“Dredging in Figures” is an annual review of the global dredging market. The edition focuses on the global dredging industry in 2015. IADC aims to be thorough and precise in the figures presented in this document. The data of the closed markets could not be verified in its entirety and thus, the information has been restricted to the open markets. The statistics provided here are based on information from public sources as well as from IADC member companies.

MARITIME SOLUTIONS FOR A CHANGING WORLD
More than six years since the world economy emerged from its deepest recession, there is a fluctuating improvement of economies across the globe. Data from the International Monetary Fund (IMF) stated that the global economic growth in 2015 was 3.1%.

Advanced economies experienced falling unemployment but recovery was modest. Emerging markets and developing economies as a whole had a fifth consecutive year of declining growth. According to the IMF, the sources of slower growth in emerging markets and developing countries were diverse such as commodity and oil price declines (which were also affecting a few advanced economies adversely), to overhangs from past rapid credit growth and political turmoil.

Despite the slow growth and fluctuations in the world’s economy, the dredging industry’s turnover in 2015 (excluding the closed markets) increased to €7.115 billion compared to €6.415 billion in 2014 – mainly as a result of the sizable Suez Canal expansion project (€1.1 billion).

This paper highlights essential information about the dredging industry, which is divided into three sections – Corporate Social Responsibility (CSR) that includes sustainability, emissions, safety; the drivers of the dredging industry; and the turnover in the open markets of the industry.

CORPORATE SOCIAL RESPONSIBILITY
Through CSR activities companies aim to assume responsibility for their actions and toward the environment, consumers, employees, communities and stakeholders in general. The CSR efforts of the major dredging companies include programmes for sustainability, community involvement, fuel emissions reductions, in-house safety programmes and extended education for employees.

SUSTAINABILITY
Sustainable development forms a main part of the CSR strategies of the major dredging companies. These companies take sustainability seriously – sustainable projects and dredging sustainably form a part of their CSR strategies.

These organisations have put in place plans to achieve their sustainability goals. For a sustainable environment, contractors are testing biofuels, utilising biodegradable lubricants, reducing carbon emissions and have vessel recycling policies for controlled and monitored ship dismantling.

The industry is also disseminating information on the effects of dredging (positive or negative) in project areas. This is where the concept of the ecosystem services (ES) comes in. The concept has been around for decades but over the past few years it has been drawing more attention. It can be used to enable efficient implementation and realisation of sustainable dredging and marine infrastructure works in environmentally sensitive areas. The concept can also serve as an important tool for integral evaluation of project effects whether positive or negative and thereby achieve broad public support. IADC recognises the importance of the ES concept and how it can bring about the overall acceptance of projects (“Ecosystem services: Towards integrated marine infrastructure project optimisation”).
EMISSIONS

The dredging industry is committed to reducing CO₂ emissions, especially since most of their carbon footprint is a result of fuel consumption during dredging works. These companies are measuring their energy consumption and are committed to fuel reduction by testing alternative fuels like LNG and biofuels for instance. Ultimately, fuel consumption reduction can contribute to cost efficiency for the contractors.

For more information about emissions reduction, one can refer to the European Dredging Association’s (EuDA) emissions overview and its 2009 position paper on emission reduction of greenhouse gases (GHG), especially CO₂ by the European dredging sector.

SAFETY

Safety has one of the highest priorities in the dredging industries as good safety procedures and safety awareness protect staff and crew during their work. Furthermore, companies are most efficient when daily operations run smoothly without incidents.

Major dredging companies are in compliance with international and industry expressed regulations found in various ISO certificates. Most companies have in-house safety training programmes for staff and crew. Safety is highlighted as an essential priority for everyone. A next step in the safety programmes of contractors is actively cultivating a safety culture whereby employees are consciously aware of safety at all times and at places where they work.

IADC plays a major role in promoting safety within the industry. It set up the Safety Committee to enable the sharing of best practices amongst its members and active communication thereof. Moreover, IADC established a Safety Charter and its members are committed to creating a safe and healthy working environment for their employees and comply with all applicable safety and health laws as well as relevant regulations and codes of practice where they operate. IADC members are dedicated to keeping risks to its personnel, equipment and the environment at a level as low as reasonably possible.

The Association has started an initiative for the IADC Safety Award. The award was established with several aims: to encourage the development of safety skills on the job; and to reward people and companies who make it possible to work safer. In addition, the award is aimed at rewarding those who demonstrate special diligence in safety awareness in performing their profession.

IADC is publishing safety articles in its dredging journal, Terra et Aqua in order to disseminate information about safety within the industry.

In addition, IADC keeps track of the improvement of safety standards and the number of lost time injuries within its member companies, which shows a continuous reduction year on year.
WHAT DRIVES DREDGING?
There are six drivers of the dredging industry: world trade, population growth (demographics and urbanisation), coastal protection, growing demands for energy, water-related tourism, and environment.

WORLD TRADE
World trade has grown over the years and statistics show that goods are mainly transported via sea. The World Trade Organization estimates that the value of all global trade is US$16.5 trillion and almost 85% of the volume is transported over sea (Clarksons Research, 2016). World trade is a major driver for the dredging industry. Ports are needed to handle goods from seaborne trade and with growing trade, port development needs to be undertaken. These ports need to be maintained to work at optimal levels and dredging companies carry out this maintenance work.

The United Nations Conference on Trade and Development (UNCTAD) estimates that world seaborne trade volumes exceeded 10 billion tonnes in 2015. This is a 2.1% increase from 2014 when world seaborne trade amounted to 9.84 billion tonnes. Developing nations accounted for a large part of the trade volume in 2015 – approximately 60% at ports worldwide.

With seaborne trade accounting for the bulk of world trade, the expansion of existing ports and construction of new ports and waterways cannot be underestimated. The Suez Canal expansion was the largest project at the Canal since its construction. A new shipping lane was created to double the waterway’s capacity. The Panama Canal expansion project began in 2007 and will be completed in 2016.

According to the Organisation for Economic Co-operation and Development (OECD), numerous ports across the globe need to improve their capacities in order to handle future trade growth as well as increasing container ship sizes.

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**CONTAINER TRAFFIC (BY SEA) AND PLANNED CAPACITY BY 2030**

<table>
<thead>
<tr>
<th>Region</th>
<th>Traffic 2012</th>
<th>Traffic 2015</th>
<th>Traffic 2020</th>
<th>Estimated or 2030</th>
<th>Planned or 2030</th>
<th>Traffic capacity 2030</th>
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</thead>
<tbody>
<tr>
<td>Greater China</td>
<td>130.6</td>
<td>230.2</td>
<td>404.1</td>
<td>284.1</td>
<td>365.8</td>
<td>25.8</td>
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<td>Southeast Asia</td>
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<td>231.0</td>
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<td>305.0</td>
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<td>97.5</td>
<td>186.9</td>
<td>257.5</td>
<td>265.1</td>
<td>270.1</td>
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<td>48.0</td>
<td>68.2</td>
<td>146.2</td>
<td>107.0</td>
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<td>41.7</td>
<td>14.4</td>
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<td>55.2</td>
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<td>18.7</td>
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<td>8.2</td>
<td>16.0</td>
<td>48.2</td>
<td>13.0</td>
<td>31.9</td>
<td>10.7</td>
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<td>19.2</td>
<td>28.2</td>
<td>54.2</td>
<td>28.1</td>
<td>54.3</td>
<td>9.2</td>
</tr>
<tr>
<td>East Mediterranean &amp; Black Sea</td>
<td>14.0</td>
<td>23.6</td>
<td>53.7</td>
<td>27.3</td>
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<td>40.5</td>
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<td>50.5</td>
<td>33.0</td>
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<td>8.0</td>
<td>15.6</td>
<td>7.6</td>
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<td>36.3</td>
<td>17.1</td>
<td>23.9</td>
<td>7.7</td>
</tr>
<tr>
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<td>29.2</td>
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<td>26.1</td>
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<td>18.0</td>
<td>36.6</td>
<td>28.5</td>
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<td>15.6</td>
<td>6.3</td>
<td>15.4</td>
<td>15.4</td>
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<tr>
<td>North Africa</td>
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<td>57.0</td>
<td>13.2</td>
<td>47.4</td>
<td>22.3</td>
</tr>
<tr>
<td>West Coast South America</td>
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<td>19.2</td>
<td>48.0</td>
<td>14.6</td>
<td>27.8</td>
<td>18.6</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td><strong>363.0</strong></td>
<td><strong>613.2</strong></td>
<td><strong>1172.5</strong></td>
<td><strong>558.6</strong></td>
<td><strong>794.8</strong></td>
<td><strong>445.6</strong></td>
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</tbody>
</table>

Container traffic by sea and estimated ship capacity is expected to grow from 2013-2030.
(Source: Capacity toGrow, OECD)
DEMOGRAPHICS AND URBAN DEVELOPMENT

Population growth pressure on countries has increased the need for land reclamation. Land reclamation is a driver for the dredging industry as contractors regularly work on land reclamation projects across the globe, building new land to existing urban areas or islands near the coast.

The world population is steadily growing and according to the UN Department of Economic and Social Affairs (UN DESA), the figures are expected to grow for decades to come. In July 2015, the world population reached 7.3 billion. The world has added one billion people since 2003 and two billion since 1990. UN DESA predicts that that world population will be between 8.4 and 8.6 billion in 2030, between 9.4 and 10 billion in 2050 and between 10 and 12.5 billion in 2100.

As population grows, it is evident that there is a steady increase in urbanisation of countries across the globe. According to “The World’s Cities in 2016” report from the UN, currently an estimated 54.5% of the world’s population is living in urban settlements. The UN predicts that by 2030, urban areas are projected to house 60% of people globally and one of every three people will live in cities with at least half a million inhabitants. Currently, 23% of the world’s population (1.7 billion people) live in a city with at least 1 million inhabitants and this is projected to increase to 27% by 2030. City sizes are also expected to grow including megacities that have more than 10 million inhabitants. Currently, there are 31 megacities across the world and this number is projected to rise to 41 by 2030 (see figures). With such an increase in growth of the population living in cities, there is and will be scarcity of land and reclamation is one way to add space to the cities.

Furthermore, as depicted in the figures, most of the urban cities are located along coastlines across the world which are flood risk areas.
COASTAL PROTECTION

In numerous countries across the globe, beach nourishment is a regular activity that helps maintain coastal integrity. Dredging companies undertake such beach nourishment and coastal protection projects. Climate change has led to more extreme weather conditions as well as sea-level rise which directly impacts cities and areas that are located near coasts. Thus, the need for coastal and inland protection against flooding has increased over the years.

According to the OECD, flooding affects approximately 250 million people around the world each year. In many countries, a substantial portion of their populations live in areas prone to flooding – 49% of Japan’s population is located in former river and coastal flood plains; two-thirds of the population of the Netherlands lives in flood prone areas and mega cities such as Ho Chih Minh City, Jakarta and Manila have been affected by flooding repeatedly.

Annual average damages from floods reported by the international disasters database (EM-DAT) have increased over the decades – from less than US$4 billion per year between 1971-1980 to over US$40 billion per year between 2011 and 2015 (see figure). As such, coastal cities need to improve their flood management including better coastal defences.

Dredging contractors are working on coastal defense projects across the world. Over the course of the last decades they gained a lot of experience and specialist knowledge, which is applied in innovative solutions for coastal works.
ENERGY

The energy sector is a driver for the dredging industry especially fossil fuels such as oil and gas. The oil and gas sector is exploiting resources offshore and in remote regions and dredging is often required for such projects. The dredging activities regularly include trenching and backfilling trenches as well as seabed preparation for offshore installation purposes.

According to the “BP 2016 Energy Outlook” report, population and increase in income are driving the need for more energy. The report also states that fossil fuels remain the major source of energy across the world and gas looks set to become the fastest growing fossil fuel. Data from “BP Statistical Review of World Energy 2016” noted that global primary energy consumption increased by just 1.0% in 2015, similar to the below-average growth recorded in 2014 (+1.1%). Energy consumption growth was below the 10-year average for all regions except Europe and Eurasia; emerging economies accounted for 97% of the increase in global consumption.

Prices for all fossil fuels fell in 2015 for all regions and crude oil prices recorded the largest decline on record in dollar terms, and the largest percentage decline since 1986. In fact, 2015 suffered a sharp drop in the price of crude oil per barrel, US$52.39 (Brent, the international crude oil benchmark) compared to US$98.95 a year before. The drop in oil prices has had an impact on the oil and gas industry with projects being delayed. This in turn has had an impact on the dredging industry.

Offshore wind energy is a driver for the dredging industry as contractors execute seabed preparation for the foundations of wind turbines. According to IEA, investment on renewables remained steady and renewable power investment in the European Union reached US$55 billion in 2015. Wind energy accounted for a significant portion of this investment.
Tourism along coastlines and beaches is growing and cruise ships and yacht harbours also attract tourists. Though beach tourism does attract a lot of people, the beaches are prone to erosion. As such, dredging contractors execute beach replenishment work on a regular basis.
The total turnover of dredging contractors in the open markets was estimated at €7.115 billion for 2015. This is an increase of 11% compared to the €6.415 billion turnover for 2014. However, a major part of the 2015 turnover was realised on the Suez Canal project (€1.1 billion). This was an extraordinary project that was executed in an extremely short period and influenced the general picture of the industry. Without the Suez Canal Project the global turnover in the open markets would have been €6 billion, a decrease of 6% compared to 2014.

IADC aims for a level playing field, nevertheless an important part of the global dredging market is not open for international competition. Examples of closed markets are China and the United States. IADC will not publish information about these markets as long as data cannot be verified. The turnover of projects that were not available for international tendering in the open markets was also excluded from the €7.115 billion.
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DEFINITIONS AND METHODOLOGY
This review relates to the annual global dredging turnover estimated for 2015. “Carried out in 2015” therefore does not necessarily mean “contract awarded in 2015”, nor that payment was received in 2015. It only reflects work that was actually performed in 2015. For projects only partially performed in 2015 (e.g., a project started on 1-6-2014 and finalised on 30-6-2015), the value of the part actually executed in 2015 has been attributed.

Dredging projects in inland waterways – as far as known – are excluded in the survey as is rock installation through flexible fall pipe vessels (FFPV) and side-stone dumpers. Specific land-based “dry” engineering works are also excluded. Stone protection works for quay walls and coastal protection is included as well as environmental measures and remedial dredging.

TYPES OF PROJECTS

Trade:
- harbour extensions (excluding offshore crude oil terminals and LNG terminals [see Energy] and excluding marinas and cruise terminals [see Tourism])
- navigation channels and turn basins
- maintenance dredging

Coastal defence:
- beach nourishment and replenishment
- dike building/raising and flood defence works (excluding civil works)
- coastal protection, river training and other shore protection measures

Urban development:
- land reclamation for, e.g.:
  - industrial infrastructure port, industrial, trade and service, recreational, transport infrastructure and for urban development (coastal expansion)
  - trade and service infrastructure (trade fairs, business parks, conference centres)
  - transport infrastructure (airports, roads, parking facilities, rail projects)
  - residential real estate (housing driven by demographic pressure)
- dredging trenches for immersed tunnels, dams
- outfalls and landfalls
- marine storage basins for contaminated dredged materials

Energy:
- dredging for offshore crude oil terminals and LNG terminals
- trenching and backfilling for sub-marine cables and pipelines
- (pre)dredging related to oil drilling facilities such as production platforms
- other offshore installations (seabed preparation for the installation of gravity-based structures for wind farms)

Tourism:
- land reclamation for recreation sites such recreation piers/wharfs, shopping malls) and marinas and cruise terminals, land reclamation for hotels, holiday resorts
- beach restoration and replenishment
REGIONS
Africa:
Continent from North Africa Coast, Atlantic Coast and Indian Coast up to and including Suez Canal, Madagascar, La Reunion, Mauritius, Seychelles, Canary Islands, Cape Verde.

North America:
Canada, USA (closed market) including Hawaii.

Latin America:
From Mexico southwards, including Caribbean States.

Europe:
Europe, Turkey, Coast of Black Sea, Western Russia (west of river Ob).

Middle East:
Near East south of Turkey, Georgia, Armenia, Azerbaijan, including Israel, Arabian Peninsula, Persian Gulf and Iran.

Indian Subcontinent:
India, Bangladesh, Sri Lanka, Maldives, Pakistan.

Asia:
Including Eastern Russia (east of river Ob), South East Asia, Far East, including Taiwan, excluding China.

China (closed market):
PR of China including Hong Kong and Macao.

Oceania:
Australia, New Zealand and Pacific Islands.

METHODOLOGY
“Dredging in Figures” has been carefully compiled by a Delphi survey amongst IADC members, analyses of company reports and other (public) sources. All information has been verified to the best of IADC’s ability. IADC and its members cannot be held for any inaccuracies. The review does not necessarily reflect the opinions of the individual IADC members.

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The International Association of Dredging Companies (IADC) is the global umbrella organisation for contractors in the private dredging industry. As such, the IADC is dedicated to promoting not only the skills, integrity and reliability of its members, but also the dredging industry in general. The information presented here is part of an on-going effort to communicate with clients, stakeholders and other concerned parties about the fundamental importance of dredging and maritime construction.