sector to more frequent extreme events. Such action will be vital to ensure navigational safety, to reduce downtime and to protect business continuity.

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 of Jan Brooke



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

⁸ IPCC (2014): Intergovernmental Panel on Climate Change Fifth Assessment Report. Topic 1: Observed Changes and their Causes. http://ar5-syr.ipcc.ch/topic_observedchanges.php

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. 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 may need to be more fundamentally changed. In some situations conventional designs or operational solutions may no longer be sustainable. New ways of thinking will be needed. 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. Climate change is 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 river 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 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 seminal December 2015 COP21 discussions focused on adaptation to a greater extent than has previously been the case at these Conferences; and adaptation is firmly on the agenda for COP22 in Marrakech, Morocco.

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, IAPH and ESPO have been actively – and in some cases jointly – involved in promoting 'green port' initiatives.

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. It is also important to be aware that resilience is not only about engineering design. Social resilience, economic resilience, flexibility and robustness are all key. 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, they can 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.



An innovative approach to the beneficial re-use of navigation dredged material at Horseshoe Bend⁹ 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: 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:

⁹ Suedel, B. et al (2015). Creating Horseshoe Bend Island, Atchafalaya, Louisiana. Terra and Aqua. Number 140. September 2015.

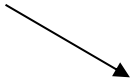
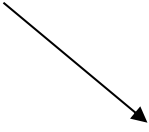
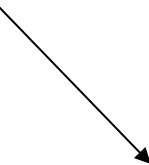

¹⁰ <http://el.erdg.usace.army.mil/ewn/>

- 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. These actions are elaborated in the following Action Plan.

Navigating a Changing Climate: Road Map

2015	Objectives	Actions	Under-way 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. Promote awareness of and scale up relevant ESPO and EcoPorts Initiatives 2d. Raise awareness and promote Blue Carbon pilot studies 2e. Raise awareness of relevant partner initiatives to reduce emissions from vessels 2f. Deliver good practice guidance on carbon management 2g. Establish an effective means of documenting and monitoring emissions from dredging and infrastructure construction projects 2h. Prepare guidance on port emissions status assessment 2j. Facilitate the preparation of new technical guidance on mitigation and offsetting measures and low carbon alternatives 2k. Facilitate the development and delivery of training and capacity building in relation to emissions reduction options	2016 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. Raise awareness of the need for adaptation, adding a climate change adaptation component to the EcoPorts methodologies 3d. Improve awareness of the implications of climate change for operational practices and supporting infrastructure 3e. Raise awareness of existing technical guidance on risk assessment and on climate proofing waterborne transport infrastructure 3f. Collect and disseminate port best practices in the field of climate change adaptation. 3g. Facilitate the preparation of new technical guidance on navigation infrastructure adaptation and strengthening resilience 3h. Facilitate the development and delivery of training and capacity building on adaptation options for navigation infrastructure	2015 2016 2017 2015 2016 2017 2016 2016	
	4. Work with Nature; seek integrated and sustainable solutions	Work together to: 4a. Promote awareness of and scale up relevant <i>Working with Nature</i> activities 4b. Continue to build knowledge and practical experience of Building with Nature and Engineering with Nature solutions 4c. Promote integrated coastal management to help develop and deliver nature friendly mitigation and adaptation solutions 4d. Promote the adoption of sustainable, integrated solutions for shippers and supply chains 4e. Disseminate information about integrated initiatives such as Early Contractor Involvement 4f. Promote the ESPO 5Es approach	2015 2016 2016 2015 2015 2016	
				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

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NAVIGATING A CHANGING CLIMATE: ACTION PLAN

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1. Expand the network of Think Climate partners and supporters; raise awareness of climate-related issues throughout the waterborne transport infrastructure sector

1a.-1b. A vital step in raising sector-wide awareness of climate change, of the challenges inland and maritime waterborne transport infrastructure will face, and of potential solutions or opportunities, is to ensure that as many individuals as possible have access to relevant resources including the outputs of the Navigating a Changing Climate initiative. By increasing the number of international and regional partner associations in the Think Climate coalition, and by encouraging national-level associations, corporate bodies and other organisations to sign up as 'supporters' of the initiative, it is our intention to:

- double the number of individuals who will have access to the coalition's products to 500,000 by end 2016
- increase this to more than 1,000,000 individuals with interests in waterborne transport infrastructure by end 2020.

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					1a. Increase the number of Think Climate partner associations and supporter organisations	
PIANC is leading the Navigating a Changing Climate initiative and establishing the initial membership of the Think Climate coalition	✓	✓	✓	✓	1a.(i) Increase the number of international associations signed up as partners in the Think Climate coalition to 8	End 2016
					1a.(ii) Increase the number of regional associations signed up as partners in or supporters of the Think Climate coalition to 10	End 2016
					1a.(iii) Aim to have a minimum of 40 organisations signed up as supporters	End 2016
					1a.(iv) Aim to have a minimum of 100 organisations signed up as supporters	End 2020
					1b. Promote the work of the Think Climate coalition	
PIANC will take relevant opportunities to hold Press Conferences at events around the world between September 2015 and the COP21 meetings. PIANC will also publicise the Think Climate coalition through articles in its newsletter and via social media (Twitter, LinkedIn, Facebook). Coalition partners will take similar steps to raise awareness of the initiative and to help attract new partners and supporters.	✓		✓		1b.(i) Partners to prepare and issue Press Releases; hold Press Conferences and organise similar publicity in the run-up to COP21	2015
					1b.(ii) Seek opportunities to publicise the work of the Think Climate coalition throughout the waterborne transport infrastructure sector, and to attract new partners and supporters: publicise the Navigating a Changing Climate initiative via articles in technical publications, magazines, newsletters, etc.	2016
					1b.(iii) Continue development of a media strategy to maintain momentum and ensure longevity of the work of the Think Climate coalition through to 2020	2016

1c. Several members of the Think Climate coalition are already undertaking activities of relevance to the wider waterborne transport infrastructure community but awareness of these initiatives is often limited to the membership of the lead association. It is therefore our intention to facilitate the sharing of experiences relevant to the Navigating a Changing Climate initiative, wherever practicable providing access to existing and new resources throughout the sector.

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					1c. Create a new website to connect the sector and facilitate sharing of experiences	
Coalition partners are already undertaking a number of climate-related activities, and others are planned. Work on climate issues is also underway elsewhere within the wider waterborne transport infrastructure sector. An important objective of the Think Climate coalition is to facilitate the dissemination of this relevant and potentially useful sector-specific information.	✓	✓	✓	✓	1c.(i) Develop a new website designed to act as a one-stop-shop for the navigation sector on climate change matters 1c.(ii) Create and maintain a 'master list' of climate relevant existing initiatives undertaken by members and supporters of the coalition; add new initiatives as they are commenced/completed 1c.(iii) Develop a network for the exchange of knowledge and experience operating via a common Think Climate website, also providing members of all partner associations and supporter organisations with a single point of access to relevant resources 1c.(iv) Prepare 'overview' brochures and similar summary documents for distribution to association members at conferences and workshops, etc. <i>inter alia</i> describing the Navigating a Changing Climate initiative and directing readers to the Think Climate webpage	2016 2016 2015 2017

1d.-1f. Conferences, seminars and workshops provide an important opportunity to raise awareness of climate-related challenges and opportunities whilst at the same time disseminating good practice. In this regard the coalition partners will collaborate to organise and publicise a range of climate-specific events, taking care to ensure that events make provision for and accommodate the needs of owners, operators and users of waterborne transport infrastructure in less developed and less well-resourced nations.

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					1d. Organise two new international conferences on the theme 'Navigating a Changing Climate'	
Most partners in the Think Climate coalition currently organise conferences or seminars dedicated to the interests of their membership. In some cases these include sessions on climate	✓	✓	✓	✓	1d.(i) Collaborate to organise a joint international, waterborne transport infrastructure conference in 2017 entitled 'Navigating a Changing Climate' with the following three themes:	2016

<p>change issues, for example at the 33rd PIANC World Congress in San Francisco, USA in 2014.</p> <p>However, exchange of information and experiences <i>between</i> the partner associations is currently somewhat ad hoc and often relatively limited. There are therefore many opportunities associated with improved, well-planned cooperation.</p> <p>To this end, sessions on climate change planned/organised for 10th IHMA Congress in Vancouver, Canada, in 2016; the 23rd IMPA congress in Seoul in 2016; PIANC-COPEDEC congress 2016 and ESPO's conference in 2017.</p>				<ul style="list-style-type: none"> reducing greenhouse gas emissions and moving towards low carbon infrastructure and operations improving preparedness, strengthening the resilience of infrastructure assets and institutions, and acting to adapt <i>Working with Nature</i> to adapt navigation infrastructure, and identifying integrated and sustainable solutions <p>1d.(ii) Organise a second, similar international conference four years later, <i>inter alia</i> to disseminate the outcomes of the Navigating a Changing Climate initiative</p> <p>1d.(iii) Ensure major conferences and congresses organised by partner associations include at least one session dedicated to climate change issues. Ensure other coalition partners are invited to participate wherever practical</p> <p>1d.(iv) Offer technical case study or preparedness 'process' presentations, or submit abstracts thereon, to conferences organised by other organisations or in related sectors, disseminating relevant findings from the Navigating a Changing Climate initiative and in turn drawing attention to the work of the Think Climate coalition</p>	<p>2020</p> <p>2016; ongoing</p> <p>2016; ongoing</p>
				1e. Organise or facilitate at least 25 climate change workshops	
<p>Most of the associations in the coalition run technical events such as workshops to facilitate the continuing professional development of their members. For example, EuDA together with CEDA¹¹ organised a workshop on the contribution of the dredging industry to climate change adaptation at the ECCA¹² 2015 Conference in Copenhagen, Denmark; and NordPIANC ran a workshop on climate adaptation for arctic navigation infrastructure at Lappeenranta, Finland in 2015. Similar, climate-specific workshops should be organised for members of all partner associations.</p>	✓	✓	✓	<p>1e.(i) Promote, support, organise or facilitate a minimum of five climate change-themed workshops or similar events annually, including in developing countries; document and share the outcomes with other coalition partners. Amongst others in 2016 these include: collaborative workshop PIANC-Philippine Ports Authority, climate themed workshops in South Africa and the UK, and short course in Dubai</p> <p>1e.(ii) Use these workshops to co-promote relevant activities of coalition partners, either by invitation or using agreed standard materials</p>	<p>2015</p> <p>2015</p>
				1f. Prepare and promote webinars and web-based tools	
<p>Some coalition partners promote live/interactive or pre-recorded webinars and similar.</p> <p>The advantage of web-based awareness raising is that it can be made widely available, globally, and that it can cover topics at a variety of levels of detail.</p>	✓	✓	✓	<p>1f(i) Identify themes for technical webinars or web-based 'tool box talks' on climate-related topics; development of a platform for video-based knowledge sharing.</p> <p>1f.(ii) Promote and advertise events through the website and via relevant partner and supporter associations.</p>	<p>2016</p> <p>2016</p>

¹¹ Central Dredging Association

¹² European Conference on Climate Change Adaptation

1g. Awareness of the potential effects of climate change, and the resulting need to improve the resilience of waterborne transport infrastructure, varies considerably within the membership of the coalition partners. As such, it is a priority for the Think Climate coalition to understand not only how climate change will affect waterborne transport infrastructure and the operations reliant thereon, but also the requirements of association members. In other words, it is important to establish what support the owners, operators and users of waterborne transport infrastructure need to enable them to build capacity and deliver effective mitigation and adaptation measures. Developing this understanding will help to ensure that future actions are properly targeted and that they address the real needs of those responsible for navigating a changing climate across all parts of the sector.

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					1g. Undertake a gap analysis to understand the wider needs of the waterborne transport infrastructure sector	
Associations joining the Think Climate coalition have provisionally indicated known gaps in knowledge and understanding insofar as climate change issues are concerned.	✓	✓	✓		1g.(i) Undertake a gap analysis (possibly based on a questionnaire or similar survey, but supplemented by other activities such as discussion sessions at workshops, conferences, etc.) to identify the needs of waterborne transport infrastructure owners, operators and users	End 2016

* S = Sustainability, R = Resilience, I = Integration, W = Working with Nature

2. Promote action to reduce (net) greenhouse gas emissions and encourage a shift towards low carbon waterborne transport infrastructure and operations

2a.-2e. The waterborne transport infrastructure sector needs to play its part in reducing greenhouse gas emissions. Whilst port and waterway infrastructure and operations typically account for only a very small proportion¹³ of the total greenhouse gas emissions associated with the shipment of a particular consignment, it is nonetheless important that the owners, operators and users of waterborne transport infrastructure, along with their specialised service suppliers, take steps to minimise the emissions associated with their activities, thus contributing to the 'less-than-2-degrees' pathway. The associations represented on the coalition recognise the importance – and the urgency – of implementing effective mitigation measures: to reduce greenhouse gas emissions; to avoid decisions that lock in to fossil fuel-based systems; and to move towards low carbon infrastructure.

Several of the partners in the Think Climate coalition already have activities and initiatives ongoing to help their members manage greenhouse gas emissions associated with waterborne transport infrastructure but awareness of these initiatives is often limited outside the lead association. Most of these initiatives would benefit from further dissemination and promotion both to raise awareness and encourage increased uptake although the need for action to ensure consistency between these initiatives is also acknowledged. Where existing activities are not directly relevant to other parts of the wider sector they may nonetheless provide inspiration – a model or ideas on which other organisations might build to create an equivalent resource. Such opportunities need to be identified and exploited.

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					2a. Promote awareness of and scale up relevant IAPH World Ports Climate Initiative activities	
IAPH has produced a 'Tool Box' to give ports easy access to the tools needed to address port-related air quality and climate change issues. This includes a range of resources to reduce greenhouse gas (GHG) emissions developed through the World Ports Climate Initiative (WPCI):	✓		✓		2a.(i) Improve awareness and take-up of each of these resources, for example via presentations at conferences, dedicated workshops, webinars and tool-box talks, <i>inter alia</i> emphasising the opportunity for significant potential for cost savings as well as carbon savings	End 2016
<ul style="list-style-type: none"> a <u>carbon foot-printing</u> reference helps ports to develop or improve their GHG emissions inventories, both from landside operations' emissions and from ships and other equipment outside their boundaries the promotion of <u>intermodal transport</u> – reducing or avoiding handling of cargo improves efficiency and productivity as well as reducing emissions to air 					2a.(ii) Promote these initiatives, with modification as appropriate, to other types of owner and operator within the wider waterborne transport infrastructure sector. For example work with representatives of inland ports and with terminal operators to promote the adaption and uptake of relevant WPCI resources.	End 2017

¹³ See, for example, the following presentation indicating that <1% of the total CO₂ 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

<ul style="list-style-type: none"> support is provided to ports promoting the installation and use of <u>onshore power supply</u> (OPS) via practical information on measures to improve air quality in ports and port cities including reducing vessels' dependence on auxiliary engines support is provided to ports promoting the installation and use of <u>onshore power supply</u> (OPS) via practical information on measures to improve air quality in ports and port cities including reducing vessels' dependence on auxiliary engines 						
					2b. Promote uptake of the GLEC framework for emissions calculations	
<p>Smart Freight Centre leads and coordinates the Global Logistics Emissions Council (GLEC) which is working across the various modes, industry sectors and global regions to develop a common framework for the calculation of logistics emissions as an enabler to design, selection, reporting and tracking of more efficient logistics and global supply chains.</p> <p>In 2015 SFC identified several existing methodologies that are already being applied for emissions calculation at locations where goods are handled between transport modes, including ports and inland terminals. An initial, simple interpretation of this is included in version 1.0 of the GLEC Framework for Logistics Emission Methodologies launched in June 2016.</p>	✓		✓		<p>2b.(i) Organise a workshop with Think Climate coalition members and selected industry partners, to harmonise existing calculation methodologies for ports and terminals (to include WPCI (2a), Portopia (2c), Green Efforts, Green Logistics and EN16258 methodologies). Agree a common approach to future methodology development that is aligned with activities that play a similar role in the supply chain (air freight terminals, road/rail terminals & warehousing).</p> <p>2b.(ii) Using presentations, workshops and articles in technical publications, etc. engage the wider sector in promoting the uptake of the GLEC framework and consistent approaches for the calculation of logistics emissions.</p>	<p>2016</p> <p>2016</p>
					2c. Promote awareness of and scale up relevant ESPO and EcoPorts Initiatives	
<p>The ESPO Green Guide has a chapter dedicated to energy consumption and climate change with the main focus being on mitigation. The Green Guide is also accompanied by a good practice annex highlighting concrete port practices in reducing carbon emissions.</p>	✓		✓		<p>2c.(i) Improve awareness and further disseminate the ESPO Green Guide and its accompanying good practice annex.</p> <p>2c.(ii) Further populate the good practice annex of the ESPO Green Guide with port practices on climate change mitigation.</p>	<p>2016</p> <p>2017</p> <p>2018</p>
<p>EcoPorts is a global network of ports working together on environmental management. In Europe and neighbouring countries, EcoPorts is managed by ESPO through www.ecoport.com. 75 Ports are currently part of the network.</p>	✓		✓		<p>2c.(iii) Improve awareness of EcoPorts and bring more European ports into the network. Target 100 ports.</p> <p>2c.(iv) Increase attention to climate change on the EcoPorts agenda, for example via organisation of a dedicated EcoPorts workshop (with the participation of inland and global ports).</p>	<p>2016</p> <p>2017</p>

ESPO also has a memorandum of understanding for the use and dissemination of EcoPorts globally. The main EcoPorts tools: Self Diagnosis Method (SDM) and Port Environmental Review System (PERS) already have an embedded climate change component, with the main focus currently being on mitigation.					2c.(v) Expand the climate change element of the SDM and disseminate relevant benchmark data for the European ports annually indicating, for example, the priority given to energy consumption and climate change; the percentage of ports monitoring and reporting on their carbon footprint. 2c.(vi) Update PERS so that climate change mitigation policies and actions are needed as part of the certification process whereby ports achieve the standard. 2c.(vii) Extend the international and global dimension of the EcoPorts network through partnership with other regional port associations. 2c.(viii) Involve more inland ports in EcoPorts in cooperation with the European Federation of Inland Ports (EFIP)	2017 2017 2018 2018
The PORTOPIA project focuses on the development and implementation of port performance indicators. ESPO is a project partner and will be guaranteeing the continuation of the PORTOPIA data collection and reporting systems after the end of the project in 2017. Carbon footprinting and reporting is an important component of the environmental part of the PORTOPIA project.	✓		✓		2c.(ix) Work towards the Implementation of a data collection and reporting system on port carbon footprint as a follow up after the end of the PORTOPIA project.	2018
					2d. Raise awareness and promote Blue Carbon pilot studies	
EuDA is developing a CO ₂ strategy to facilitate the capture and long term storage of atmospheric CO ₂ . 'Blue Carbon' initiatives will be delivered through the restoration of habitats that are natural carbon sinks such as saltmarshes, seagrasses and mangroves. This initiative could provide valuable, transferable experience for offsetting emissions associated with both existing and new waterborne transport infrastructure.	✓	✓	✓	✓	2d.(i) Other coalition members will work with EuDA to identify and promote pilot studies to improve understanding and facilitate take-up of Blue Carbon (offsetting) initiatives 2d.(ii) Raise awareness of the potential for and experience with Blue Carbon restoration as an offsetting measure, through presentations, workshops and technical briefing notes and guidance 2d.(iii) Explore the viability of setting a legal framework for emissions rights to facilitate the development and maintenance of such environments	2016 2017 2018
					2e. Raise awareness of relevant partner initiatives to reduce emissions from vessels	
Other initiatives being implemented, particularly by infrastructure owners and operators, are seeking to reduce emissions from vessels using, or involved in the development of, waterborne transport infrastructure. For example an <u>Environmental Ship Index</u> (ESI): an IAPH-WPCI tool to evaluate the amount of nitrogen oxide (NOX) and sulphur oxide (SOX)	✓	✓	✓	✓	2e.(i) Raise awareness of these initiatives, promote their uptake and seek opportunities to replicate or scale-up such initiatives through presentations, webinars, technical articles and briefing notes	2016

released by a seagoing vessel, enables ports to identify and reward clean ships-					N.B. The port-call definitions initiative being led by IHMA and described in Action 4d. will also contribute towards the reduction of emissions from vessels.	
Whereas these activities are associated with vessels rather than directly with the infrastructure, they are nonetheless important in contributing to an overall reduction in emissions, including in the vicinity of waterborne transport infrastructure.						

2f.-2j. Whilst some tools do already exist to help identify and reduce emissions associated with the use of waterborne transport infrastructure, general awareness of emissions reduction or offsetting options remains low and there are some significant gaps in knowledge and experience. Some low carbon technology relevant to waterborne transport infrastructure already exists or is being developed, but awareness of these initiatives could be improved. Low carbon options are also being developed in other sectors (road, rail, flood risk management) some of which have the potential to be applied in the port or waterway environment, but cross-sectoral dialogue is needed to help highlight such opportunities, followed by awareness-raising within the waterborne transport infrastructure sector. Establishing the needs of the owners, operators and users of waterborne transport infrastructure sector will enable both technical guidance and research and development requirements to be identified.

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W		
					2f. Deliver good practice guidance on carbon management	
PIANC's technical Working Group (WG188) is developing guidance on carbon management for port and navigation infrastructure projects. The Working Group will collate available international experiences including those of other coalition partners; review navigation-relevant case studies; and report on methods to quantify and manage navigation infrastructure carbon footprints as well as describing good practice for conservation of carbon-sequestering coastal ecosystems (blue carbon). These methodologies and best practices will be relevant not only to the international PIANC community but also to other coalition partners and supporters.	✓	✓	✓		2f.(i) Invite coalition partner associations to nominate representatives to Working Group 188, and confirm the relevance of the Terms of Reference to all associations 2f.(ii) Ensure effective dissemination of the resulting guidance on carbon management for port and navigation infrastructure projects; advertise and distribute the guidance via partner associations; deliver or facilitate workshops; submit conference papers, etc.	End 2015 End 2017
					2g. Establish an effective means of documenting and monitoring emissions from dredging and infrastructure construction projects	
In relation to new dredging and infrastructure projects in particular, EuDA and its members are contributing to policies	✓		✓		2g.(i) EuDA and other coalition partners will cooperate locally and regionally as appropriate to establish datasets and methodologies with the objective of deriving an effective means of documenting	2017

aimed at reducing CO ₂ emissions from construction projects (e.g. Netherlands CO ₂ performance scale)					and monitoring emissions from dredging and other waterborne transport infrastructure construction projects.	
					2h. Prepare guidance on port emissions status assessment	
IAPH, working with the International Maritime Organization, identified a need for technical guidance to support port operators and developers in considering emissions and energy efficiency as part of their operation management and future investments.	✓		✓		2h.(i) Prepare a Guidance Document to support ports in undertaking a "Port Emissions Status Assessment", including the identification of potential emissions reduction strategies. This guidance will cover all the main aspects that need to be considered in evaluating the ship-port interface with regard to emissions and energy efficiency.	2016
					2j. Facilitate the preparation of new technical guidance on mitigation and offsetting measures and low carbon alternatives	
Whilst some resources exist, there are also gaps in experience. In some parts of the sector, the owners, operators and users still lack knowledge, both about the measures that can be taken to reduce or offset greenhouse gas emissions from existing waterborne transport infrastructure and about the options available to shift to low carbon alternatives. Action is therefore needed to identify gaps and determine priorities with regard to the need for new technical resources, guidance documents and similar.	✓	✓	✓	✓	<p>2j.(i) Use discussion sessions at workshops, conferences, etc., to identify gaps in knowledge and understanding about GHG emissions and mitigation and offsetting measures for existing and new waterborne transport infrastructure.</p> <p>2j.(ii) Where relevant information is available from existing initiatives, develop and disseminate briefing papers and checklists to enable the owners, operators and users of waterborne transport infrastructure to make more informed choices about GHG mitigation and/or offsetting</p> <p>2j.(iii) Identify outstanding gaps in technical resources to help with the selection and delivery of mitigation, offsetting and low carbon alternatives (e.g. briefing papers, detailed technical guidance or knowledge gaps requiring research and development)</p> <p>2j.(iv) Facilitate the preparation of international good practice technical guidance on priority topics</p> <p>2j.(v) Agree on a strategy to enable identified research and development priorities to be communicated and realised.</p>	<p>2016</p> <p>2017</p> <p>2017 onwards</p> <p>2018</p> <p>2018</p>

2k. Capacity building is another vital step towards achieving the coalition's vision. Where inland or maritime waterborne transport infrastructure owners, operators or users are unfamiliar with options for reducing or offsetting greenhouse gas emissions, for shifting to low carbon infrastructure, or for avoiding locking in to fossil fuel futures, technical guidance can usefully be supplemented by a campaign of awareness raising and training.

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W		
					Actions	
					2k. Facilitate the development and delivery of training and capacity building in relation to emissions reduction options	
Whilst there are various ad hoc awareness raising activities associated with the existing initiatives listed in Annex 2, there has been no coordinated, sector-wide campaign of activity dedicated to mitigation i.e. reducing or offsetting emissions from waterborne transport infrastructure and to promoting low carbon alternatives. Any capacity building initiative should both seek to provide training in relation to existing products and resources (e.g. introduction to WPCI resources; combined training sessions to support integrated calculations of logistics emissions according to GLEC framework; raising awareness of the ESPO Green Guide and EcoPorts network and approach) as well as identifying possible new initiatives.	✓	✓	✓		<p>2k.(i) Coalition partners will take steps to identify their members' key capacity building requirements in relation to mitigation and offsetting measures and low carbon alternatives</p> <p>2k.(ii) Coalition partners will then plan for and facilitate the delivery of relevant sector-specific mitigation training based both on existing coalition products and newly identified needs. This could include:</p> <ul style="list-style-type: none"> classroom (face-to-face) or internet-based (virtual), formal or informal training courses; other types of training (e.g. workshops, toolbox talks, webinars) facilitation of secondments or peer review opportunities (for example via the creation of networks within or between associations); virtual meeting places and chat-based forums for the exchange of information. <p>This action could lead to the identification of new coalition supporters in the form of training providers.</p>	<p>2017</p> <p>2018</p>

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3. Improve preparedness, strengthen resilience and enable the waterborne transport infrastructure sector to adapt to climate change

3a.-3d. Levels of preparedness to deal with the effects of climate change vary considerably within the Think Climate coalition partners' members. Many organisations and individuals are not yet well prepared. Uncertainty is a real issue, often culminating in a lack of action, and there are plenty of examples where significant improvements in planning and preparedness are needed to reduce vulnerability and to strengthen the resilience of waterborne transport infrastructure.

Awareness raising and capacity building are fundamental prerequisites to improving resilience. Access to technical advice and guidance is similarly essential for effective delivery. Most of the associations in the coalition have a mandate that includes the preparation and/or dissemination of good practice guidance; and the provision or signposting of training and other activities aimed at capacity building. Ensuring that their members have access to sector-specific resources will be vital for these associations if the owners, operators and users of inland and maritime waterborne transport infrastructure are to become better informed and hence better-prepared to navigate the effects of a changing climate.

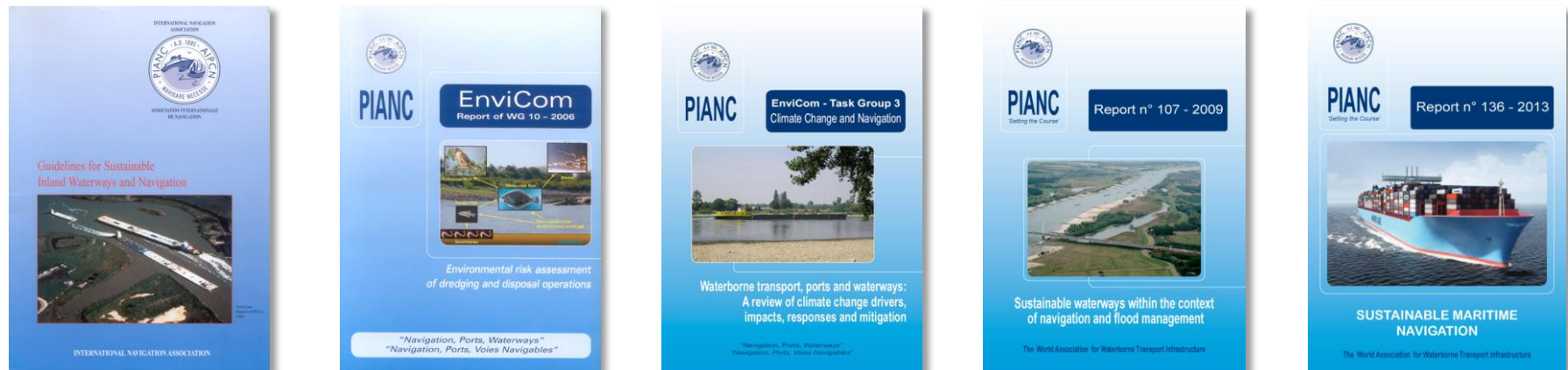
What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					3a. Prepare and disseminate technical guidance on climate change adaptation for inland and maritime navigation infrastructure	
<p>PIANC's Working Group 178 is preparing guidance on climate change adaptation for inland and maritime navigation infrastructure. This guidance, due for publication in 2017, will describe good practice - from understanding the climate science, collecting locally-relevant data, building capacity and carrying out risk assessments through to the evaluation and selection of appropriate measures to strengthen both institutional and structural assets, and otherwise adapt to climate change. Part of this initiative is the organisation of workshops which aim to:</p> <ul style="list-style-type: none"> raise awareness of climate change; of adaptation planning and delivery options; of the guidance document provide a platform for the presentation of regionally-specific examples and the exchange of experience 	✓	✓	✓	✓	<p>3a.(i) Ensure all interested coalition partners are participating in WG178 and are encouraged to organise workshops or other WG 178 events</p> <p>3a.(ii) Confirm the relevance of the WG178 project to all partners. Where interests are different, explore the need for and promote opportunities to produce equivalent guidance for other parts of the sector (e.g. for terminal operators, freight handlers)</p> <p>3a.(iii) Ensure effective dissemination of the final WG178 report and any equivalent guidance documents. Advertise and distribute the guidance via partner associations; deliver or facilitate workshops; submit conference papers, etc.</p>	<p>End 2015</p> <p>2016</p> <p>End 2017</p>

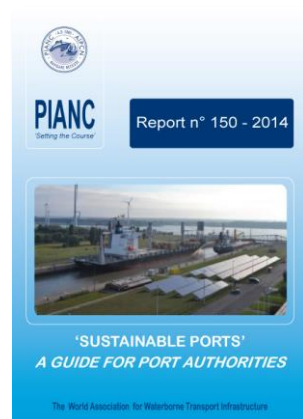
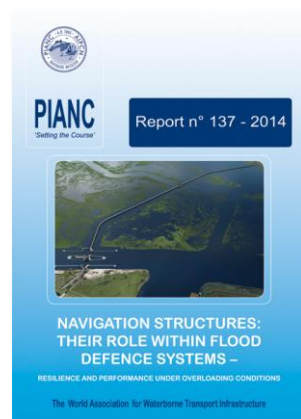
<ul style="list-style-type: none"> identify and collate case study information for the PIANC WG 178 guidance document. <p>These and other case study examples collected to inform the report will be presented as part of the guidance.</p>						
					3b. Update PIANC's Task Group 3 report Climate Change and Navigation	
PIANC's Task Group 3 report 'Climate change and navigation' was prepared in 2008 using the 2007 IPCC outcomes. This guidance needs to be updated to include the 2014 Fifth Assessment Report and to include reference to regional assessments.	✓	✓	✓		3b.(i) Prepare Terms of Reference for the update and issue call for Task Group members including for members from coalition partner associations; prepare updated TG3 report. 3b.(ii) Advertise and disseminate the revised PIANC TG3 report; use for reference in workshops; submit and prepare conference papers, etc.	End 2016 End 2017
					3c. Raise awareness of the need for adaptation <i>inter alia</i> by adding a climate change adaptation component to the EcoPorts methodologies	
EcoPorts is a global network of ports working together on environmental management (see 2c.). The main EcoPorts tools (i.e. Self Diagnosis Method (SDM); Port Environmental Review System (PERS)) focus on mitigation in the embedded climate change component. This can be extended to include an adaptation component.	✓	✓			3d.(i) Bring climate change adaptation onto the EcoPorts agenda, for instance by the organisation of a dedicated EcoPorts workshop with the participation of inland and global ports 3d.(ii) Introduce climate change adaptation into the SDM and collect relevant data for European ports 3d.(iii) Update PERS so that climate change adaptation policies and actions are taken into account in order for a port to become certified by the standard. 3d.(iv) Develop the international and global dimension of the EcoPorts network through partnership with other regional port associations. 3d.(v) Involve more inland ports in EcoPorts in cooperation with the European Federation of Inland Ports (EFIP).	2017 2017-2018 2018 2018 2018
					3d. Improve awareness of the implications of climate change for operational practices and supporting infrastructure	
IMPA is continually monitoring and disseminating to members, information about operational practices, new equipment and techniques, etc. to facilitate safe operation and ship manoeuvring in increasingly challenging environmental and meteorological conditions, whilst meeting the continuing and improved goals of shipping trade efficiency		✓	✓		3d.(i) Improve awareness amongst port authorities, national administrations, shipowners and managers, class and trade associations and others about the implications of climate change for ship movements in port and how operational practices and supporting infrastructure may need to adapt to these demands	2015

3e.-3g. In addition to raising awareness and building capacity, providing access to sector-specific technical support and guidance on adaptation options and delivering more resilient infrastructure is another fundamentally important aspect of improving resilience and adaptation capability.

A key role of PIANC and many of the other associations in the coalition is the promotion of technical excellence. This is achieved *inter alia* through the preparation and publication of good practice guidance. Such publications enable individuals throughout the sector to access up-to-date international or regional documents - for example sector-specific summaries and interpretation of factual information; technical good practice guidance; and in some cases standards. These reports typically set out the key guiding principles to be applied in the national or local context. In the specific case of climate adaptation, guidance and other resources will be needed to cover the spectrum of decision-making, from initial risk assessment through to design guidance.

Existing relevant good practice may need to be reviewed and developed to more explicitly accommodate climate change issues. Effective dissemination of relevant existing publications and, on completion, of the various technical guidance documents currently in preparation will be an essential action in the coming years. Equally important, however, will be the identification of critical gaps in knowledge/understanding and guidance. Coordination between coalition members in setting up relevant initiatives leading to the preparation of new resources is therefore another priority action.





A key role of PIANC is promoting technical excellence via the preparation and publication of guidance documents and web-based resources, enabling individuals throughout the sector to access up-to-date international good practice

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					3e. Raise awareness of existing technical guidance relevant to risk assessment and climate proofing for new waterborne transport infrastructure	
PIANC has already published several guidance documents of relevance, for example, to those involved in understanding and assessing the risks and consequences of climate change or in ensuring that waterborne transport infrastructure design is 'climate-proofed'. Many of these Working Groups included representatives of relevant coalition partner associations.	✓	✓	✓		<p>3e.(i) Review and revise if appropriate, and then use publications page on website to ensure coalition partners and supporters are aware of publications such as:</p> <ul style="list-style-type: none"> Sustainable Ports - A Guide for Port Authorities. PIANC Report 150. 2014 Navigation Structures: Their Role within Flood Defence Systems. Resilience and Performance under Overloading Conditions. PIANC Report 137. 2014 Harbour Approach Channels - Design Guidelines. PIANC Report 121. 2014 Sustainable Maritime Navigation. PIANC Report 136. 2013 	2016 onwards

				<ul style="list-style-type: none"> Sustainable Waterways within the Context of Navigation and Flood Management. PIANC Report 107. 2009 Dredging management practices for the environment - a structured selection approach. PIANC Report 100. 2009 Life Cycle Management of Port Structures, Recommended Practice for Implementation. PIANC Report 103. 2008 Environmental risk assessment of dredging and disposal operations. PIANC EnviCom WG 10 report. 2006 <p>3e.(ii) Discuss with the relevant PIANC Commission opportunities for any review or update of existing guidance in a climate change context</p>	2017 onwards
				3f. Collect and disseminate port best practices in the field of climate change adaptation	
The ESPO Green Guide has a chapter dedicated to energy consumption and climate change with the main focus being on mitigation. The Green Guide is also accompanied by a good practice annex highlighting concrete port practices in reducing carbon emissions. The scope of the Green Guide annex can be extended to include adaptation examples.	✓	✓		3f.(i) Expand the scope of the good practice annex and populate it with port examples on adaptation to climate change.	2017
				3g. Facilitate the preparation of new technical guidance on navigation infrastructure adaptation and strengthening resilience	
It is expected that Working Group 178 will highlight the need for additional technical guidance. For example, anticipating the outcomes of the WG 178 report, it is likely that more detailed guidance will be needed on improving the resilience of waterborne transport infrastructure systems.	✓	✓	✓	3g.(i) Work with coalition partners and supporters (including at relevant events) to identify other inland and maritime waterborne transport infrastructure topics on which international good practice guidance would be useful	End 2016
Recommendations for further initiatives are similarly likely to be made through conferences, workshops and other avenues.				3g.(ii) Facilitate the preparation of technical guidance on priority topics (e.g. through discussions with the relevant PIANC Commission)	2017 onwards

3h. As indicated above, capacity building is another vital step towards achieving the coalition's vision. For a variety of reasons, many organisations with interests in inland or maritime waterborne transport infrastructure currently have a limited capacity to adapt to the changing climate. This might be an institutional or resourcing issue; it may be a function of the scale of the organisation; or there may be a lack of access to relevant, sector-specific training. In addition to providing guidance and technical reference materials, the associations represented on the coalition will therefore instigate a number of actions dedicated to training and capacity building.


What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					3h. Facilitate the development and delivery of training and capacity building on adaptation options for navigation infrastructure	
Some of the associations represented on the coalition have a reasonable appreciation of the needs of their members in relation to climate change preparedness issues; others have a less mature understanding. If effective steps are to be taken to strengthen the resilience of waterborne transport infrastructure assets and institutions in the face of a changing climate, and to promote relevant adaptation measures, all partner associations need to properly understand the needs of their members.	✓	✓	✓		<p>3h.(i) Coalition partners to take steps to identify their members' key capacity building requirements in relation to climate change implications for waterborne transport infrastructure</p> <p>3h.(ii) Coalition partners will plan for and facilitate the delivery of relevant sector-specific training; this could include</p> <ul style="list-style-type: none"> classroom (face-to-face) or internet-based (virtual), formal or informal training courses; other types of training (e.g. workshops, toolbox talks, webinars) facilitation of secondments or peer review opportunities (for example via the creation of networks within or between associations); virtual meeting places and chat-based forums for the exchange of information <p>This action could lead to the identification of new coalition supporters in the form of training providers.</p>	<p>End 2016</p> <p>2017; ongoing</p>

* S = Sustainability, R = Resilience, I = Integration, W = Working with Nature

4. Encourage new ways of thinking about waterborne transport infrastructure: Working with Nature; identifying sustainable and integrated solutions

4a.-4b. The partners in PIANC's Think Climate coalition recognise that navigating a changing climate will often require changing the way we think about challenges. As climate changes, doing 'more of the same' may no longer be sustainable. New problems may need new solutions. PIANC's Working with Nature philosophy provides an example of such an approach – focusing on achieving project objectives in an ecosystem context rather than assessing consequences of a pre-defined design; and identifying win-win solutions rather than simply minimising ecological harm.

Working with Nature encourages waterborne transport infrastructure owners, operators and users to identify solutions that reduce the vulnerability of natural ecosystems and improve their resilience, at the same time as realising resilient and sustainable infrastructure projects that can help to offset carbon emissions.

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					4a. Promote awareness of and scale up relevant Working with Nature activities	
<p>Working with Nature is an established philosophy with web-based resources, a Position Paper and a system of certificates and awards. PIANC's Working Group 176 is now preparing technical guidance on the practical application of the Working with Nature philosophy to inland and maritime navigation infrastructure projects.</p> 	✓	✓	✓	✓	<p>4a.(i) Ensure that WG 176 considers the application of the <i>Working with Nature</i> philosophy to the adaptation of waterborne transport infrastructure, providing technical guidance on options for working with natural processes, improving the resilience of both infrastructure and nature, and often reducing (net) carbon emissions as a result.</p> <p>4a. (ii) Finalise and disseminate the PIANC good practice guidance document on Working with Nature. Dissemination should include facilitating or delivering workshops, submitting and preparing conference papers, etc.</p> <p>4a.(iii) Scale up the promotion of the <i>Working with Nature</i> certificate and award scheme, amongst others by reaching out to coalition partners and supporters</p>	<p>End 2015</p> <p>End 2016</p> <p>2016</p>
					4b. Continue to build knowledge and practical experience of Building with Nature and Engineering with Nature solutions	
EuDA and its members are actively involved in raising awareness of the Building with Nature ¹⁴ approach to the design, management and implementation of infrastructure	✓	✓	✓	✓	4b.(i) Continue to build knowledge and experience; work with Think Climate coalition partners to identify additional pilot projects; monitor and record experience to improve techniques	2015

¹⁴ <http://www.ecoshape.nl>

projects. EuDA members are already implementing Building with Nature pilot projects in tropical and temperate climates. The 'Engineering with Nature' program is an initiative of PIANC member USACE, which is developing and delivering similar practical solutions.					and maximise their effectiveness for both climate mitigation (through carbon sequestration) and adaptation (through improved resilience).	
					4c. Promote integrated coastal management to help develop and deliver nature friendly mitigation and adaptation solutions	
Integrated coastal management has a potentially important role in strengthening resilience to climate change. For example, healthy coastal habitats can provide a degree of protection to port and harbour infrastructure against sea level rise and increasingly frequent storms; a more resilient coastal community will be better placed to help the ports recover from an extreme event).	✓	✓	✓	✓	4c.(i) Raise awareness of the potentially important role of integrated coastal management in strengthening resilience in port communities and how ICM can contribute to the protection or post-event recovery of navigation infrastructure.	2016



Applying the Working with Nature philosophy enabled Mersey Docks and Harbour Company Ltd. to identify potential beneficial uses for maintenance dredged sediment from Liverpool Docks, England. Discussions with stakeholders identified that rather than transporting the dredged silt to the existing disposal site 20 km offshore it would be preferable to deposit it at the Mid River licensed disposal site less than 1km from the Docks. Modelling and tracer studies demonstrated that disposing of the dredged material at this site on the flood tide would facilitate the natural up-estuary transport of sediment. This would in turn encourage a proportion of the silt to remain within the estuarine system to sustain the inner estuary saltmarshes, strengthening their resilience in the face of climate change. In addition to this ecological gain, another benefit of disposal at Mid River would be the reduced distance that 800,000 tonnes of dredged material will need to be transported every year for disposal. This will significantly reduce emissions and hence the carbon footprint of the port's maintenance dredging operation.

4d.-4f. The Think Climate coalition partners recognise that adaptation is not simply about increasing the resilience of waterborne transport infrastructure. Other sectors must also navigate the changing climate, and their requirements may bring new opportunities. Integration and collaborative action - not only within but also beyond the waterborne transport infrastructure sector - will be key drivers to realising effective, cost-beneficial and sustainable solutions.

What are we already doing?	Which pillars?				What else will we do?	Underway by
	S	R	I	W	Actions	
					4d. Promote the adoption of sustainable, integrated solutions for shippers and supply chains	
<p>Multinationals' logistics supply chains are vast and complex, involving combinations of trucks, trains, ships, and planes and their associated infrastructure. Improving freight efficiency will both reduce emissions and increase profits. Individual companies cannot do this alone so look to collaborate, including through green freight programmes. They also need a harmonised method to measure emissions along the full supply chain.</p> <p>Think Climate coalition partner SFC helps industry to demonstrate leadership and drive change, <i>inter alia</i> by defining and driving 'Smart Freight Leadership', developing the GLEC Framework for Logistics Emission Methodologies (see also Action 2b), making connections between green freight programmes to maximise cooperation and alignment; and supporting the development of new programmes and partnerships.</p> <p>IAPH, through the WPCI, is actively involved in the promotion of intermodal transport, an integrated approach to handling of cargo - improving efficiency and productivity, reducing costs, as well as reducing emissions to air.</p> <p>IHMA is working with the shipping industry to develop port-call definitions in support of safe, efficient and sustainable transport logistics.</p>	✓		✓		4d.(i) Promote the adoption of sustainable, integrated (intermodal) solutions such as those advocated by SFC, WCPI and IHMA. Work across and beyond the sector, including shippers and supply chains, and understand these groups' requirements of waterborne transport infrastructure providers.	2016

					4e. Disseminate information about integrated initiatives such as Early Contractor Involvement	
EuDA is active in promoting initiatives such as 'Early Contractor Involvement' (ECI), an approach to contracting <i>inter alia</i> for waterborne transport infrastructure that promotes integration through teamwork and innovation, in turn contributing to just-in-time, value for money navigation infrastructure projects.	✓		✓		4e.(i) Collate and disseminate relevant experience with such initiatives, enabling members of partner associations to adopt integrated practices leading to both cost and carbon savings.	2017
					4f. Promote the ESPO 5Es approach	
In its Green Guide, ESPO sets out a common framework for action on the environment under 5Es: Exemplify, Enable, Encourage, Engage and Enforce. The 5Es framework requires the active involvement of all stakeholders in the port area and the logistics chain.	✓		✓		4f.(i) Raise awareness on the 5Es framework and give visibility to practices on climate change under Encourage and Engage in particular.	2016

* S = Sustainability, R = Resilience, I = Integration, W = Working with Nature

ABOUT

The Navigating a Changing Climate Initiative is led by **PIANC** on behalf of the **Think Climate coalition**.

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