



# DREDGING IN FIGURES 2017



INTERNATIONAL ASSOCIATION OF DREDGING COMPANIES



# DREDGING IN FIGURES 2017



IADC presents the 2017 edition of *Dredging in Figures*, an annual review of the global dredging market including the international dredging industry's revenue.

The facts and figures provided in this document are based on information provided by public sources as well as IADC's member companies. To ensure precision, IADC only represents information about the dredging industry's activities in open markets since data resulting from closed markets cannot be verified.

## GLOBAL GROWTH KEEPS GROWING

The dredging industry's performance is influenced by worldwide economic trends. According to the International Monetary Fund (IMF), global growth strengthened by 3.8 per cent in 2017, making it the eighth year of continued economic growth since the end of the Great Recession in 2010.

On the heels of two years of weak growth, global trade volume reached 6.4 per cent in 2017, driven primarily by emerging market and developing economies, increased domestic demand, and investment recovery in advanced economies. The United Nations World Trade Organization reports international tourism grew by 7% and showed strong demand in all global regions, benefitting from indispensable incomes.

As an indicator of economic conditions, crude oil prices struck an annual average of US\$54.25 per barrel, falling short of 2014's highest average price of US\$99 per barrel and more than double 2001's average of US\$24.45 per barrel.

This fundamental overview of the year's performance as a whole forms the basis for *Dredging in Figures 2017*. Key topics and information related to the dredging industry's state are highlighted in this report including the areas of sustainability, emissions and safety; the dredging industry's drivers of demographics and urban development, coastal protection, energy, tourism; and the turnover in the open markets.

## SUSTAINABILITY

Sustainable development is a major concern for dredging companies. Environmental issues are given priority within projects and dredging activities which are carried out in compliance with a company's own environmental policies and goals as well as applicable legislation. Dredging companies aim to assume responsibility for their activities in regards to the environment as well as consumers, employees, communities and other stakeholders. In addition to sustainability, Corporate Social Responsibility (CSR) efforts of major dredging companies include programmes for community involvement, fuel emissions reductions, in-house safety programmes and extended education for employees.

Dredging contractors are putting the concept of ecosystem services (ES) into practice. The ES framework has existed for decades but has been implemented in activities and projects in recent years, contributing to the efficient implementation and realisation of sustainable dredging and marine infrastructure works in environmentally sensitive areas. The framework continues to serve as an important tool for the integral evaluation of a project's positive and negative impacts to aid in achieving broad public support. The industry regularly integrates diverse stakeholders in the early phases of a project's design as well as voluntarily circulating information to the public regarding both the positive and negative effects of dredging in areas where projects are being undertaken. In 2016, IADC produced and released the publication *Ecosystem services: Towards integrated marine infrastructure project optimisation*, recognising the concept's importance and its role in bringing an overall acceptance to dredging projects.

Also prevalent throughout the industry is the concept of Building with Nature. By incorporating natural components into the design of marine infrastructure, a flexible, adaptable and long-term solution will be achieved. With an additional aim of meeting societal needs, projects are often realised at lower costs on a life-cycle basis than 'traditional' engineering solutions.

## EMISSIONS

A majority of the dredging industry's carbon footprint results from fuel consumption during dredging works. The dredging industry is committed to reducing its CO<sub>2</sub>, SO<sub>x</sub> and NO<sub>x</sub> emissions. Companies monitor their energy consumption and are committed to reducing fuel usage. By reducing fuel consumption, cost efficiency is also improved, benefitting contractors and clients alike. Alternative fuels such as liquefied natural gas (LNG) and biofuels are being utilised in vessels as well as biodegradable lubricants. For further information about emissions legislation and their impact on the European dredging market, refer to the European Dredging Association's (EuDA) information paper from 2013 which focuses on ways to reduce SO<sub>x</sub> emissions into marine environments from dredging vessels.



## SAFETY

A dredging company can only perform at its best when daily operations occur without incident. Major dredging companies are in compliance with international and industry regulations as delineated in various ISO standards.

Contractors are actively cultivating and embracing a safety-oriented culture by increasing awareness and identifying processes and situations where employees may encounter risks. A majority of companies have created in-house safety training programmes and procedures for their workers which emphasise safety as the responsibility of each individual. Through continuous emphasis of safety procedures and awareness, employees and crew are protected on the job.

IADC plays an active role in promoting safety awareness within the industry. Through its Safety Committee, best practices are clearly and effectively communicated amongst its members. The committee created a 'Safety Charter' to demonstrate IADC's members are committed to ensuring a safe and healthy working environment for their employees as well as their compliance with all applicable safety and health laws, relevant regulations and codes of practice where they operate. IADC members are dedicated to eliminating risks to their personnel, equipment and the environment wherever possible and committed to stimulating a culture of safety awareness with continuous improvement.

An initiative of the Safety Committee, the IADC's annual Safety Award aims to encourage the further development of safety skills on the job and rewards people and companies which make it possible to work safer. The award promotes those who demonstrate special diligence in safety awareness in performing their profession. With more than thirty safety solutions submitted over the award's three year existence, IADC endorses the nominated and winning safety-oriented innovations through featured articles in its quarterly journal *Terra et Aqua*.

# DREDGING IN FIGURES 2017

## WHAT DRIVES DREDGING?

Six drivers are key to the dredging industry's progress. These drivers are world trade, demographics and urban development, coastal protection, energy, and tourism.

## WORLD TRADE

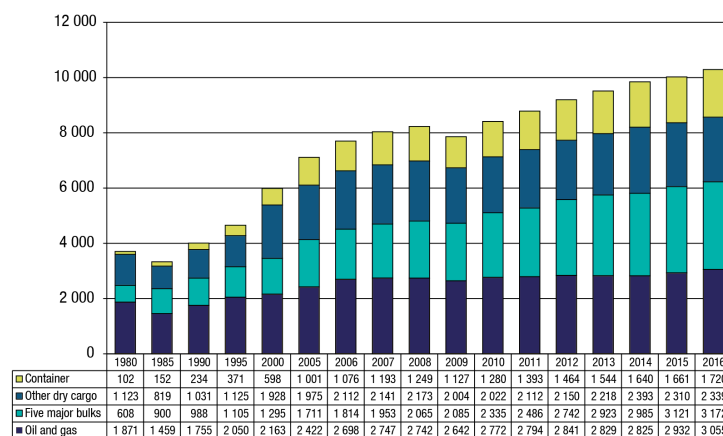
Water-borne trade is a major driver for the dredging industry. The transportation of goods is facilitated by accessible water routes and ports. With seaborne trade accounting for the bulk of world trade and largely determined by global economic developments, there is an omnipresent need to expand existing ports and maintain existing waterways as well as construct new ports and waterways. This work is carried out by dredging companies.

Maintenance and expansion of existing waterways and ports are necessary to accommodate the larger and larger vessels which are sailing through them and thus to ensure trading networks are in an optimal state. Dredging companies realise the development and maintenance of global ports and waterways.

Following two years of weak growth, the global trade volume surged to 6.4 per cent, a marked increase from 2016's figure of 2.2 per cent and the 4.7% average annual growth rate since 1980. Growth in 2017 was driven by emerging markets and developing economies, domestic demand, and investment recovery in advanced economies. There was continued strong growth in emerging Asia, a notable upswing in emerging Europe and signs of recovery in several commodity exporters.

According to the Organisation for Economic Co-operation and Development (OECD), a majority of ports across the globe still need to improve their capacities in order to handle future trade growth as well as growing container ship sizes. The completed infrastructure developments at both the Suez Canal and Panama Canal have facilitated the passage of mega-vessels, improving trade connectivity and access to suppliers and consumers. In combination with trade policy developments, population growth and urbanisation, these past and present initiatives have the potential

## INTERNATIONAL SEABORNE TRADE, SELECTED YEARS (MILLIONS OF TONS LOADED)



The breakdown of seaborne trade from 1980-2016; the graph shows an increase from 2015-2016.  
(Source: Review of Maritime Transport 2017, UNCTAD).

## CONTAINER TRAFFIC BY SEA AREA IN 2030 AND 2050 AND PLANNED CAPACITY 2030

Sea area	Traffic 2013 MTEU	Traffic 2030 MTEU	Traffic 2050 MTEU	Estimated capacity 2013 MTEU	Planned capacity 2030 MTEU	Traffic - capacity 2030 MTEU
Greater China	196.4	290.0	494.1	248.3	383.8	-93.8
Southeast Asia	88.0	231.0	520.3	124.4	277.3	-46.3
Western Europe	97.8	149.4	257.5	168.1	238.2	-88.8
North Asia	43.0	96.5	146.0	70.9	141.6	-45.1
East Coast North America	23.9	29.1	34.7	42.4	51.7	-22.6
West Coast North America	24.9	36.8	32.2	43.2	65.5	-28.7
East Africa	8.2	14.6	46.2	13.0	31.9	-17.3
South Asia	19.2	56.2	143.8	29.1	53.1	-3.1
East Mediterranean & Black Sea	16.8	23.6	50.7	27.5	65.1	-41.5
Middle East	36.7	50.0	108.4	50.9	137.6	-87.6
Gulf Coast North America	7.4	13.2	58.1	11.8	33.1	-19.9
Southern Africa	4.7	8.9	18.6	7.8	15.5	-6.6
Oceania	11.2	16.2	36.3	17.1	23.9	-7.7
Central America / Caribbean	19.6	20.2	58.5	29.5	75.4	-55.2
East Coast South America	13.2	14.3	28.8	19.0	35.0	-20.7
West Africa	5.4	12.8	36.6	8.8	40.9	-28.1
North Africa	9.8	23.3	87.0	13.2	47.4	-24.1
West Coast South America	7.9	9.2	19.3	14.0	27.8	-18.6
TOTAL	634.3	1095.2	2177.1	938.7	1744.9	-649.5

Container traffic by sea and estimated ship capacity is expected to grow from 2013-2030.  
(Source: ITF Transport Outlook 2017, OECD)

to collectively grow merchandise trade and overall seaborne trade volumes, generating opportunities for developing countries as both users and providers of maritime transport services.

## DEMOGRAPHICS AND URBAN DEVELOPMENT

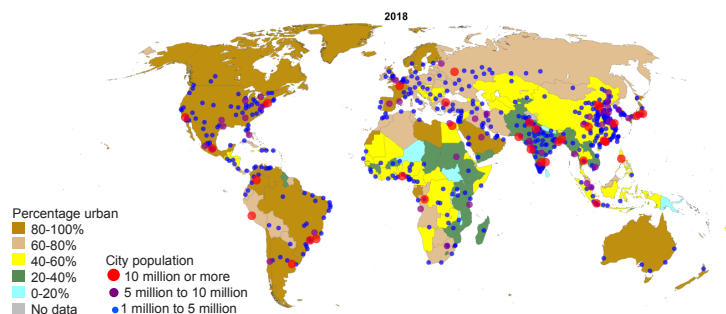
World population continues to grow steadily. In July 2017, world population reached 7.6 billion people according to the UN Department of Economic and Social Affairs (UN DESA). UN DESA's predictions set the upper limits of world population as 8.6 billion in 2030, 9.8 billion in 2050 and 11.2 billion in 2100. By 2050, half of the world's population growth is predicted to be concentrated in just a few countries including India, Nigeria, Pakistan, the United Republic of Tanzania, the United States of America and Indonesia.

To keep up with the projected increase in population, countries must continue to develop their urban areas. When population growth places pressure on countries with limited space to urbanise, the ability to expand their buildable land area can alleviate this problem. This need has made land reclamation a major driver for the dredging industry. Contractors regularly execute land reclamation projects around the world, broadening the boundaries of existing coastal areas or islands.

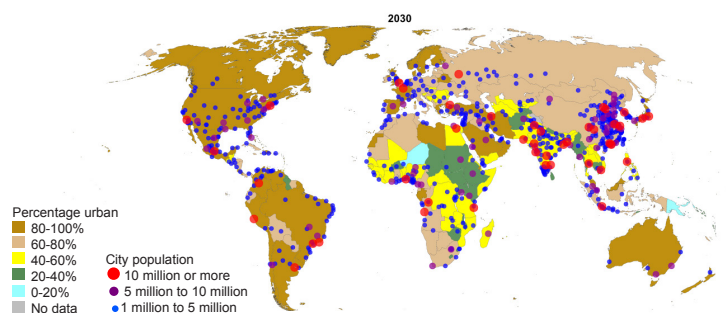
According to the World Bank, 55% of the global population now lives in urban areas, and this trend is expected to continue. By 2045, the number of people living in cities will increase to 6 billion, representing an additional 2 billion urban residents, and 68% of the world's population will be urban by 2050.

City sizes are projected to grow as well as the prevalence of the mega-city which has a population over 10 million inhabitants. There are 39 megacities across the world – with most of the urban cities in flood risk areas – and this total is projected to rise to 41 by 2030 (see figures). With such an increase in population growth occurring specifically in cities, the dilemma of land scarcity can be resolved with reclamation, adding space where it is needed, as most urban cities are located along coastlines across the world.

## WORLD URBAN POPULATION GROWTH IN CITIES: 2018 AND 2030



Urban populations across the globe in 2018.



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted lines represent approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed by the parties. Final boundary between the Republic of Sudan and the Republic of South Sudan has not yet been determined.

Estimated urban populations in 2030 with a great increase in the number of mega cities – cities with population of 10 million and more.  
(Source: *World Urbanization Prospects*, UN)



# DREDGING IN FIGURES 2017

## COASTAL PROTECTION

Many coastal countries must regularly maintain the integrity of their dynamic shorelines.

Dredging companies aid in the process by undertaking coastal protection projects and maintaining shorelines by means of beach nourishment. The side effects of climate change – more extreme weather events and rising sea levels – have a direct consequence for increasingly inhabited waterfront or low-lying cities and areas such as an elevated potential for flood risks, especially resulting from natural disasters. It is projected more than half of the world's population will reside within 100 kilometres of a coast by 2030.

For many countries, a majority of their inhabitants live in flood-prone areas with OECD approximating floods currently affect 250 million people around the world every year. For example, two-thirds of the Netherlands' inhabitants live in flood-prone areas and nearly half of Japan's population resides in former river and coastal flood plains. In Asia, the mega-cities of Ho Chi Minh City, Jakarta and Manila already suffer from subsidence and regular flooding events. Nearly half a billion urban residents live in coastal areas which are vulnerable to storm surges and sea level rise. Upgrades to coastal defences will contribute to the protection of these populations.

Since 1980, the United States experienced 212 events which individually generated damages amounting to over US\$1 billion (cost-adjusted to the 2017 Consumer Price Index) for a total of US\$1.2 trillion. In 2017, Hurricanes Harvey, Irma and Maria made landfall within one month of each other and each landed on the top five costliest storms since recording started.

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). Large flood events have clear financial and economic implications for government, business and households as well as indirect impacts of business interruption, employment losses and decreased tax revenues.

## ANNUAL AVERAGE DAMAGES FROM FLOOD EVENTS



Annual average damages from flood events have increased over the past four decades – 1971-2015.  
(Source: *Financial Management of Flood Risk*, OECD)

In the aftermath, agricultural output and tourism revenue may be reduced until recovery efforts are implemented.

A new study by Deltares indicates that extreme sea levels (ESL) will rise more than previously expected by 2100, exacerbated by increases in mean sea level rise as well as extreme weather events and natural disasters. Predictions for global average 100-year ESL show an increase of 34-76 cm under a moderate emission mitigation policy scenario and 58-172 cm under a business as usual scenario. Sea level rise leads to coastal erosion, inundations, storm floods, tidal waters encroachment into estuaries and river systems, contamination of freshwater reserves and food crops, loss of nesting beaches, as well as displacement of coastal lowlands and wetlands.

Without sufficient mitigation, the impacts on human populations could be significant. Over 600 million people – approximately 10 per cent of global population – live in coastal areas which are less than 10 meters above sea level. It is estimated that by 2100, 500 million people will be living in coastal areas which are less than five metres above sea level. Around 15 per cent of cities – most of which are situated near coastlines – are already at high risk of exposure to two or more types of natural disaster.

Coastal cities must respond to nature's call by improving their flood management capabilities through coastal protection strategies. Dredging

contractors have performed coastal protection projects across the world for decades, gaining experience and specialised knowledge in the sector, leading to innovative solutions for future works.

## ENERGY

The energy sector is a driver for the dredging industry due to the construction of offshore oil, gas and wind energy infrastructure. The oil and gas sector is exploiting resources offshore and in remote areas, often requiring dredging for the realisation of these projects. Dredging activities include trenching, backfilling trenches and seabed preparation for offshore installation purposes.

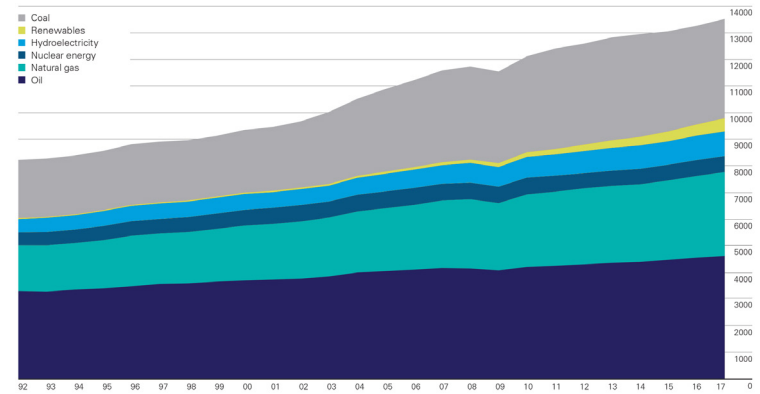
In 2017, global energy investment totalled US\$1.8 trillion, a 2% decline from the previous year according to the World Energy Investment 2018 report. More than US\$750 billion went to the electricity sector while US\$715 billion was spent on oil and gas supply globally. The share of fossil fuels in energy supply investment rose last year for the first time since 2014 as spending in oil and gas increased modestly. For the second consecutive year, investment in electricity generation and networks in 2017 was higher than investment in oil and gas supply, including upstream, midstream and downstream investments.

Offshore wind energy is a driver for the dredging industry as contractors execute seabed preparation for the foundations of wind turbines as well as the installation of the units. Larger turbines with an expected reduction in installation costs are making offshore wind a competitive alternative to land-based turbines and solar and nuclear power.

Cumulative offshore wind capacity had a record increase of 4,331 megawatts (MW) representing a 95% increase from 2016. As of the end of 2017, there were 18,814 MW of installed offshore wind capacity in 17 markets around the world. Of the global offshore wind capacity, 84% (15,780 MW) is located off the coasts of eleven European countries.

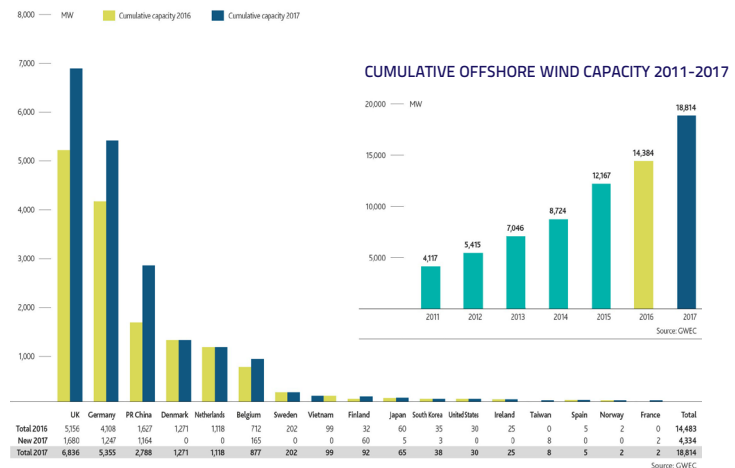
The UK is the world's largest offshore wind market, accounting for a little over 36% of

## GLOBAL CONSUMPTION FOR VARIOUS SOURCES OF ENERGY



(Source: BP Statistical Review of World Energy 2018, BP)

## GLOBAL CUMULATIVE OFFSHORE WIND CAPACITY IN 2017



A comparison of 2016 and 2017's global cumulative offshore wind capacity by country and cumulative offshore wind capacity from 2011 through 2017.  
(Source: Global Wind Energy Council).

installed capacity. Germany ranks in second with 28.5% and China follows with nearly 15%. Other key market players include Denmark with 6.8%, the Netherlands with 5.9%, Belgium with 4.7% and Sweden with 1.1%. Other countries in the market include Vietnam, Finland, Japan, South Korea, United States, Ireland, Taiwan, Spain, Norway and France.

# DREDGING IN FIGURES 2017

It was a record-breaking year for both onshore and offshore wind installations. The European Union added 3,154 MW to its power grid from offshore alone, representing 20% of the EU's annual installations and a doubling of 2016's figures. Falling unit costs are an ongoing factor impacting investment trends, prices and inter-fuel competition within the energy sector.

## TOURISM

Tourism has grown faster than world trade for the past five years and represents 7% of the world's exports in goods and services. According to the United Nations World Tourism Organization (UNWTO), international tourist arrivals increased by 7% in 2017. This marks the strongest upward trend in seven years as preceding years had sustained growth of 4%.

All global regions benefitted from a strong demand for international tourism, with advanced economies performing as well as emerging economies driving the upward trend. International tourist arrivals have increased from 25 million globally in 1950 to 278 million in 1980, 674 million in 2000, and 1,235 million in 2016. It was the seventh consecutive year of above average growth in international tourism since the start of the 2009 global economic crisis, and similar uninterrupted solid growth has not been recorded since the 1960s.

More than half of 2017's tourism – at 53% – were holidays for leisure and recreation. Beach-oriented tourism draws visitors to sandy shorelines which can then experience accelerated rates of erosion. As a result, dredging contractors are regularly tasked with beach replenishment projects.



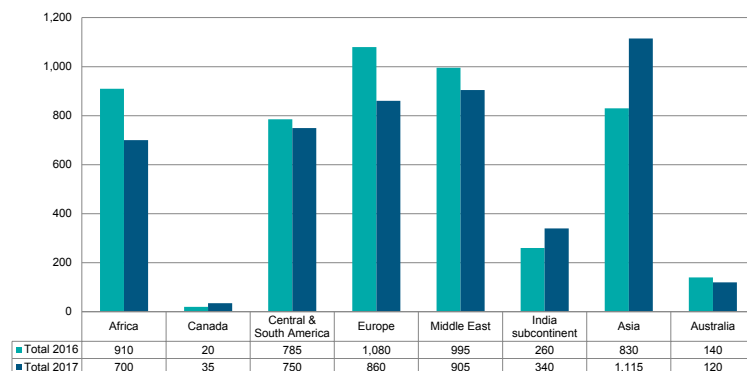


## ANNUAL INDUSTRY TURNOVER

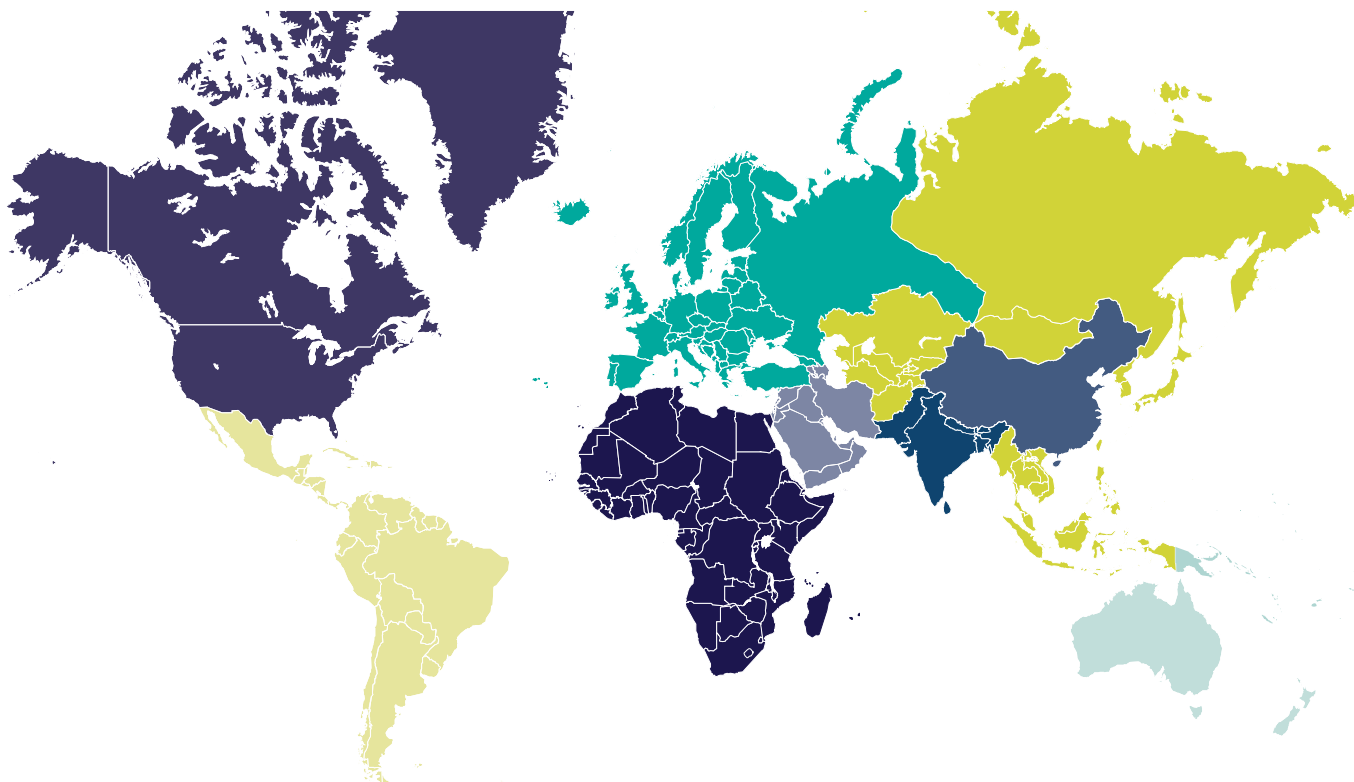
As the world's economy demonstrated solid growth, the dredging industry's total turnover – excluding closed markets – in 2017 was estimated at €4.8 billion (US\$5.55 billion). In terms of trade-related development, new infrastructure projects constituted 36% of this year's turnover with a majority of works realised in Africa, Asia and the Middle East. Maintenance of existing infrastructure constituted 13% of turnover, with a large share taking place in Asia, Europe, and Central and South Americas. The total annual turnover from 2017 marks a 5% fluctuation from 2016's turnover figure of €5.02 billion (US\$5.81 billion). As the dredging industry's nature is cyclical, this annual turnover does not fully reflect the global economy's recovery and growth.

The turnover figures in this report exclude turnover from projects which were not available for international tendering in open markets. The IADC will not publish revenue information resulting from competition in closed markets – such as China and the United States – as the data cannot be verified and therefore does not benefit the global dredging market as a whole.

## ANNUAL TURNOVER FROM 2016 AND 2017 IN € MLN



A comparison of annual turnover from 2016 and 2017 according to geographical area.  
(Source: IADC member companies)



# DREDGING IN FIGURES 2017

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## DEFINITIONS AND METHODOLOGY

This review relates to the annual global dredging turnover estimated for 2017. 'Carried out in 2017' therefore does not necessarily mean 'contract awarded in 2017', nor that payment was received in 2017. It only reflects work that was actually performed in 2017. For projects only partially performed in 2017 (e.g., a project started on 1-6-2016 and finalised on 30-6-2017), the value of the part actually executed in 2017 has been attributed. Dredging projects in inland waterways are excluded from the survey as well as 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 are 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 as recreation piers/wharfs, shopping malls) and marinas and cruise terminals, land reclamation for hotels, holiday resorts
- beach restoration and replenishment



# DREDGING IN FIGURES 2017

## 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 accountable 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.*



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