Presentation (text version):
GREENER DREDGING
Thank you for the kind introduction.

Dredging seems to have a rather negative connotation. Of course you all are more or less involved in dredging and so you might know at least a little bit what dredging is all about. But most stakeholders think that dredging has to do with contaminated material and dredgers are devastating the environment.

In The Netherlands for instance when something is really bad they say ‘that is bagger, the synonym of ‘dredged material’. In English as well, when people say that they are dredging something up, it is always something bad.

My job as Secretary General of IADC – and that is why I was invited to this mid-term conference – is to tell you how dredging is getting greener. Yes, I am here to tell you about “Greener Dredging” and this title has a clear implication. It means that dredging is already green – and GETTING GREENER.

And that is a concept which may not be known to most people.

Dredging is green and is getting greener and greener. In this presentation I will emphasise the fact that my member companies are already taking care of the environment and often even trying to improve it. I will try to “clean up” the image of our industry and show that we were already green yesterday, we are greener today, and we will become even more green tomorrow.

Start with this: does anybody know how much dredged material is not contaminated:

Experts estimate that more than 90% of dredged material is relatively uncontaminated, natural, undisturbed sediment and could be considered for a wide range of alternative uses.

That implies that only a minor portion is contaminated.

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First of all, a quick overview: I’d like to start with a short introduction about IADC. Then I will show you where we are coming from. I will touch upon a few issues which are of concern nowadays. Most of the time I will focus on developments which have commenced already and will become more and more important in the near future.

And at the end hopefully there will be some time left for questions and answers.

IADC has 11 main members with about 100 subsidiaries all over the world. To be a full member of IADC you must:

• Have € 25 mln value of seagoing vessels
• Be working Internationally ; outside of your own country regions.
• Be privately owned

Since CCCC is 70% state owned it can only have observer status and is therefore placed outside of the circle.
IADC as an association is dealing with PR and communication issues. And as you probably know the perception of the reality of dredging very much depends on your perspective. I looked for an example of this nearby.

Zalul is one of Israel's leading environmental NGOs dedicated to protect the seas and rivers of Israel. Volcani Center on the other hand is The Agricultural Research Organization (ARO), this research arm of the Ministry of Agriculture and Rural Development, is responsible for most of the agricultural research conducted in Israel.

When you read both texts, it is hard to believe they are dealing with the same reality, the same Kishon river here in Israel. Nevertheless their perceptions diverge nearly 180 degrees.

So let's deal with the history of green dredging and future of the dredging industry and at the end I hope your perceptions will converge a little with mine.

The importance of the environmental aspects of dredging has already been recognised a long time ago. IADC and CEDA, the Central Dredging Association has published a series of booklets since 1997. Which were collected, updated and published in 2008 in this 300 page book: 'The Environmental aspects of dredging'.

Looking at the past, we can conclude that the environmental movement and green dredging grew up together and these books reflect this.

What are some of the innovations from the past in dredging technology and equipment that could be identified as 'green'?
- First we have the increase in the dredging accuracy in order to decrease dredging tolerances. This is of course an essential development: less tolerances mean less material to be dredged. From an environmental perspective it will result in a decrease of suspended sediments. which result in lower costs which might lead to reduced tender prices. And -It is the same with the reduction of carbon dioxide, which is related to fuel consumption. If you reduce fuel consumption you will reduce emissions. A major part of the dredging costs consist of fuel costs. Substantial reduction in fuel usage will give a dredging company a major competitive advantage.

A major improvement in reduction of the environmental impact was the development of the green valve early this century.

To begin, a reduction was achieved by an overflow discharging at the bottom of the vessel instead of on the water surface. The second improvement was the use of this so-called green valve. The Green Valve resulted in a major reduction of turbidity. The water overflow consists of water, sediments and fines and last but not least, air. The larger sediments will be discharged to the sea/riverbed but as the air rises from the underwater outlet to the surface of the water, it takes the fines with it. As a consequence, the fines spread over a much larger area which increases turbidity. The Green Valve reduces the air entrainment and
sediments and fines will sink to the sea or riverbed and therefore reduce the turbidity. Less turbidity and less environmental impact.

A very common instrument to reduce the impact is the definition of environmental windows. At designated moments dredging is not allowed, at all. This can be related to local circumstances as currents or tides or severe weather conditions, but a window can also be the result of the spawning period of corals as shown in the slide. Don’t ask me for the reproduction details of corals but the pink balls will settle and become young coral. You can imagine that disturbance of this reproductive process has great influence on the long-term health of the coral reef.

In the recent years several innovations have been implemented to improve the dredging process in general and the protection of the environment specifically. Dynamic positioning systems make it possible to dredge very precisely and avoid vulnerable marine habitats. The manual control of the dredging process is more and more being replaced by automated dredging information systems. As said earlier, an increased density of dredged material results in decreased water volume, and there for a more efficient process and less harm to the environment. The multi beam echo sounder – shown left under in the slide -- gives an accurate picture of the actual dredging site. It prevents under- or over-dredging and contributes to an optimal use of dredging information systems.

Dedicated equipment has been developed for distinct projects. The Melbourne, Australia, Channel deepening project with its strict environmental requirements, wouldn’t have been possible without the development of specific equipment. This project -- in a very sensitive protected Marine Nature Preserve -- was necessary to allow larger vessels to call at the port of Melbourne. The contractor had to deal with hard rock and had to ensure that the rock did not tip over the edge into the underwater canyon and destroy the coral. To do this the contractor developed a modified so-called ripper draghead, which fragmented the rock into sufficiently small pieces. This ripper draghead was first tested on land and in laboratory conditions. In addition the suction characteristics were improved. The working method had to be adjusted too. The draghead had to be lifted before the edge of the walls and the hopper dredged away from the canyon walls. And every time when 24,000 m³ had been dredged, the operation had to stop and the dredged area had to be cleaned of all loose material. This whole process was controlled by video checks – which could also be viewed by the public.

This is a clear example of what is possible in an environmentally sensitive area. But clients have to realize a few things:
- When a port decides to do a significant dredging operation, it may be a once in a lifetime event. For dredging contractors, this is day-in-day-out event. We do it all the time.
We have the experience of working in all kinds of situations – including very environmentally delicate areas. Sustainability is in our DNA.

HOWEVER, working sustainably costs money. It needs budgets, it costs time, and new equipment and special procedures demand investments in R&D.

The price per cubic metre is not the only cost. Investments in hi-tech ships, training hi-quality crews, researching safer, sustainable methods, all costs money. Only the sunrise is free.

And lastly, not every contractor has the knowledge and experience required for these kinds of projects, my members do! Working with these internationally recognized experts guarantees quality.

As we all know, monitoring a project before, during and after a dredging or maritime construction project is extremely important. Before: to establish a baseline During: to check on the process as it is happening After: to ensure there are no continuing or long-term impacts, or only the expected impacts.

But is monitoring being done correctly. Are the right data being collected, and is your interpretation correct? What is the relevance of your data?
Before you start your project you have to do your baseline monitoring. What is the actual situation before any activity has started? What is the situation of:
• Depth of sea or riverbed
• Suspended sediment concentration
• Hydrographic parameters

And don’t measure it once or twice, but over a longer period in which all parameters that could possible influence the regular situation have run their normal cycle.
Without the results of an extensive baseline monitoring you will lack a reference framework necessary for matching the monitoring results during and after the execution of the project. A simple storm can cause more turbidity than you ever will experience from a hopper.

Another important choice in your monitoring programme is where you monitor. It seems obvious that it should have relevance to your targets, but it is a common misunderstanding. Monitoring should be relevant. For instance, when you set a maximum turbidity level for protecting a coral reef, you have to monitor near the coral reef and not in the plume of the hopper.

That brings me to three developments which I foresee, will have a big influence in the future. All three are embraced by the dredging industry in a full belief that they contribute to a more sustainable way of executing maritime infrastructure projects.

I will only slightly touch upon the first two. The last one, Building with Nature I will talk about more in depth, because it is not only supported by the industry but it was even initiated by the dredging industry.

The first development is literally what it says.
Early Contractor Involvement. We think it is very beneficial for a client to have the contractor be involved early on. Not so much in case of a regular maintenance project, but looking to more complex projects as the Maasvlakte2 extension or the Melbourne Channel Deepening, it will definitely bring the client added value to consult early with contractors. For complex, mega infrastructure projects, such as large reclamation works, port expansion and new port development, ECI offers benefits that traditional procurement systems do not.

For you as a client these kind of projects are a once in a lifetime event, for my members these are daily bread-and-butter activities. And with all respect for consultants, they are not the real dredging experts. They lack the many years of experience that my members have. Contractors are the experts and when brought in early you can benefit from their technical knowhow and innovative ideas. The contractor’s knowledge will also help develop more realistic and reliable operating schedules and cost estimates for a project. Of course, I know I am biased, but please ask your colleagues from the port of Rotterdam and Melbourne and maybe there are more with ECI experience. They have experienced ECI and partnering firsthand.

The use of predictive models might support you in taking appropriate measures to prevent unwanted situations. Visiting the technical conferences of CEDA, WEDA or PIANC a lot of models are presented and working with the correct parameters they can be of great support. Unfortunately I have to emphasize the importance of correct parameters. When we look at turbidity, it is expressed in NTU. 29 NTU is probably a well-known standard. Does anybody know the origin of this standard? In 1967 it was set as standard for a project at the American East coast. It was the result of negotiations between fishermen and dredgers, not of actual research. A few years after, it was used in a project at the US west coast. Just copy-paste. Nowadays it is codified into US-law. When US consultants are involved in projects they use one standard 29 NTU, no matter what the specific local circumstance are. What about using meaningful parameters?

One new solution is Building with Nature and as I said before I like to go into more detail on the Building with Nature concept. Building with Nature is initiated by the dredging contractors as a counter movement against all these so-called hard maritime infrastructure. It is an innovative, long-term research programme supported by the Dutch dredging contractors, consultants, research institutes, universities.

Using the “Building with Nature” principles, maritime infrastructure is planned, designed and operated, while at the same time creating opportunities for the preservation of nature and utilising natural forces whenever possible by taking nature into consideration from the very early start of a project. Building with Nature wants to develop new design concepts for sustainable dredging projects. It is aimed at the synergy and cooperation that will allow natural ecosystems and human inter-
vention to reinforce each other. As this is a long-term research programme one does not have to wait for the first results to adopt the approach. Even today you can take the natural environment as a starting point for project development and assessment.

The Dutch initiative has a Belgium equivalent with the Flanders Bays. This is an initiative of the two Belgium contractors Jan de Nul and DEME, working on extensive sustainable coastline protection for the vulnerable, receding coasts of Belgium. In the meantime PIANC has developed its Working with Nature concept. This concept is in its core very much the same as Building with Nature. However, Working with Nature is only a philosophy. It outlines a theoretical way of approaching maritime infrastructure projects. But where Working with Nature is only a concept, Building with Nature extends the concept with research and practical applications and a rather impressive budget of € 30 million over the period 2008 until 2012.

Building with Nature essentially operates within the triangle “science—technology—society” which are pictured here in a blue field representing water. These three components are in a continual state of interaction:

- Natural sciences are needed to understand how the ecosystem (physical and biological) functions and the social sciences are needed to understand how public decision-making functions and what drives its participants.

- Technology is needed to realise things smoothly, efficiently and effectively.

- Society is the platform for setting standards and for decision-making and is the ultimate stakeholder of all activities.

Water (surface water, groundwater; fresh, saline), sediment (granular, fines), nutrients and pollutants, and flora and fauna are important elements in Building with Nature projects. They may all be impacted by a project, but since they all respond with a certain time delay, they all require a degree of management during as well as after an intervention. I will return on this later on.

Here, the first results of the Building with Nature programme can be seen. BwN Research projects are located all over the world, but my two examples are nearby my home, in The Netherlands. In the Eastern Scheldt, the south-west of The Netherlands, a continuous net erosion of the intertidal area is taking place. This is a result of the morphological disequilibrium caused by the construction of the Eastern Scheldt storm surge barrier and the compartmentalization dams in the 1980s. In this BwN pilot study, oyster reefs are planted in an attempt to stabilize the eroding areas. As a secondary effect the reefs may add to biodiversity and ecological functioning of the area. Shellfish reefs can stabilize eroding (intertidal) coastal areas. They protect the sediment on the flats from direct erosion by currents and waves.
Additionally sediment is trapped between the shells. Finally the reefs enhance roughness thus influencing flow and wave action. This in turn influences sedimentation, consolidation and stabilization processes. Besides these stabilising effects the reefs contribute to a healthier ecological system functioning.

Well, now you have heard about some of the green characteristics of the dredging industry. I hope you agree that we are a green industry, and are striving to be greener and greener in the future.

Our goal is to make the planet better, to confront the economic reality that dredging is extremely necessary in our society but can be successfully executed in a sustainable way, with attention to the environment. Our operations are getting greener and our equipment is getting greener. We believe that Greener Dredging is happening all the time … and hopefully your perceptions are beginning to converge with ours.

Thank you for your attention.

The second example is the sand engine Delfland in front of the Dutch shoreline. This pilot project was initiated to assess the feasibility of mega-nourishments as an innovative measure to create long term safety conditions in combination with extra space for nature and recreation.

A surplus of sand (order 20 million m3) is put into the natural system and is expected to be re-distributed along the shore and into the dunes, through the continuous natural action of the waves, tides and wind.

In this way mega-nourishments gradually induce dune formation along a larger stretch of coastline over a period of one or more decades, thus contributing to the preservation and increase of safety against flooding over a longer period. And limiting or eliminating the need for sand replenishment annually.

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