



INTERNATIONAL ASSOCIATION OF DREDGING COMPANIES

DREDGING IN FIGURES 2022

AN ANNUAL REVIEW OF THE GLOBAL DREDGING MARKET



DREDGING IN FIGURES 2022

Compiled and published by the International Association of Dredging Companies (IADC), Dredging in Figures presents an annual overview of the global dredging industry's performance in 2022 as well as insights into its key performance indicators. This report enables individuals and organisations participating in the dredging industry as well as its related sectors to assess the state of the dredging industry amid a backdrop of the performance of the industry's essential drivers and operations.

All facts, figures and information contained in this report are sourced from reputable international resources and IADC's member companies. IADC only conveys information about the dredging activities conducted in open markets as data from closed markets cannot be verified and is standard practice for every publication released by the organisation.

This report begins with a general overview of the preceding year's economic situation as this indirectly impacted each of the industry's performance indicators. The most recent standpoints regarding the dredging industry's priorities in the areas of corporate social responsibility (CSR), sustainability – such as initiatives to reduce environmental impact and emissions – and safety are then described, followed by the key drivers of dredging activities that continue to be world trade, population growth and urban development, climate change and coastal protection, energy and tourism. The dredging industry's cumulative turnover generated by work performed in the open market concludes this document.



GLOBAL ECONOMIC CONDITIONS

ENERGY TRILEMMA

Just as the world emerged from the huge impact on energy demand caused by the global pandemic, 2022 witnessed energy markets again in crisis, as Russia's invasion of Ukraine upended assumptions about supply and sent out ripples around the world. That in turn precipitated a price crisis and profound cost-of-living pressures across many economies.

It's likely that the conflict will have a persistent effect on the future path of the global energy system, increasing the focus on energy security, weakening economic growth and changing the mix of energy supplies.

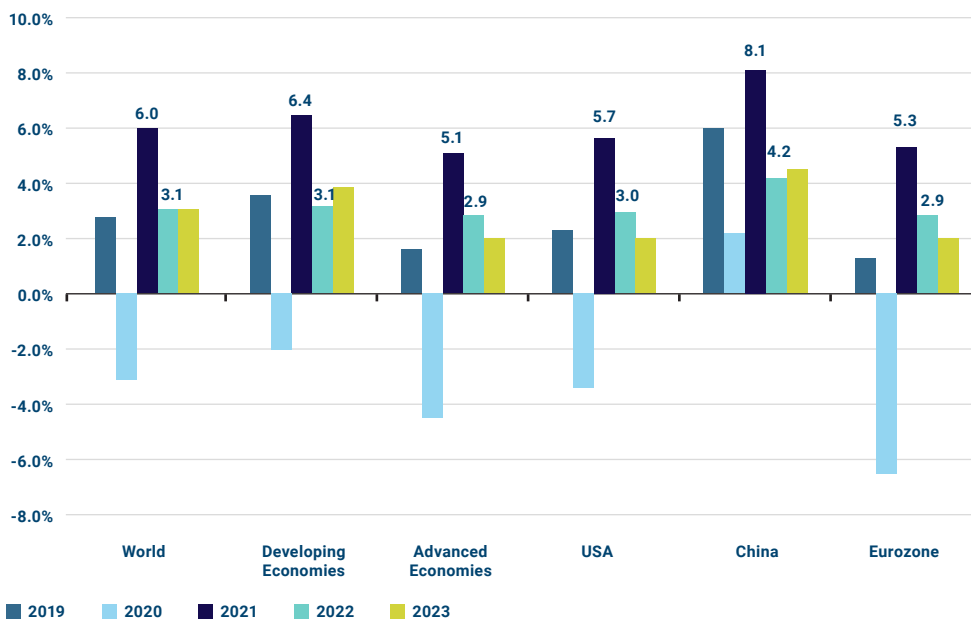
The events of the past year served as a reminder that the energy transition also needs to take account of the security and affordability of energy. Together these three dimensions of the energy system – security, affordability, and sustainability – make up the energy trilemma.

Many countries are looking to boost their energy security by reducing their dependency on imported (fossil fuel) energy. Having access to more domestically produced energy, much of which is likely to come from renewables and other non-fossil energy sources, means that the war is likely to accelerate the pace of the energy transition.

Economic damage from the conflict contributed to a significant slowdown in global growth in 2022 and added to inflation. Curtailment of Russian supplies to Europe precipitated record international gas prices in Europe and Asia, and unprecedented shifts in global oil and gas trade flows. In addition to the cost of fuel, food prices increased rapidly. According to the International Monetary Fund (IMF) Global growth is projected to fall from an estimated 3.5 percent in 2022 to 3.0 percent in both 2023 and 2024.

FIGURE 1

GLOBAL REAL GDP INDEX, BASELINE AND ALTERNATIVE SCENARIOS: 2019-2023



Source: Euromonitor International Macro Model.

LARGEST EVER INCREASE IN WIND AND SOLAR NEW BUILD CAPACITY

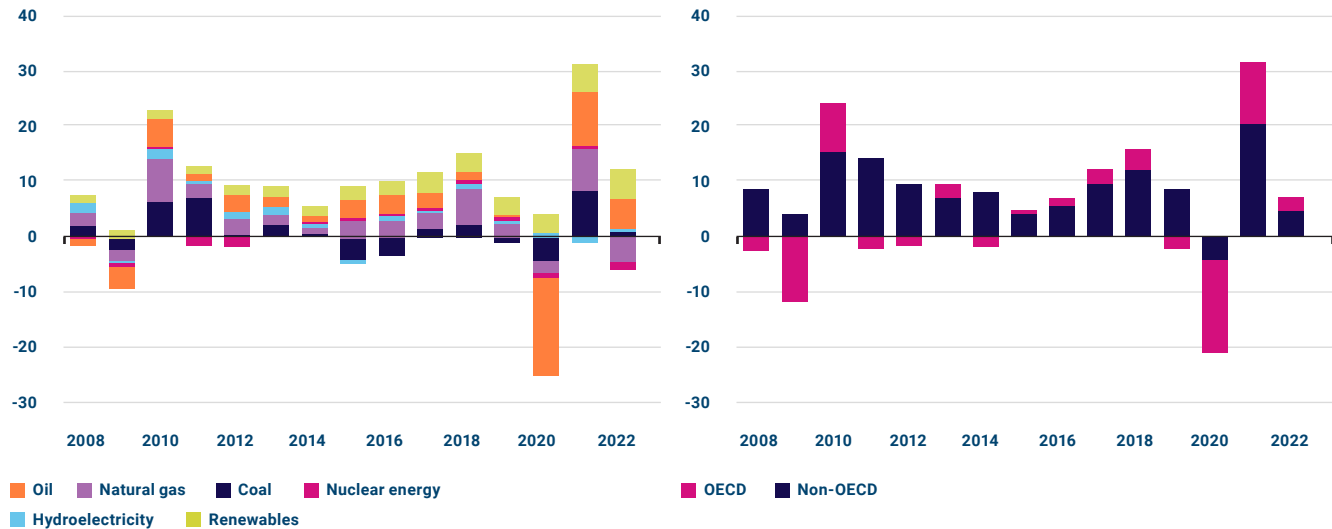
Primary energy consumption grew by around 1% in 2022, taking it to nearly 3% above the 2019 pre-COVID level. Consumption increased in all regions apart from Europe (-3.8%) and Commonwealth of Independent States (CIS) (-5.8%). The dominance of fossil fuels was largely unchanged at almost 82% of total consumption.

According to the International Energy Agency’s (IEA) CO₂ Emissions in 2022 report, global energy-related CO₂ emissions grew by 0.9% in 2022, reaching a record high of over 36.8 gigatonnes of equivalent carbon dioxide. Following two years of exceptional oscillations in energy use and emissions, caused in part by the COVID-19 pandemic, last year’s growth was much slower than 2021’s rebound of more than 6%. In a year marked by energy price shocks, rising inflation and disruptions to traditional fuel trade flows, this figure was lower than expected, despite gas-to-coal switching in many countries (IEA).

Increased deployment of clean energy technologies, such as renewables, electric vehicles and heat pumps helped prevent an additional 550 metric tonnes of equivalent carbon dioxide in CO₂ emissions. Industrial production curtailment, particularly in China and Europe, also averted additional emissions.

The Energy Institute Statistical Review of World Energy 2023 revealed the strong pace of deployment of renewables in the power sector continued, driven by solar and wind. 2022 saw the largest ever increase in wind and solar new build capacity. Together they reached a record 12% share of power generation, with solar up 25% and wind up 13.5%.

FIGURE 2
CHANGE OF PRIMARY ENERGY DEMAND BY REGION AND BY FUEL IN 2021 RELATIVE TO 2019



Source: Energy Institute Statistical Review of World Energy 2023.

SUSTAINABILITY

The Paris Agreement, the international treaty on climate change, was adopted by 196 Parties at COP21 in Paris on 12 December 2015 and entered into force on 4 November 2016. The signatory countries agreed to work together to limit global warming to well below 2 degrees Celsius and aim for 1.5 degrees Celsius, to adapt to the impacts of a changing climate and to make funds available to deliver on these aims.

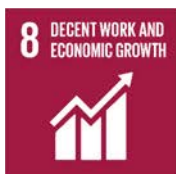
On 13 November 2021, COP26 concluded in Glasgow with all countries agreeing the Glasgow Climate Pact to keep aiming for 1.5C and finalise the outstanding elements of the Paris Agreement. Climate negotiators ended two weeks of intense talks with consensus on urgently accelerating climate action. The Glasgow Climate Pact, combined with increased ambition and action from countries, means that 1.5C remains in sight and scales up action on dealing with climate impacts, but it will only be delivered with concerted and immediate global efforts.

The GWEC Global Wind Report 2023 reported that 2022 was the third best year ever for new capacity with 78 GW added globally. The total installed global capacity grew to 906 GW, which represents year-on-year growth of 9% compared with 2021.

Stakeholders are ever more keenly aware of the need for sustainability as a priority for their projects and base their collaboration in part and even wholly on contractors' ability to work this way. By far, most members of IADC operate within signatory countries and therefore a policy environment encouraging businesses to make sustainable choices aimed at limiting a negative impact on the environment. Human and labour rights are an increasingly important topic for internationally operating companies.

For dredging contractors, the UN's Sustainable Development Goals (SDGs) are the reference point for sustainable operations. They present a framework for shaping ambitions and taking responsibility. The interrelated goals expressed in the SDGs are included in all phases of projects, design, preparation and execution, to create shared value, and enhance positive impact on the one hand while mitigating negative impact on the other. IADC's Sustainability Committee focuses on six out of the 17 UN Sustainable Development Goals as the starting point for its work. These six goals are:

1. Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all;
2. Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;
3. Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation;
4. Goal 13. Take urgent action to combat climate change and its impacts;
5. Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development; and
6. Goal 17. Strengthen the means of implementation and revitalise the Global Partnership for sustainable development.



Source: <https://www.un.org/sustainabledevelopment>.

ENSURING SAFETY

A measure of risk is inherent for the industry as it performs work with heavy equipment and requires changing of crews all within marine environments. Dredging companies can only perform at their best when daily operations occur without incidents and accidents. The International Labour Organization points out that occupational health and safety problems at work cause suffering for workers and their families, and additionally lead to colossal costs for enterprises. It cites compensation, lost workdays, interrupted production, training and reconversion as well as health-care expenditure as being a major part of the world's annual GDP.

Most dredging companies have actively developed their own safety programmes and guidelines to emphasise safety awareness among all employees, aiming to identify and address potential risks upfront. Most companies invest in in-house safety training programmes for employees. These point out individual employee's roles in maintaining safety standards and strive to give them the tools by which to ensure their own and their colleagues' safety.



On behalf of Boskalis, Pim van der Knaap (right), group director of the Dredging division, accepts the IADC Safety Award 2023 from Frank Verhoeven, President, IADC.

Since 2021, IADC has presented two Safety Awards to encourage the development of safety skills on the job and reward individuals and companies demonstrating diligence in safety awareness in the performance of their profession. One award is granted to a dredging company (also non-IADC members) and one to a supply chain organisation active in the dredging industry. This concerns subcontractors and suppliers of goods and services. In 2022, only submissions for the dredging company award were received and therefore only one award was presented.

The consensus among every contractor is that safety awareness and training requires constant attention and they actively do so by monitoring safety on a regular basis. To maintain the excellent health and safety results of its members, IADC promotes safety and prevention through its Safety Committee. IADC's annual Safety Awards presented to dredging companies and supply chain partners are a means to emphasise the importance of safety in the industry.

OPTIMISING POSITIVE ENVIRONMENTAL AND SOCIAL IMPACT

Projects are carried out not only in accordance with international and national legislation on, for example, reducing CO₂ emissions. They also comply with the social and environmental policies and goals of dredging companies, which are in turn formed by regulatory requirements. By building collaborative relationships with local communities through consultation, engagement and participation, dredging companies can better understand local needs and concerns. These can then be addressed in the decision-making process before and during a project, along with the involvement of clients and other stakeholders. In addition, local employees are frequently employed during project works and in many instances facilities have been built as part of giving back to and supporting the community. IADC promotes the use of models to make a fully inclusive assessment in which all externalities of a project are included.

The dredging industry is ideally positioned to provide a positive environmental impact because of its close association with and influence on both marine and coastal environments. It has taken a proactive approach towards enhancing environmental value, going far beyond international and national policy and legislation. Research is dedicated to finding more sustainable ways of carrying out projects. Industry efforts to enhance positive environmental impact are set forth in the Building with Nature consortium as well as the *Dredging for Sustainable Infrastructure*

publication. The IADC's industry journal *Terra et Aqua*, which celebrated its 50th anniversary in 2021, continues to disseminate sector-related sustainability information, dedicating much of its content to the subject. Applying Ecosystems Services to projects offers the dredging industry a structured and analytical way of calculating the impacts of projects on the planet, people and profit. A recurring theme in the industry is the beneficial use of dredged sediments that ensures natural resources contribute to the circular economy.

REDUCING EMISSIONS

While its carbon footprint results primarily from fuel consumption during dredging works, the dredging industry remains committed to reducing its CO₂, SO_x and NO_x emissions. Reducing emissions from fuel use is a continual work in progress that permeates technical decision-making, research and education, innovation and knowledge exchange. The use of alternative fuels is another way of achieving lower emissions, specifically fuels that burn cleanly or reduce CO₂ output to be considerably lower or near zero. Alternative fuels such as liquefied natural gas (LNG) and biofuels as well as biodegradable lubricants are increasingly prevalent.

Furthermore, the Ultra-Low Emission Vessels (ULEV) being built today are fitted with a highly advanced exhaust gas filtering systems using Selective Catalytic Reduction (SCR) systems and Diesel Particle Filters (DPF), strongly reducing emissions of NO_x and of particulate matter, increasing the sustainability of all used fuels.



Written by a team of experts from academic institutes, dredging contractors, consultants and project owners, *Dredging for Sustainable Infrastructure* presents state-of-the-art guidance on how to achieve dredging projects that fulfil their primary functional requirement, while adding value to the natural and socio-economic system.

The publication promotes the message that through a thorough understanding of these systems and with proactive engagement of stakeholders throughout a project's phases, a value added project can be successfully achieved.

TO ORDER A COPY

Visit: <https://www.iadc-dredging.com/publication/dredging-for-sustainable-infrastructure/>

DRIVERS OF DREDGING

Assessed in the following sections, five global trends drive the progress of the dredging industry: world trade, population growth and urban development, climate change and coastal protection, energy demand, and tourism.

WORLD TRADE

The World Trade Organization reported that trade volume growth in 2022 was slower than expected at 2.7% following a slump in the fourth quarter, but still stronger than worst case scenarios considered at the start of the war in Ukraine.

Global merchandise trade in 2022 was also up 32% compared to its pre-pandemic level in 2019. The fastest growing sectors were those related to energy. In 2022, growth in fuel trade was 61%. This growth came on the back of a similarly large increase in 2021, mainly reflecting rising energy prices.

Several factors contributed to the trade slump in Q4 of 2022, the most conspicuous being the rise in global commodity prices.

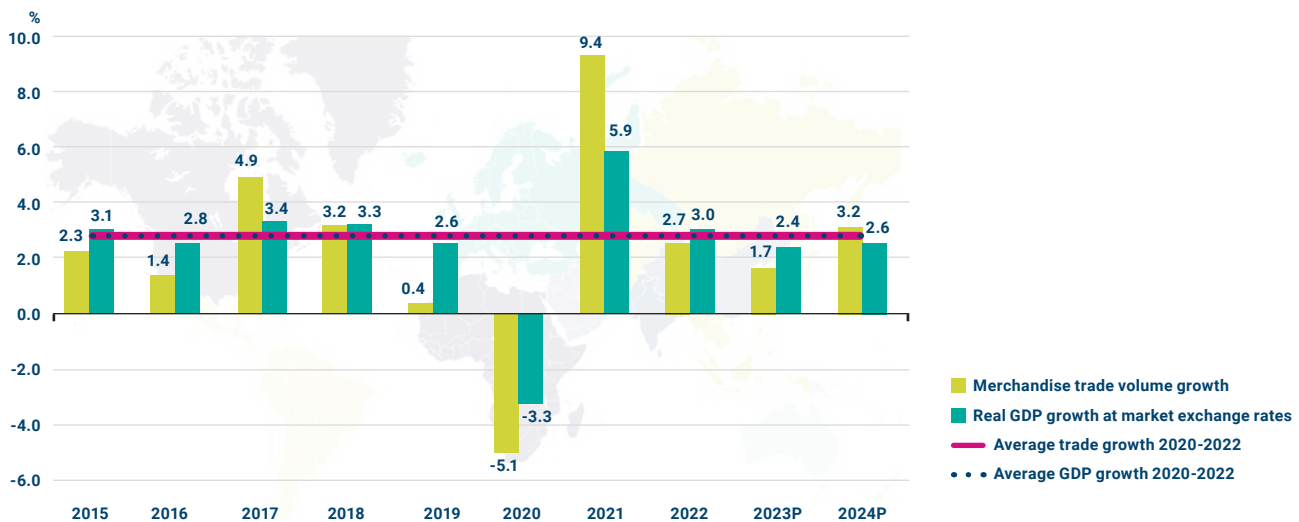
Although food and energy prices had receded from their post conflict peaks by Q4, they remained high by historical standards.

The impact of energy prices was strongest during the winter months in Europe, where gas supplies from Russia were cut off. High prices for wheat and other grains were also keenly felt in Middle Eastern and African countries that relied heavily on imports from Ukraine and Russia before the war.

Global shipping continued to navigate COVID-19 post-pandemic trends, the legacies of the 2021-2022 crunch in global supply chains, a softening in the container shipping market and shifts in shipping and trading patterns arising from the war in

FIGURE 3

WORLD MERCHANDISE TRADE VOLUME AND GDP GROWTH 2015-2024



Source: WTO for merchandise trade volume and consensus estimates for GDP.

Ukraine. Data from the United Nations Conference on Trade and Development (UNCTAD) show that maritime trade volume declined marginally by 0.4% in 2022, reaching 12,027 million tons, down from 12,072 million tons in 2021. This drop comes after a strong rebound in 2021 but is dwarfed by the sharp decline observed in 2020 at the onset of the COVID-19 pandemic. The 2022 performance reflects the normalisation that followed the extraordinary market surge in 2021 (UNCTAD Review of Maritime Transport 2023).

POPULATION GROWTH AND URBAN DEVELOPMENT

In 2022, the global human population reached 8.0 billion and according to the United Nations Department of Economic and Social Affairs (UN DESA) is expected increase by nearly 2 billion in the next 30 years.

UN DESA reports this dramatic growth has been driven largely by increasing numbers of people surviving to reproductive age, the gradual increase in human lifespan, increasing urbanisation and accelerating migration. Major changes in fertility rate have accompanied this growth.

As of 2022, the world's most populous countries – listed from most to least populated – are: India, China, United States, Indonesia, Pakistan, Nigeria, Brazil, Bangladesh, Russian Federation, Mexico, Japan, Ethiopia and the Philippines.

According to the World Bank, some 56% of the world's population – 4.4 billion inhabitants – live in cities. This trend is expected to continue, with the urban population more than doubling its current size by 2050, at which point nearly 7 of 10 people will live in cities. With more than 80% of global GDP generated in cities, urbanisation can contribute to sustainable growth through increased productivity and innovation if managed well.

To accommodate the projected increases in population, and consequent increases in city size, countries will be faced with having to expand their land areas. As many of these urban agglomerations are located along coastlines or rivers, the dilemma of land scarcity can be alleviated by reclaiming land from the water, adding buildable areas adjoining the coast where needed. Meeting this demand through land reclamation has made urbanisation a major driver for the dredging industry. In the past decades, dredging companies have regularly executed land reclamation projects to extend the boundaries of existing coastal areas or islands.

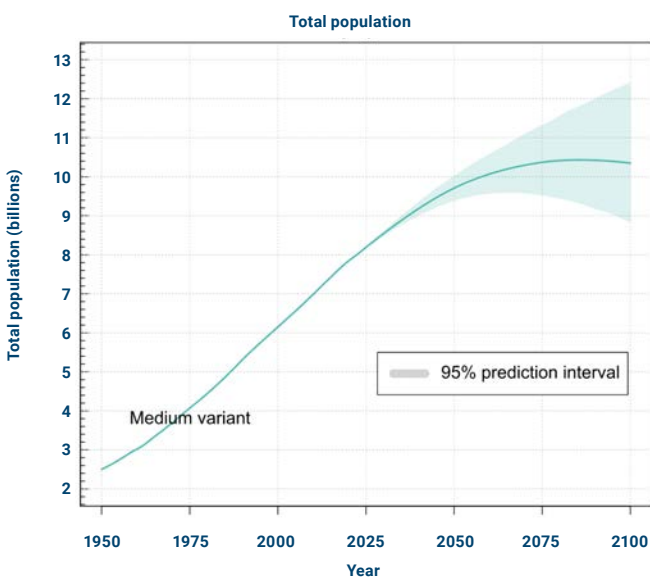
CLIMATE CHANGE

It is estimated that more than 600 million people live in coastal areas that are less than 10 metres above sea level, and nearly 2.4 billion people live within 100 kilometres of the coast (UN Oceans Conference 2017). Often this is in urban agglomerations that are vulnerable to storm surges and sea-level rise. In addition, many coastal countries are vulnerable to flooding and must regularly maintain the integrity of their dynamic shorelines. It is projected that more than half of the world's population will reside within 100 kilometres of a coast by 2030.

The side effects of climate change – more extreme weather events and rising sea levels – have direct consequences for increasingly inhabited waterfront or low-lying areas, which have a greater potential for flooding especially resulting from natural disasters. Dredging companies have traditionally contributed to coastal protection projects and maintaining shorelines and have increasingly improved engineering technologies to achieve this.

An increase in extreme weather events is a worldwide phenomenon. In 2022, the Emergency Event Database (EM-DAT) recorded 387 natural hazards and disasters worldwide, resulting in the loss of 30,704 lives and affecting 185 million individuals. Economic losses totalled around USD 223.8 billion. The total

FIGURE 4
UN POPULATION GRAPHICS



Source: <https://population.un.org/wpp/Graphs/DemographicProfiles/Line/900>.

of 387 catastrophic events in 2022 was slightly higher than the average from 2002 to 2021 (370).

Hurricane Ian single-handedly caused damage costing USD 100 billion in the Americas. The human and economic impact of disasters was relatively higher in Africa, e.g., with 16.4% of the share of deaths compared to 3.8% in the previous two decades. It was relatively lower in Asia despite Asia experiencing some of the most destructive disasters in 2022.

COASTAL PROTECTION

Upgrades to coastal defences contribute to the protection of coastal areas and their populations and the dredging industry is well prepared to tackle these engineering challenges. The need for coastal resilience plans is becoming clearer worldwide. For example, the European Commission's Directive on Maritime Spatial Planning (MSP) obliged the EU's coastal states to develop national maritime spatial plans by 31 March 2021 that address land-sea interactions, follow an ecosystem-based approach and encourage transboundary cooperation between neighboring states.

Dredging companies have a clear role to play in protecting coastlines from sea-level rise and extreme weather events.

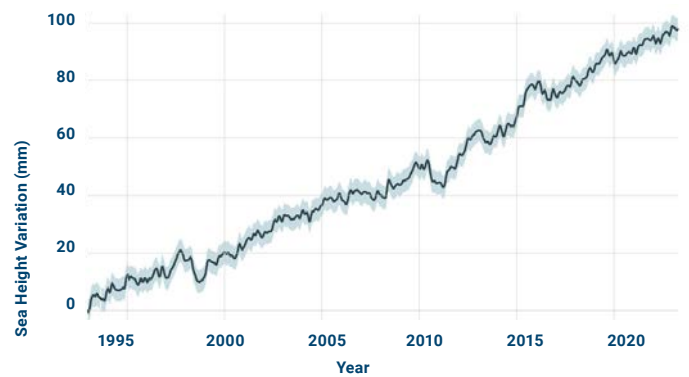
For many decades they have performed coastal protection projects across the world, gaining experience and specialised knowledge in the sector, leading to innovative solutions for the future.

FIGURE 5
SATELITE SEA LEVEL OBSERVATIONS

Satellite data: 1993 - present

Rise since 1993

↑ 98.0
millimeters



Source: NASA's Goddard Space Flight Center.



ENERGY

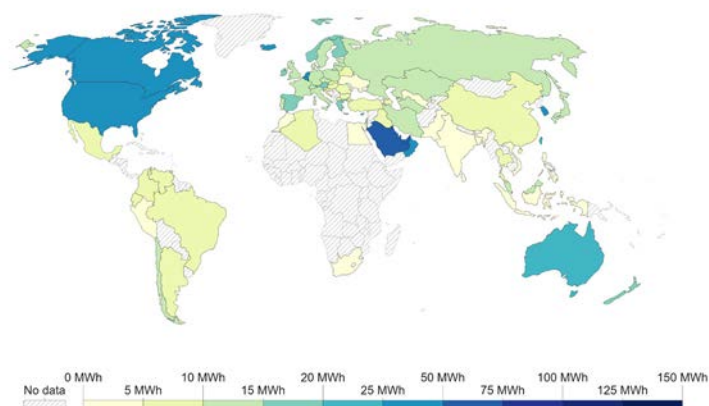
Dredging companies play a significant role in the construction of infrastructure for offshore energy sources, such as oil, gas and wind energy. Wind farms and oil and gas fields are often located offshore and in remote areas. Seabed intervention is therefore required in the form of trenching for cables and pipelines carried out by dredging companies to provide connections with the off-takers on land.

Global energy prices rose sharply in 2022 driven by energy supply concerns. Oil prices rose by around 40%. Gas prices increased by over 130% while coal prices also increased by 142%.

The Energy Institute Statistical Review of World Energy 2023 reported the primary energy demand growth slowed compared to 2021, increasing 1.1% in 2022 compared to 5.5% in 2021. Since 2019, primary energy consumption in non-OECD countries increased by just over 20 EJ (exajoule), driven largely by growth in China accounting for 72% of the increase. The increase in primary energy supply between 2019 and 2022 was largely driven by renewable (excluding hydro) energy sources and coal, with increased gas production also evident.



FIGURE 6
OIL CONSUMPTION PER CAPITA



Source: Energy Institute Statistical Review of World Energy (2023).
<https://ourworldindata.org/fossil-fuels/> • CC BY.

The share of renewables (excluding hydro) in global power generation continued its rising trend, driven by record new build of solar and wind. Their share of total global electricity production reached 14% in 2022, higher than that of nuclear energy (9%). The share of coal in the power sector stood at around 35% whilst the share of gas remained at 23%.

The Offshore Wind Market Report 2023 stated that 8,385 MW of offshore wind energy was deployed in 2022, bringing the total global installed capacity to 59,009 MW across 292 operating projects and over 11,900 operating wind turbines. This growth represents an increase of 16.6% in total deployment over the previous year. The amount of capacity installed in 2022 was lower than the record deployment of 17,399 MW that came online in 2021 but represents the second-largest annual capacity addition ever. China overtook the United Kingdom in 2021 as the world leader in installed offshore wind energy and continued to increase its share of the market in 2022 with 46.2% of the total 59,009 MW deployed globally. In Europe, the United Kingdom had the next largest annual share (23.1%), followed by Germany (13.5%), the Netherlands (5.1%) and Denmark (3.9%), with the remaining 8.2% deployed in the rest of the world.

TOURISM

The United Nations World Tourism Organization (UNWTO) reported that the number of international tourist arrivals worldwide bounced back in 2022 after dropping sharply with the onset of the coronavirus (COVID-19) pandemic. Despite the significant annual increase, international tourism arrivals remained below pre-pandemic levels, totalling approximately 969 million in 2022. In the first year of the health crisis, inbound tourism arrivals worldwide had declined to roughly 407 million, the lowest figure recorded since 1989.

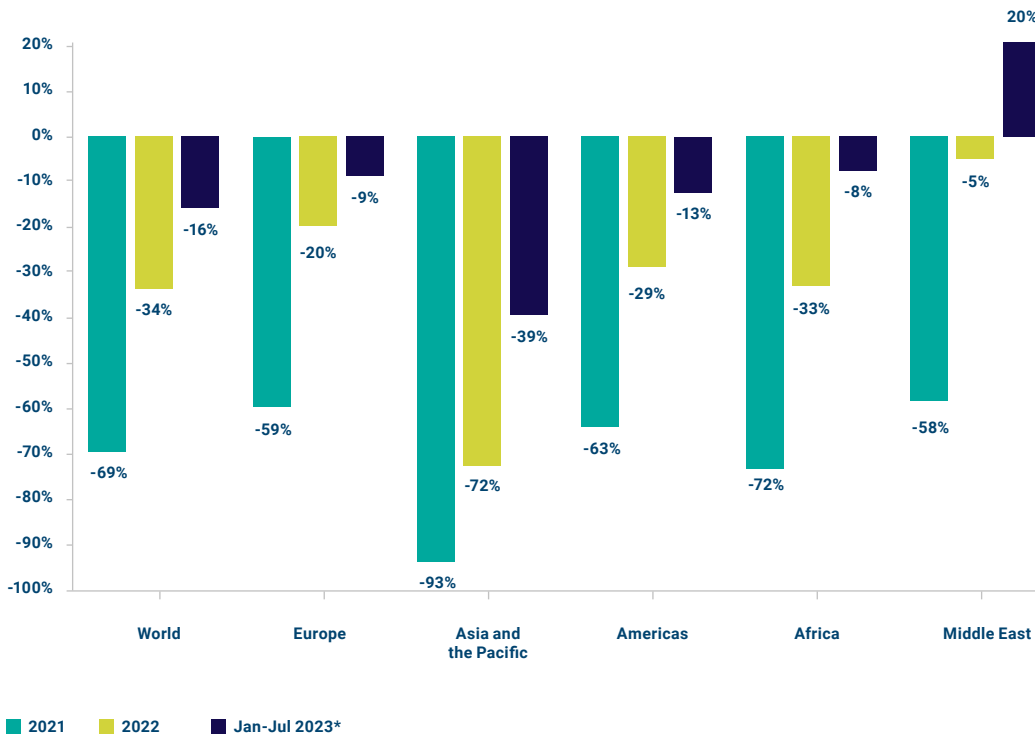
Travel, which accounted for almost one quarter of services trade before the pandemic, as well as passenger transport were hit hard by border closures and quarantine requirements. Despite remarkable catch-up growth of 79% in 2022, global travellers'

expenditure abroad was still 22% below pre-pandemic levels as Asia remained closed. In 2022, tourism growth was largely driven by European countries and the United States due to a strong US dollar.

In 2022, the total contribution of travel and tourism to the global gross domestic product (GDP) was 23% lower than in 2019, the year prior to the COVID-19 pandemic. Overall, the contribution of travel and tourism to the global GDP amounted to USD 7.7 trillion.

FIGURE 7

INTERNATIONAL TOURIST ARRIVALS, WORLD AND REGIONS



Source: World Tourism Organization (UNWTO) © % change over 2019. Data as collected by UNWTO, September 2023.

RESULTS

2022 INDUSTRY TURNOVER

The dredging industry's total turnover – excluding closed markets – compared to 2021 (EUR 5.33 billion) increased 14% in 2022 to EUR 6.09 billion. Regarding the construction of infrastructure for offshore energy, only turnover generated by seabed intervention is included in this figure.

This publication does not report on turnover in closed markets. The open market however contains turnover that is not open to all competitors, the so-called semi-open market. IADC advocates a level playing field in the dredging industry, with all dredging projects providing the same conditions for every bidder. Unfortunately, the turnover in the Middle East shows a slow but steady increase of turnover not open to all competitors.

In terms of trade-related development, capital infrastructure projects constituted 36% of the 2022 turnover with most works realised in Europe, followed by Africa and the Middle East. Maintenance of existing infrastructure constituted 18% of turnover, with the largest shares taking place in Europe and Central and South America.

The figures in this report exclude turnover from projects that were not available for international tendering in open markets. The IADC does not publish information about projects in closed markets such as China and the United States as the data cannot be verified and therefore are not reliable.



FIGURE 8
ANNUAL TURNOVER FROM 2021 AND 2022 ACCORDING TO GEOGRAPHIC AREA



Source: IADC member companies.

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METHODS

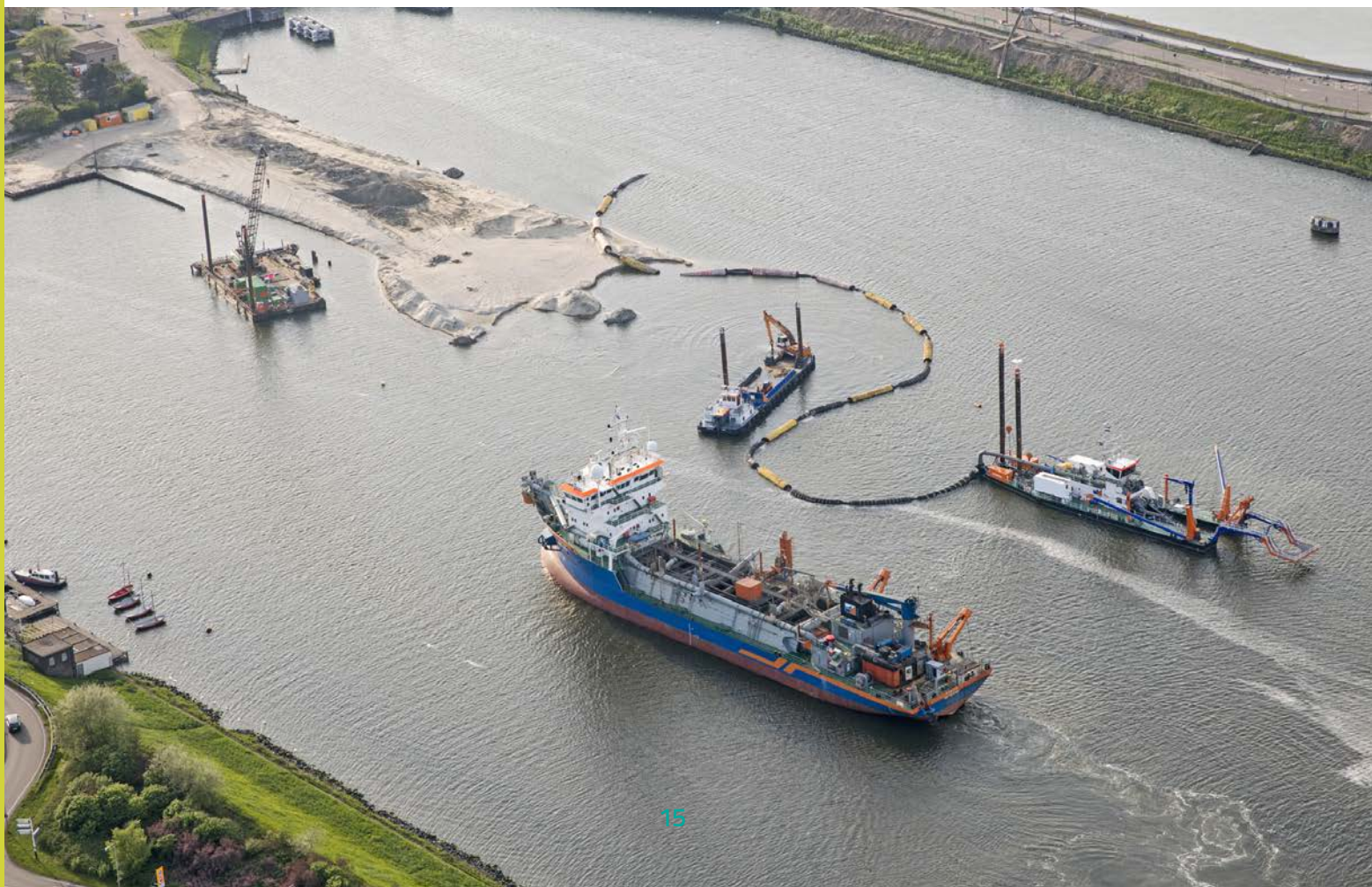
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ABOUT IADC

The International Association of Dredging Companies (IADC) is the global umbrella organisation for companies in the private dredging industry. As such, 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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