Sea Port Development on the Cross-Roads of International Routes

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Disclaimer

This report contains an analysis of cargo ports in the CEE region, which includes Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Belarus, Bulgaria, Croatia, the Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kosovo, Latvia, Lithuania, North Macedonia, Moldova, Mongolia, Montenegro, Poland, Russia, Romania, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan and Greece. Given that some of these countries do not have access to the sea, the overview for these countries was limited. This report does not include any analyses of Iran, Kyrgyzstan or Turkey.

Passenger port infrastructure and passenger turnover are not included in the analysis.

This is a second edition. Please note that the current edition was amended with an analysis of cargo traffic at Greek ports on the Aegean Sea compared to the first edition issued in 2018.

As this report goes to press, the Covid-19 pandemic continues to spread globally. The ultimate impact of the pandemic and the measures taken by many governments globally to contain it, remain highly uncertain. Lockdown and quarantine measures have meant that both supply and demand in many industries has been disrupted, as well as port operations. Trade patterns and cargo flows have also been similarly affected, both in terms of volume and in terms of the actual trade routes. Consequently, any comments we have included in this report on the possible impact of Covid-19 are subject to the inherent uncertainties as the situation unfolds.

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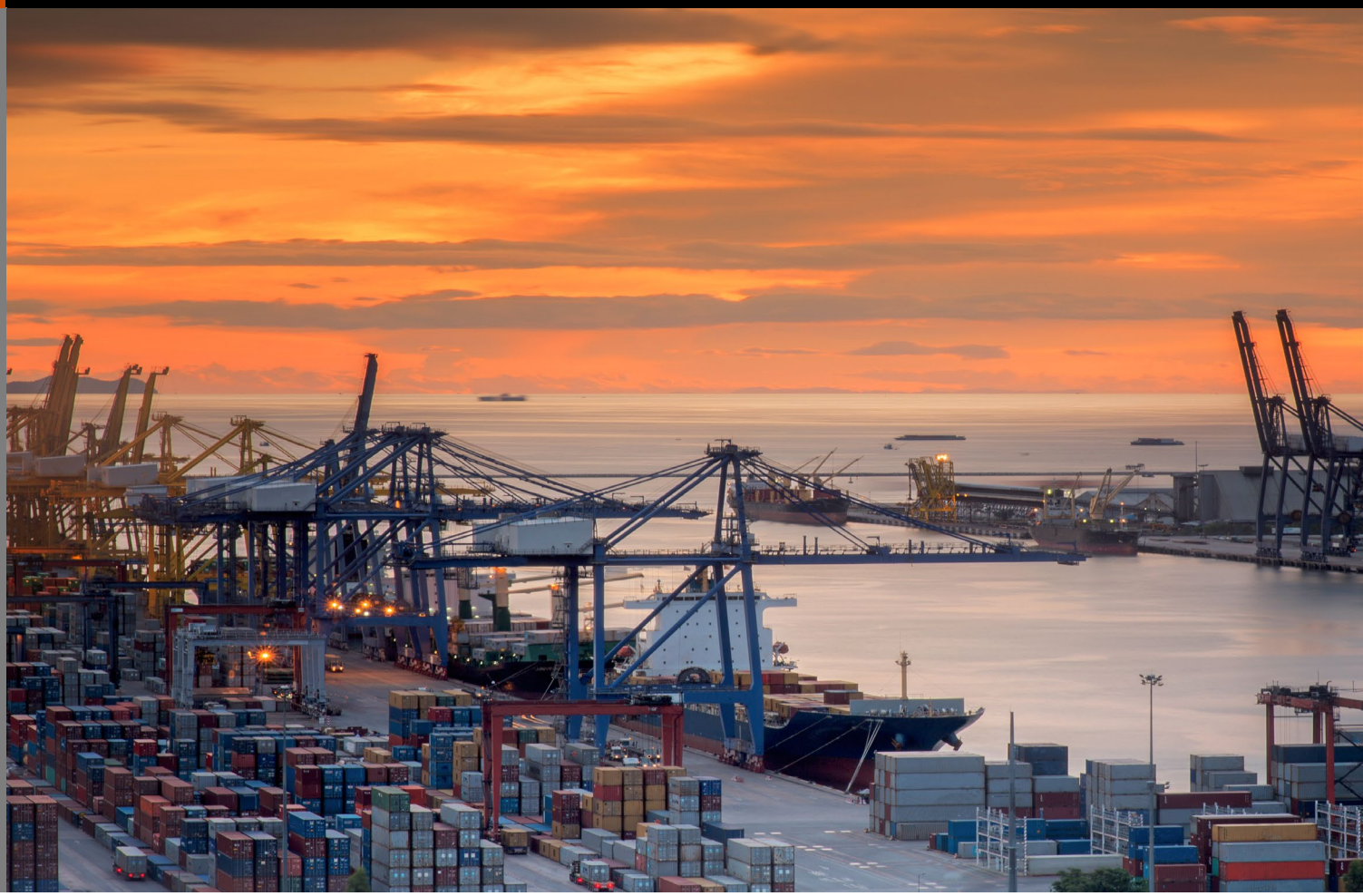

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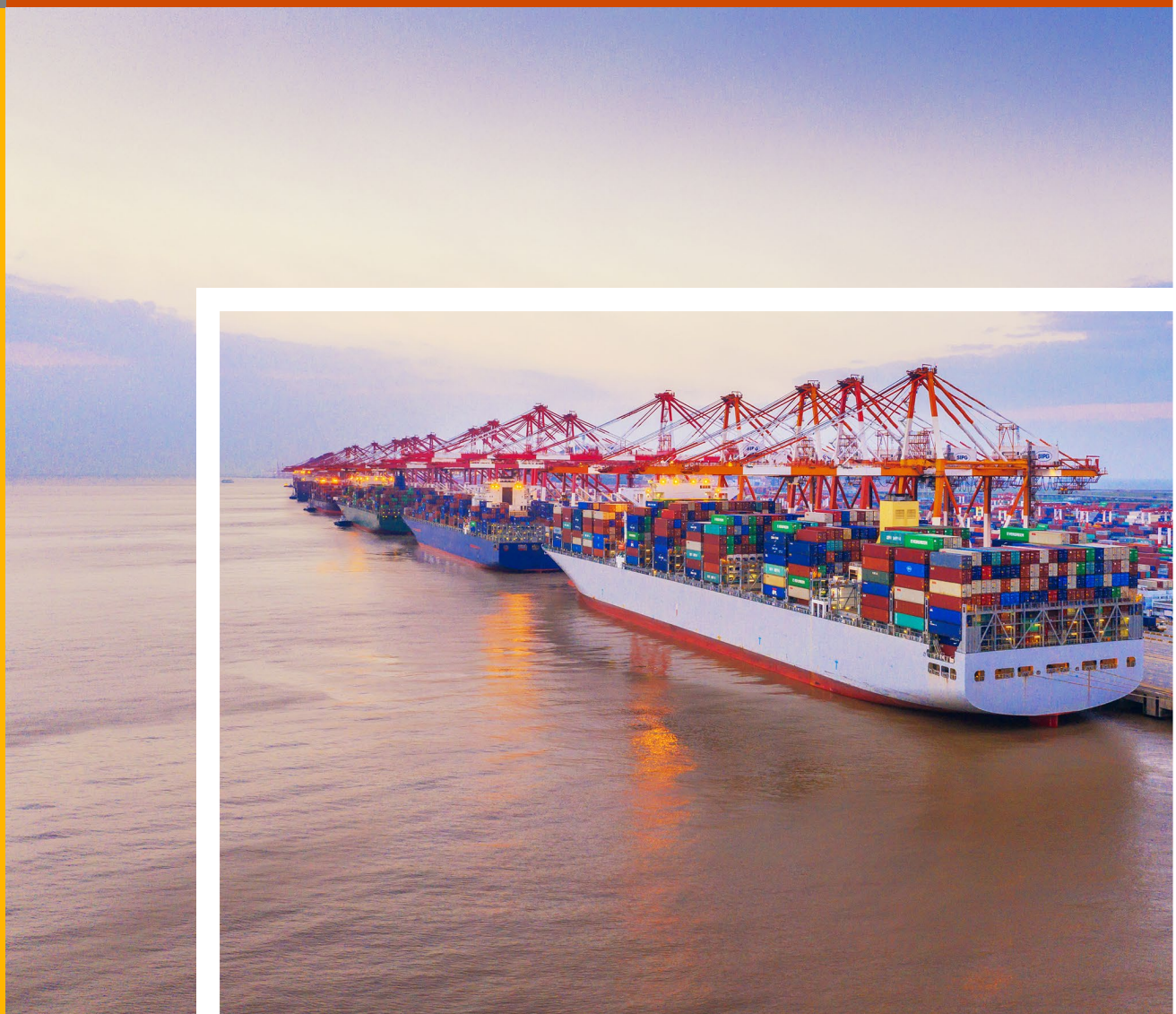
CEE Region overview

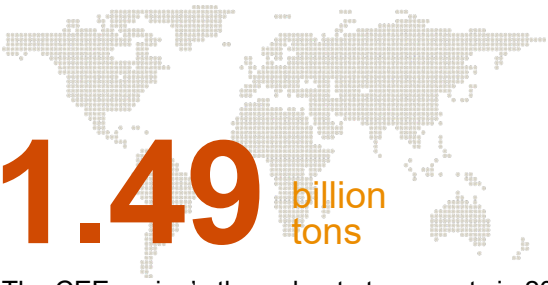


The CEE region includes 30 countries in Central and Eastern Europe and Central Asia

93

sea ports

CEE countries have access to eight major sea basins—the Baltic Sea, the Aegean sea, the Adriatic Sea, the Black Sea, the Sea of Azov, the Caspian Sea, the Sea of Japan and the Arctic Sea—and to more than 93 sea ports.



1.49 billion tons

The CEE region's throughput at sea ports in 2019. This rate has been growing at 4.7% per year for the last five years.

418 million people

The total population of the CEE region in 2019.

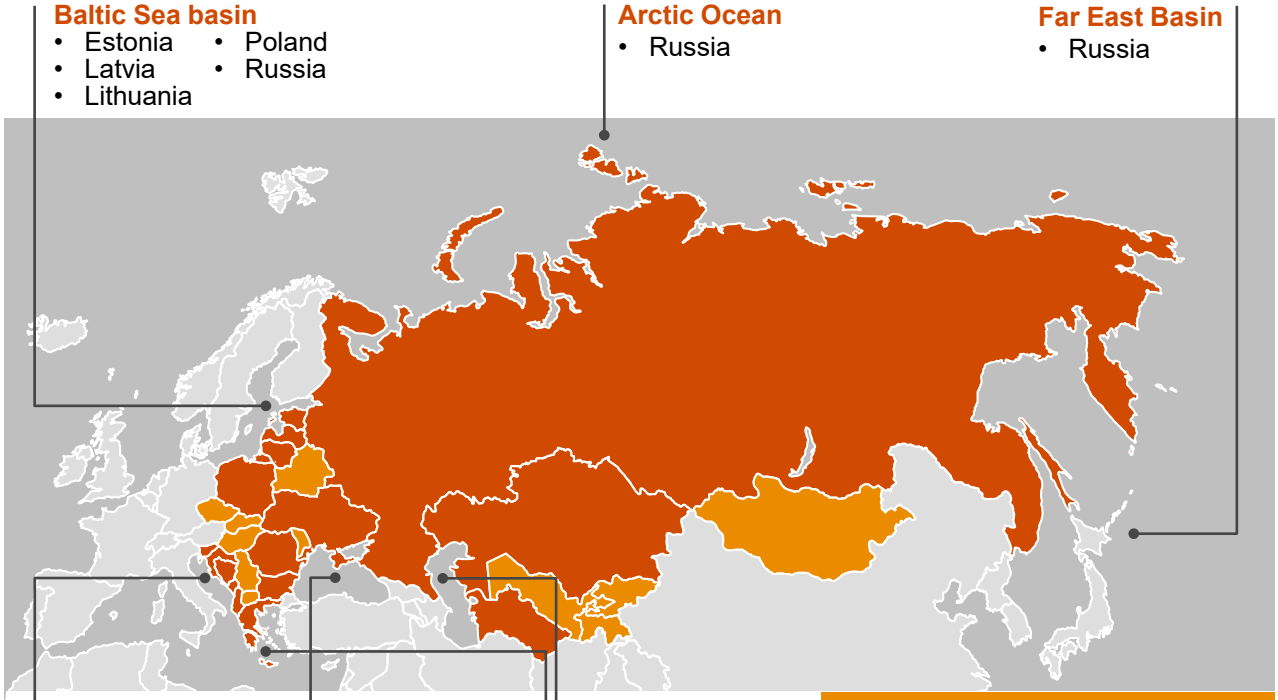
CEE region GDP: USD 4.2 trillion*

The CEE region encompasses 30 countries. The average GDP per capita in countries with access to sea ports is USD 12,193, which is 32% higher than in those CEE countries without access to sea ports.

The total territory of CEE countries is 24.8 million square kilometres, which is about 17% of the world's land area and 45% of the Eurasian landmass.

**in 2019*

Over the past five years, ports in the region have experienced annual throughput growth of nearly 4%



Adriatic Sea basin
- Albania
- Bosnia and Herzegovina
- Croatia
- Montenegro
- Slovenia

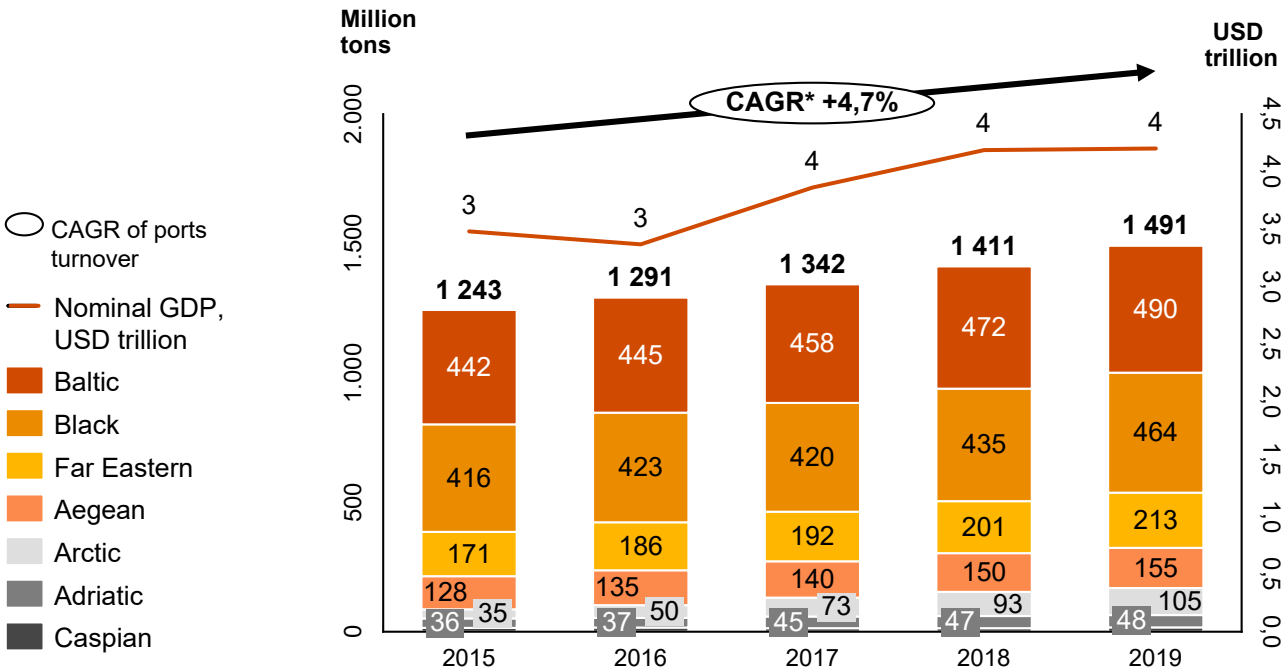
Black Sea basin
- Bulgaria
- Georgia
- Romania
- Russia
- Ukraine

Caspian Sea basin
- Azerbaijan
- Kazakhstan
- Russia
- Turkmenistan

Aegean Sea basin
- Greece

CEE countries with no access to the sea
- Armenia
- Belarus
- Czech Republic
- Hungary
- Kosovo
- Macedonia
- Moldova
- Mongolia
- Serbia
- Slovakia
- Uzbekistan
- Tajikistan

CEE GDP and port throughput



Sources: International Monetary Fund, statistics of ports' public bodies, PwC analysis
Note: *Here and further CAGR refers to Compound Annual Growth Rate

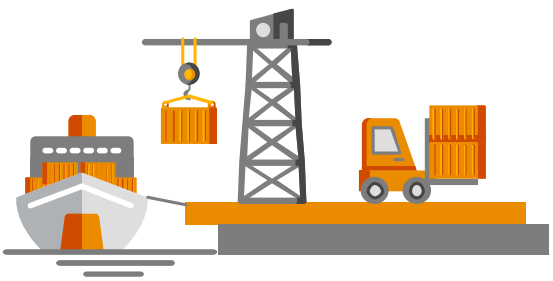
Port sector development has mainly been driven by growing trade between Europe and Asia

Over the past five years, the key factor driving port development has been the growing volume of trade between Europe and Asia. The competition for sales markets in Europe has driven the development of new logistic chains, with new players joining in the fight for port capacity, including Middle East investors. The port industry in CEE has attracted new investments on a variety of ambitious projects.

Cargo traffic between Asia and Europe has recently grown at an average CAGR of 2.6%, reaching 586 million tonnes at the end of 2019. However, the distribution of this growth has been uneven—the growth rates for exports from Asia to Europe (3.1% CAGR) are higher than the growth rates for exports from Europe (1.7% CAGR).

Shipping along the main corridor via the Suez Canal remains the route with the heaviest cargo traffic between Asia and Europe. The reduced speed of shipping along with the development of transhipment hubs in the Mediterranean Sea has led to a larger load on ports on the Adriatic Sea, Aegean Sea and Black Sea. The faster pace of growth in Eastern European economies in comparison with Western Europe has also added to the attractiveness of the region. However, alignment with hinterland infrastructure and logistics with distribution centres in landlocked countries may slow the growth of cargo traffic.

At the same time, competition from alternative transport corridors has increased, primarily along the East-West railway corridor as part of China's Belt and Road Initiative. Attracting Chinese investments in ports and hinterland infrastructure has been the main focus in the industry. However, over the past five years, global investors in other regions (especially DP) have strengthened their position.

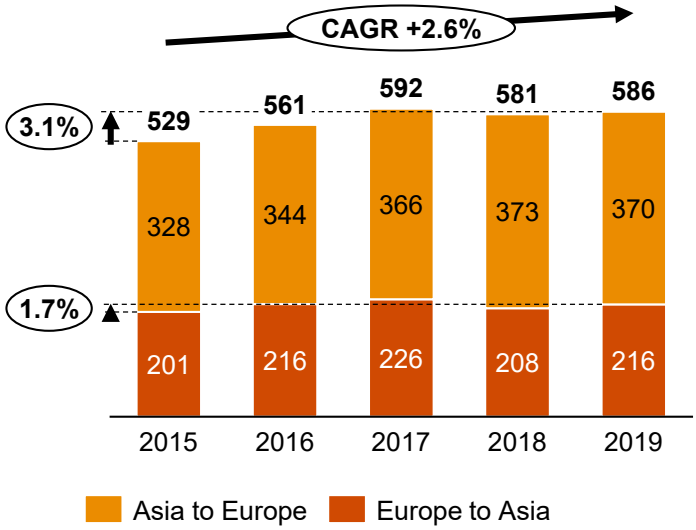


COVID-19

As part of our research, we explored trends and developments from the end of 2019. Estimating reliably the duration and implications of the COVID-19 crisis is challenging. However, the key trends and the historical analysis provided here may help paint a picture of how the port sector will develop. The potential impact of COVID-19 on the port sector is provided later in this section.

Despite expectations for significant change, including by the introduction of IMO-2020 standards, the expansion of port digitalisation and automation, and the development of alternative routes, port infrastructure in Central and Eastern Europe remains a highly promising investment target thanks to the fast pace of economic growth in the region.

Volume of trade between Europe* and Asia, million tons



Notes: *Europe stands for EU-28.
Sources: Eurostat, PwC analysis

The overall impact of COVID-19 on ports throughput volumes is yet unclear, but efficiency gains are likely

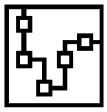
Despite the lack of a clear and complete picture of the impact of COVID 19 across the globe and in Europe, all market players expect a decline in business activity. Some of the investment opportunities outlined herein are likely not to be realised or to be realised later. Yet, there are sustainable trends and high-potential development areas are expected to gain momentum despite the challenges faced by the industry.

In every industry, a long-lasting crisis may serve as a catalyst to accelerate the adoption of new technology and the obsolescence of inefficient practices. In order to understand the impact of COVID-19 on the port industry, we must first pay attention to the key trends in the sector. Some concepts that once appeared relevant in our long-term outlook are quite likely to become pressing issues today.

The trends most likely to be affected by market changes caused by the COVID-19 crisis include:

1. Development of international corridors, diversification of supply chains and the resulting investments in CEE ports (see Chapter 2);

2. Vertical integration of various logistics and supply chain players, development of hybrid companies that own transport operators and port terminals and invest in hinterland infrastructure and inland ports (see Chapters 2 and 4);

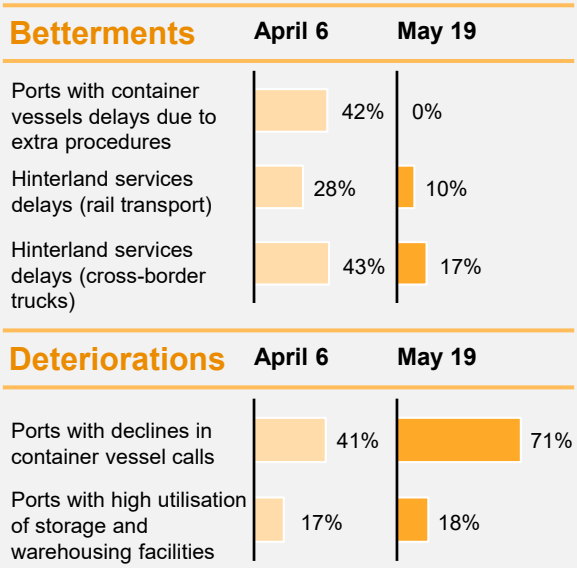


3. Stricter requirements for ports development sustainability, including deeper coordination among port sector players. Digitalisation is covered in a separate chapter (see Chapter 5)

To understand which trends will develop faster and with greater impact, we should pay attention to the key issues that arose in response to the COVID-19 outbreak.

World Ports Sustainability Report'20

According to the WPSR, the following developments occurred in the port operations industry from 6 April to 19 May:



These parameters describe various challenges faced by the port industry due to the restrictions caused by COVID-19. For some, we saw improvements in the analysed period.

The most prominent is the need for automation and electronic document flow. The most digitally and technologically advanced ports have been able to adapt to the new environment more easily. A less prominent yet hardly less significant reason is the need for a deep integration of ports with all players in the logistics chain, including hinterland infrastructure and distribution companies.

Supply chain diversification

Increased pressure to diversify supply chains could be one of the most significant developments for the logistics industry, including ports. Key issues include the growing number of suppliers and the diversity of supply channels and routes, including market entry points. The burden on port infrastructure and services is likely to increase as the size of shipment lots shrinks, while the number of counterparties for each consignor grows.

> "This will probably lead to the diversification of entry points in the logistics and supply chain. In the short term, it may create shorter supply chains."
>
> **Carles Rua, Chief Innovation Officer, Port of Barcelona***

Vertical integration

The vertical integration may be expected to continue, and the area of interest for global carriers to expand faster. In addition to the "shipping line" – "terminal" link, major market players show interest in inland ports and logistics terminals, regional logistics companies, hinterland infrastructure and collaboration of all market participants. The end consumer expects an end-to-end logistics chain build from the manufacturer to the distribution centre to the "door".

> "Synergy is required and ports will be cooperating with 3PL and other supply chain players. The supply chain has to become more resilient."
>
> **Dirk van den Bosch, Regional Commercial Director, DP World Europe and Russia***

Technology and digitalisation

Regarding digitalisation and IT development, market players have come to share the following expectations:

1. The need for tracking and monitoring the movement of goods and people will increase.
2. So far, information on the content of containers has only been available to a limited audience. Market players have an increasing need to know what is inside each container.
3. Meeting both of the two needs above entails disclosure and fraud risks and highlights the importance of secure data exchange.
4. Automation of intra-ports and warehouse logistics to reduce the dependence on human resources and human factor.

For more details on digitalisation, see Chapter 5.

> "We are currently examining how artificial intelligence can make use of historical data to predict events and speed up the decision-making process… so we can create a platform for more efficient freight flows and transport movements on land and the sea"
>
> **Malin Collin, Deputy CEO, Gothenburg Port Authority**

> "Everybody speaks about PCS (Port Community System) and things like that, but if you go further, the integration is not there yet."
>
> **Carles Rua, Chief Innovation Officer, Port of Barcelona***

Community relations

Community engagement and commitment to environmental protection have taken on a greater importance in light of the growing public demands for improved quality of life in cities. Stricter requirements (and the development of e-commerce) have placed an additional burden on market players and highlighted the importance of working with their communities.

World Ports Sustainability Report 2020

The World Ports Sustainability Report 2020 was published in May 2020, as a part of the mission of the World Ports Sustainability Programme (WPSP) to enhance and coordinate the sustainability efforts of ports worldwide and foster international cooperation with partners in the supply chain. This report follows the thematic structure of the WPSP:

1. resilient infrastructure;
2. climate and energy;
3. community outreach and port-city dialogue;
4. safety and security;
5. governance and ethics.

These main topics follow from the key trends in the industry and experts' expectations on how the market will develop.

Note: *World Ports Sustainability Report 2020* is published by the World Ports Sustainability Program (WPSP), led by the International Association of Ports and Harbours (IAPH) and guided by the 17 UN Sustainable Development Goals.
*Opinions of the mentioned experts were expressed during open webinar "Port-Centric Logistics" organized 20th May 2020.

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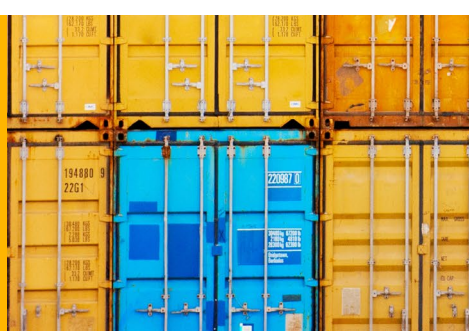
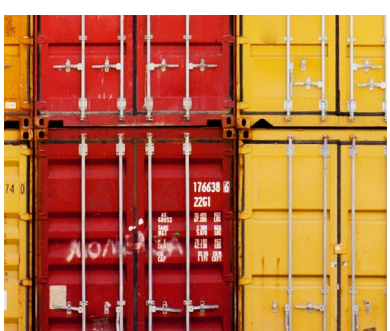
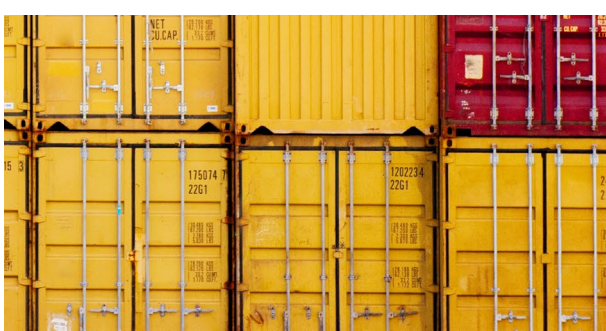
Development of transportation routes





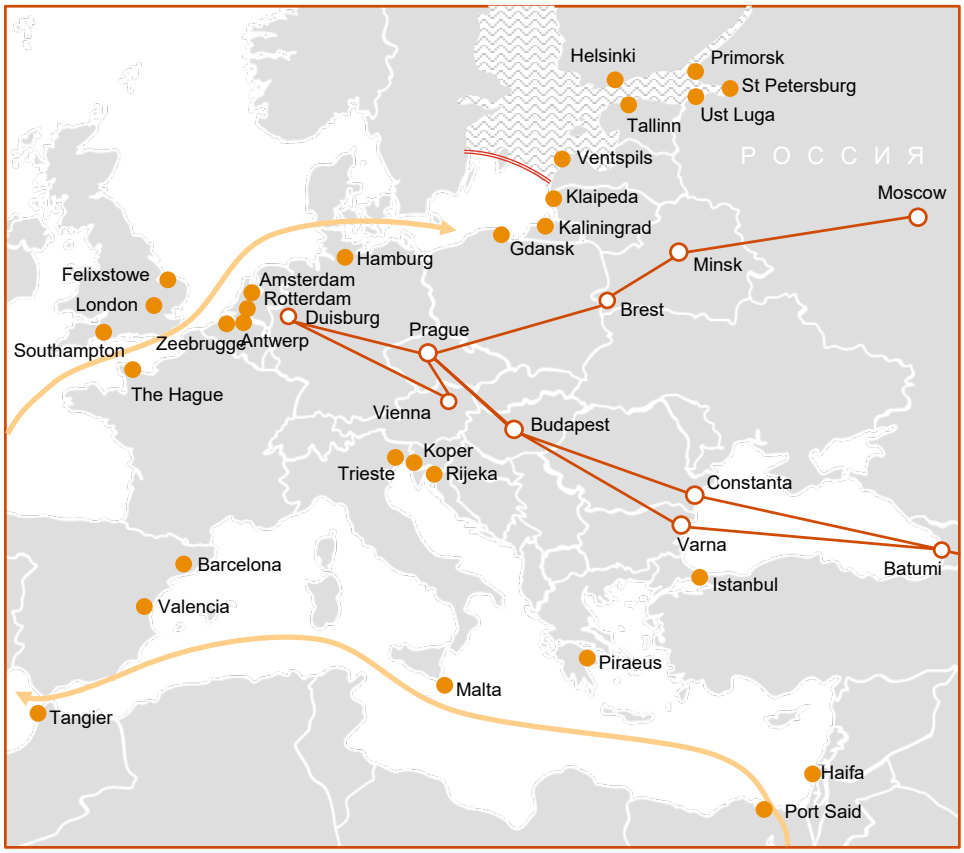


New routes have been emerging as market players are trying to mitigate risks and grow market shares

The Suez Canal route, which used to be the only route between Asia and Europe, still sees the heaviest traffic, although port development around the Mediterranean Sea is having an impact. Alternative land routes have strengthened their positions globally, including projects that have received investments under the Belt and Road Initiative. New alternative routes are developing slowly and require significant investments.

Current and potential routes for cargo transportation between Asia and Europe

Industry's attention is largely focused on the development of the alternative international corridors



Georgia (Batumi Port) as part of the Asia-Europe Inland Transportation Corridor
Batumi Sea Port Ltd was visited by a Chinese delegation. During the visit, a memorandum of understanding was signed between the ports of Batumi and Lianyungang.

May 2019

Asia-Caspian Sea-Europe Transcaspian International Transportation Route (Middle Corridor)
Rail Cargo Group (RCG), the Port of Baku and Cabooter Group of the Netherlands have signed an MoU today to jointly develop the Middle Corridor. The project was launched in October with a successful pilot train from China via Kazakhstan, Azerbaijan and Turkey to Prague along the Trans-Caspian International Transportation Route.

November 2019

Asia-Bulgaria (Port Varna)-Central Europe
The Bulgaria Logistics Corridor (Asia-Port Varna-Central Europe) EU Gateway (EGP) project was officially presented in January by the president of the NGO Black Sea Economic Zone Cluster (BSECZ), Doichin Nikov, and the project manager, Borislav Nikolov. The aim of the project is to redirect through Bulgaria a substantial part of the cargo (worth over USD 300 billion per year) from Asia and the Middle East towards Eastern and Central Europe.

January 2019

Caspian Sea-Black Sea International Transport Corridor
The foreign ministers of Romania, Azerbaijan, Georgia, and Turkmenistan have signed a declaration to promote a multimodal corridor for the transport of goods between the Black Sea and the Caspian Sea (ITC-CSBS).

March 2019

The growing significance of the Mediterranean Sea is gradually becoming a game-changer in the region

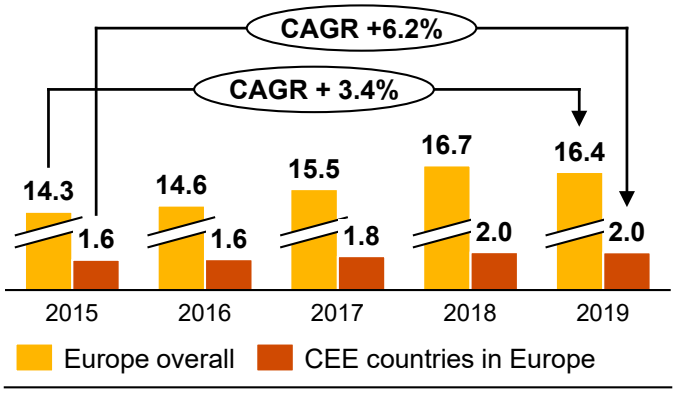
The ongoing consolidation of container shipping line operators has contributed to the appeal of the Asia-Mediterranean Europe route. As a result, the appeal of routes through the Aegean Sea, Black Sea and Adriatic Sea has increased, as has competition with ports in the North Sea and Baltic Sea.

Three macro trends have changed the balance of power in port infrastructure:

1 Growing investment in Central and Eastern Europe

CEE economies are developing faster than the overall European's average. Shipping market players have streamlined their logistics chains through key distribution centres in the region. Ports on the Black Sea, Aegean Sea and Adriatic Sea ports are developing in response to market demand and attracting investment from global companies.

GDP in current prices, trillion USD



2 Consolidation and integration with hinterland infrastructure

Oversupply in the container transportation market has resulted in lower margins and market consolidation over the past few years. Alliances and hybrid companies have appeared that combine carriers, port terminals and logistics companies. Terminals now provide links to key land routes.

> "Container ships will continue to go slower: currently, shipping from Asia to the EU takes an average of 52 days. Increasing delivery time provides Adriatic ports with a tremendous advantage. For example, it takes ~46 days to ship a container from Asia to Koper, but it takes 7-10 more days to reach ports in Northern Europe."
>
> **Former Chief Commercial Officer at A.P. Møller - Mærsk A/S**

> "Despite the capacity increase called for in the development plans of the Northern Adriatic ports, it exceeds the capacity of rail infrastructure. Current train capacity is limited by the length of the train, availability of tracks and slots for block trains on railroads."
>
> **Former CEO Air & Ocean Europe at Rhenus SE & Co. KG**

3 Environmental sustainability and increased expenses

Following the introduction of new emission standards, fuel costs have continued to grow, while the average speed of shipments is very likely to keep falling. This has increased the attractiveness of routes that terminate in the Mediterranean Sea, as well as of ports that provide access to Europe.

> "Environmental concerns have started to play a larger role in choosing a port of call, particularly carbon footprint and energy consumption. Thus, the shorter the route, the better for environment."
>
> **Former CEO Air & Ocean Europe at Rhenus SE & Co. KG**

New opportunities for European ports on the Mediterranean Sea and Black Sea

The development of ports on the Adriatic, Aegean and Black Sea has been driven by the growth of transhipment along the main marine route to the Mediterranean Sea.

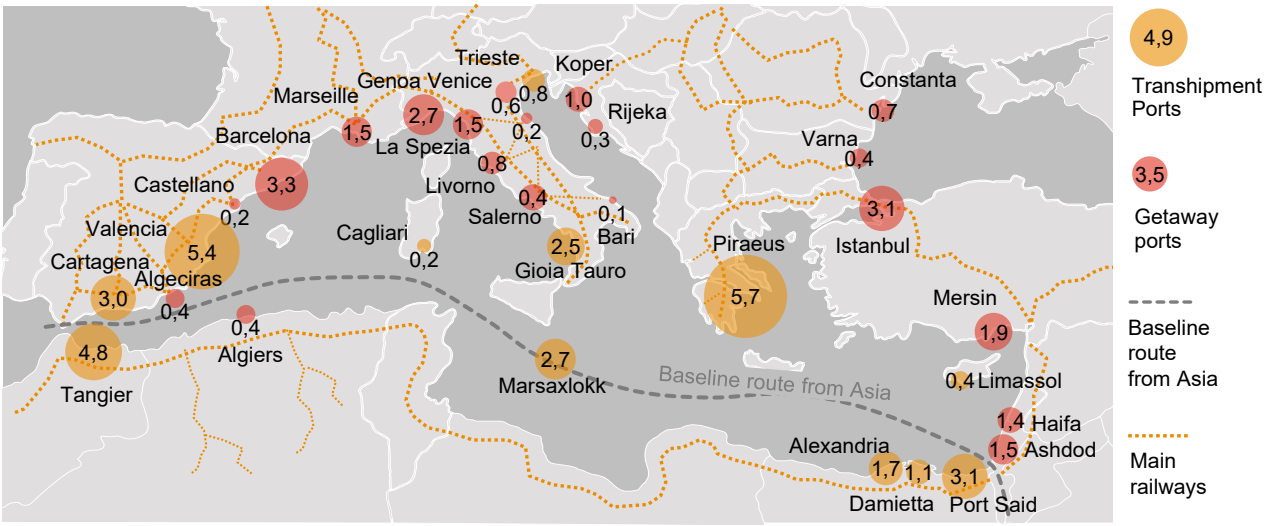
Over the past decade, there has been an imbalance in the demand and supply for container shipments. This has encouraged shipping line operators to cut their costs and optimise their business processes, and, consequently, has led to slower shipping speeds.

In the drive to optimise their operations, ports worked to integrate with terminal operators and developed transhipment hubs for storing and reallocating cargo.

In the Mediterranean, almost all the main shipping companies, including APM, MSC, CMA CGM, COSCO and Hyundai MM, have their own terminals along the main shipping route from Asia to Europe (Piraeus, Valencia, Algeciras, Tangiers, Gioia Tuaro and Marsaxlokk).

The development of transhipment ports provided incentives to build regional transportation networks to European import/export ports.

Container cargo turnover at key Mediterranean ports, 2019,* TEU millions



Sources: Port authority statistics, PwC analysis
Note: For most ports, the statistical data is for 2019. However, for some ports, 2019 statistics were unavailable
In particular, statistics for Alexandria, Port Said, Haifa and Limassol are provided for 2018. Statistics for Varna are provided for 2016, while estimates for Damietta, Venice, Livorno and Marcel are based on a split year (2019).

Transhipment ports typically handle a large share of transhipments. Being located close to the main route is critical for such ports, while a considerable internal sales market and a well-developed ground transport network are of secondary importance

Export/Import ports are focused on imports to and exports from the service region. Throughput capacity, an extensive ground transportation network, and a connected railway line are critical for such ports.

Example: Varna

The Port of Varna in Bulgaria has launched several dredging and water zone development projects in order to service higher capacity vessels. China Machinery Engineering Corporation (CMEC) has signed an EUR 120 million (USD 134.93 million) contract with Logistic Centre Varna (LCV) to jointly develop new infrastructure at the port, the largest in Bulgaria. This is the first port project being run by a Chinese company in Bulgaria.

Example: Koper

The Port of Koper in Slovenia reached peak utilisation in 2018. The main destinations for cargo traffic (besides Slovenia) include Austria, the Czech Republic and Hungary. Capacities are expected to increase by 300,000 TEU/year by the end of 2020 and by an additional 700,000 TEU/year by 2030 upon completion of a comprehensive development plan, including dredging to 15 metres.

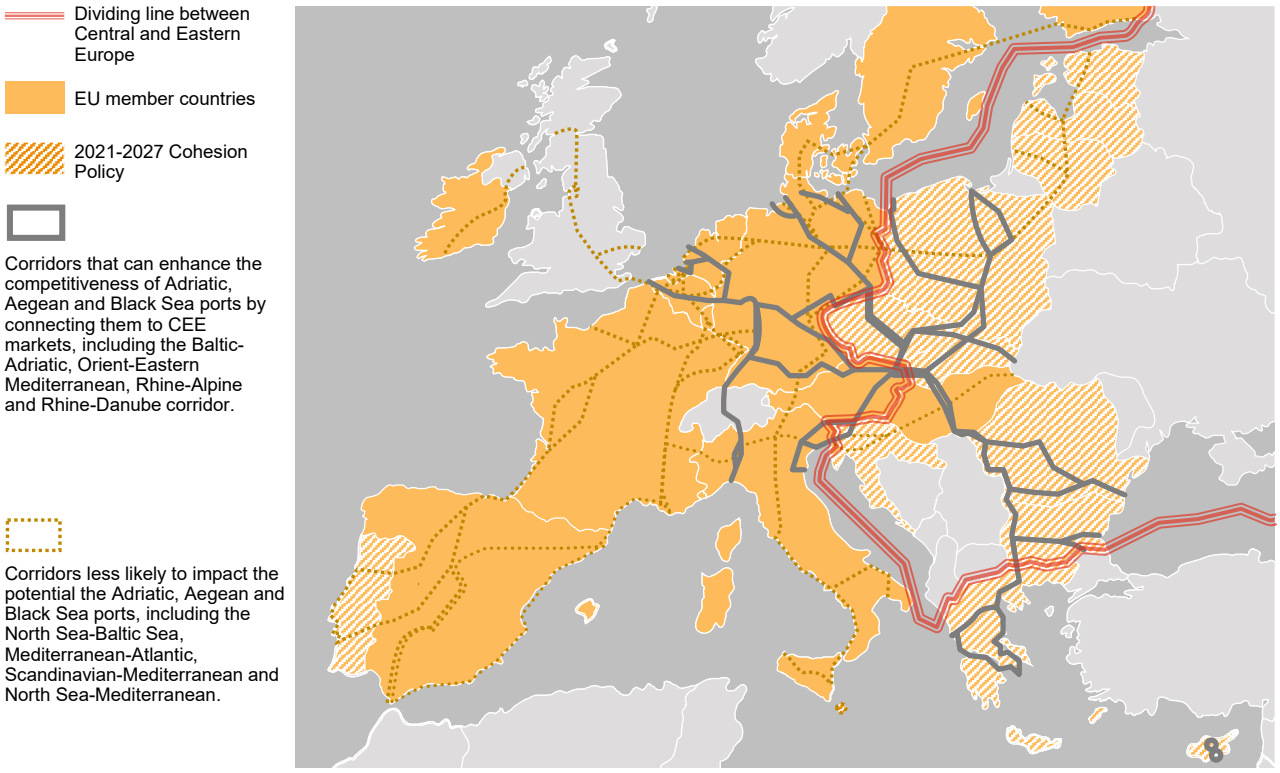
Development of the Trans-European Transport Network (TEN-T)

The Trans-European Transport Network (TEN-T) includes highways, railways, airports, ports, logistics terminals and inland waterways and connects EU countries to each other and to Europe as a whole.

The TEN-T was launched in the 1990s and continued with the expansion of the Schengen zone and European Union.

The network includes nine key international corridors and a short-term development plan for each one, including construction, maintenance and development of roads and facilities. The international corridors that are most important for CEE connect ports on the Baltic Sea, Black Sea, Aegean Sea and Adriatic Sea with distribution centres and sales markets in the centre of the region.

Map of TEN-T international corridors running across the EU and the countries supported by the Cohesion Policy



TEN-T is officially funded and managed by the EU Innovation and Networks Executive Agency (INEA). TEN-T infrastructure is mainly financed by EU sources, including European Structural and Investment Funds (ESIFs), European Fund for Strategic Investments (EFSI) / Invest EU, Connecting Europe Facility (CEF) as well as European Investment Bank and national contributions. Individual facilities and sections are financed also by international institutions such as the World Bank, European Bank for Reconstruction and Development (EBRD) as well as private investors and pan-European investment funds.

A good example of private investment is the railway branch between Piraeus (Greece) and Budapest (Hungary) on the Orient/East Mediterranean corridor. Construction of a high-speed railway between Belgrade and Budapest can connect the Port of Piraeus with CEE countries and strengthen the port's role in imports and exports (currently, the port mainly deals with transhipments). The rail line will be funded by Chinese companies and banks as part of the Belt and Road Initiative. The 350 km line is to be completed by 2023.

The Cohesion Policy introduced by the EU has played a significant role in allocating investments.

EU Cohesion Policy

Development in the region is largely being driven by the Cohesion Policy introduced upon the accession of 9 CEE countries to the EU. The policy aims to strengthen economic and social cohesion by reducing disparities in the level of development between regions. The policy focuses on key areas which will help the EU face up to the challenges of the 21st century and remain globally competitive. Under the Cohesion Policy, the EU co-finances infrastructure projects in countries and regions included in the support programme. Co-financing can cover up to 85% of the project costs. Investments in 2017-2020 totaled EUR 63.4 billion. For 2021-2027, investments are to be reduced to EUR 41.3 billion. Certain regions can be excluded from the support programme if they are sufficiently developed, e.g. the region that includes the Port of Koper in Slovenia.

Note: The EU budget 2021-2027 is still not approved at the moment of publication of the paper.

> “The main criteria is the time-to-market that a port can guarantee that cargo will reach its final destination. This is why Black Sea ports focus on the Southern Balkans, Greek ports serve the Southern Balkans, the Adriatic focuses on Central Europe, and Northern ports serve the Northern part of Europe.”
>
> **Former Italy and Eastern Adriatic Countries Managing Director at A.p. Møller - Mærsk A/S**

Development of international transport corridors requires considerable investment in hinterland infrastructure. The Trans-European Transport Network helps to connect landlocked CEE countries with ports.

The EU Cohesion Policy promotes the development of hinterland infrastructure to connects ports on the Baltic Sea, Black Sea, Aegean Sea and Adriatic Sea with key distribution and manufacturing centres in CEE.

Planned TEN-T projects

Poland

To comply with the TEN-T Regulation, modernisation is planned for the Central Branch between Gdańsk and Katowice, C-E65 railway line, with plans to start work in 2020 and complete it by 2022.

The Port of Gdynia is working to comply with standards on the railway lines connecting the terminals to the main lines (202 and 201) on the Baltic-Adriatic TEN-T corridor. Work inside the port area to increase railway throughput capacity is also expected to move forward between 2021 and 2027 (EUR 59.8 million).

Hungary

In western Hungary, a new terminal (under construction) should facilitate traffic between the Baltic Sea in the north and the Adriatic Sea in the south. The terminal of Zalaegerszeg, which is strategically placed along two rail freight corridors (RFCs), taps into the Eurasian rail freight volumes entering Europe via Poland. “This new yard is really placed at the crossroads”, explains György Firbás.

Slovenia

A second track along the Divača-Koper railway line is aimed at eliminating traffic congestion on the core TEN-T corridors along Slovenia-Baltic-Adriatic and the Mediterranean. The Divača-Koper section is a high-capacity link between the Port of Koper and the wider European railway network and forms part of the TEN-T network. Construction on the new railway track commenced in March 2019, with completion scheduled for 2025. The track will enter service in 2026.

Romania

The European Regional Development Fund (ERDF) is investing EUR 363.3 million for the construction of a bridge over the Danube River in the city of Brăila in south-eastern Romania. The project also includes the construction of connecting roads to improve transport links between the Black Sea and north-eastern Romania. The project, which is part of the trans-European transport network (TEN-T), will improve transport links between the north of the country, the city of Tulcea, the Danube Delta and the port of Constanţa to the south.

Environmental standards have become important in attracting cargo and setting requirements for ports

Starting from January 2020, the International Maritime Organisation (IMO) introduced new sulphur emission standards as part of a set of comprehensive measures aimed at tightening environmental regulations.

The new standards have encouraged an active discussion of transitioning to greener fuel and upgrading port and fleet infrastructure to be more environmentally friendly.

The increasing cost of fuel, availability of different fuel types, possibility to use scrubbers, continued decrease in sea shipping speed, port requirements for shipping companies, regulatory requirements for port infrastructure are all hot topics currently being discussed in the sector.

The growing requirements on fuel and higher fuel costs are making shorter routes from Asia terminating in the Mediterranean Sea — as well as of ports that provide access to Europe — more attractive. At the same time, environmental sustainability requirements for new port infrastructure have become more stringent.

The Connecting Europe Facility 2021-2027 (CEF) programme has set a target of 60% of CEF expenditure contributing to climate objectives in line with long-term decarbonisation commitments.

One of the key priorities is facilitating synergies among the three CEF sectors (transport, energy and digital further) to support digitalisation and decarbonisation.

The Connecting Europe Facility (CEF) programme was set up after the Trans-European Network Policy was consolidated in 2013. CEF is a dedicated financing instrument to channel EU funding into developing networks, helping to eliminate market failures and attracting further investment from the public and private sectors.

Cast study: environmental concerns

Projects for the development of LNG are included in the Baltic-Adriatic corridor project for Gdynia, Świnoujście, Bratislava, Venice and Ravenna to promote alternative clean fuels for maritime transport.

On 16 October, Baku became the first port in the Caspian region to receive a Port Environmental Review System (PERS) certificate and a status of EcoPort from the European Sea Ports Organization (ESPO).

EcoPorts Initiative

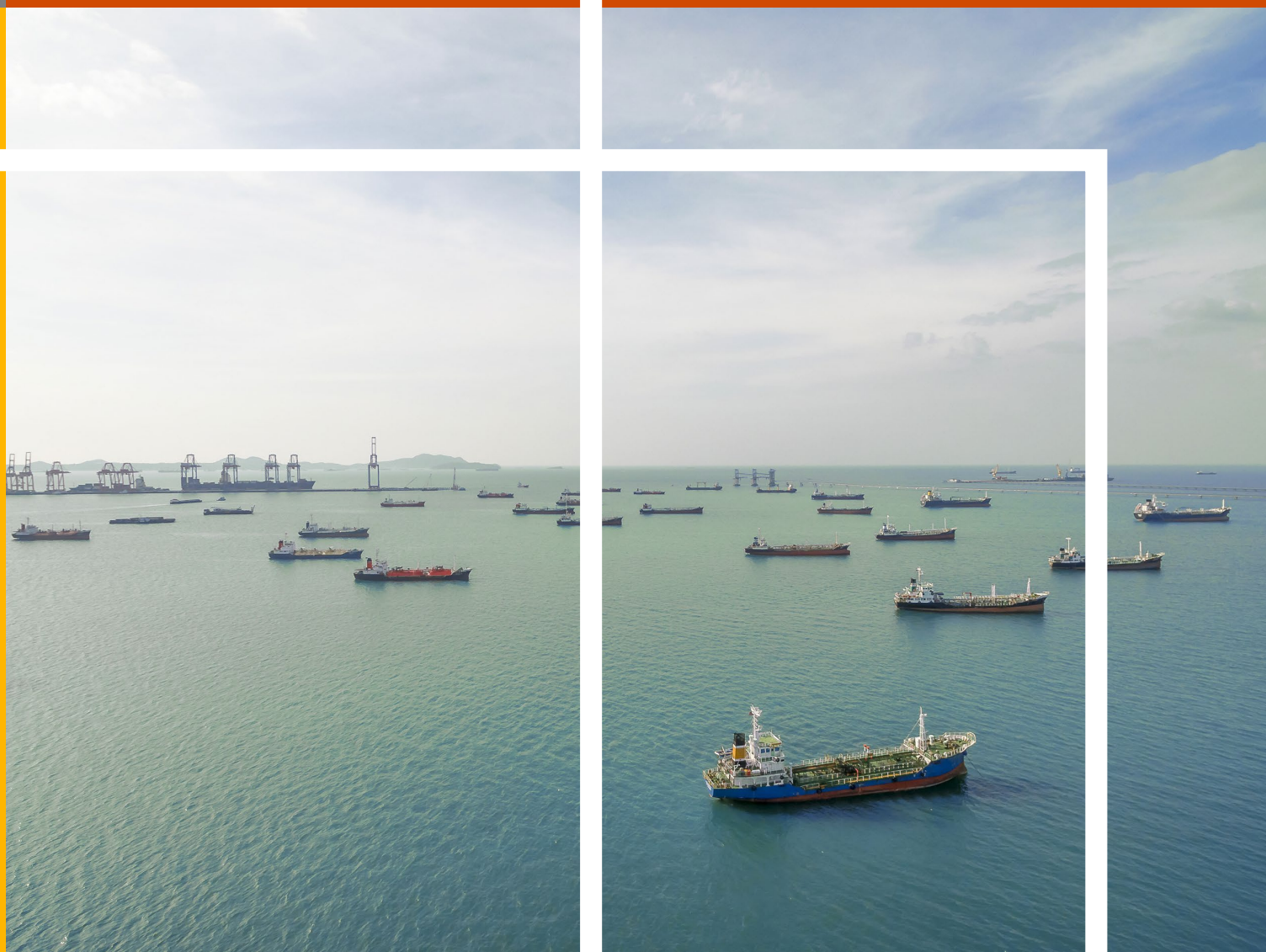
EcoPorts is the main environmental initiative in the European port sector. It was initiated by a number of ports in 1997 and fully integrated into the European Sea Ports Organisation (ESPO) in 2011. The overarching principle of EcoPorts is to raise awareness on environmental protection through cooperation and sharing of knowledge between ports and to improve environmental management.

The European Sea Ports Organisation (ESPO) has developed the Port Environmental Review System (PERS), the only environmental management standard in the port sector.

PERS is a European environment management standard for the port sector that encourages the application of advanced technologies, especially those related to energy efficiency, waste recycling, air quality, digitalisation and automation.

3

Trends and opportunities in the sea port sector



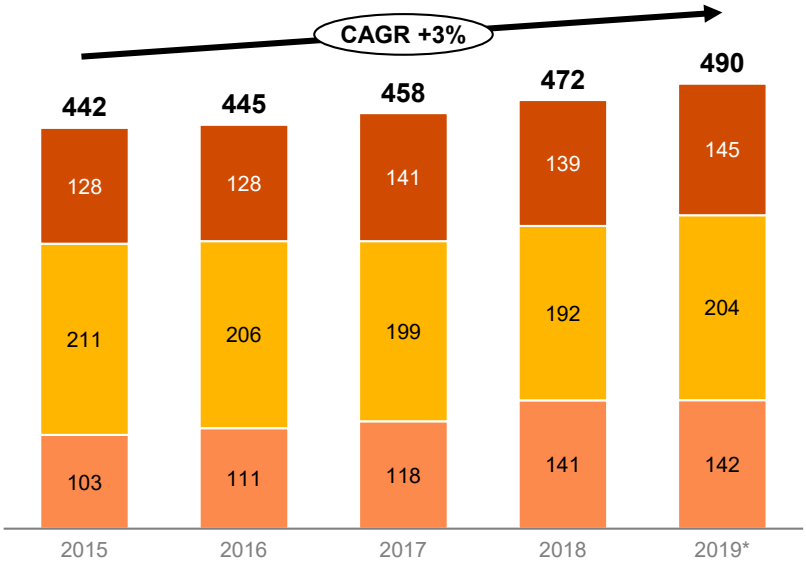
Polish Baltic Sea ports are successfully competing with the largest Northern Sea ports

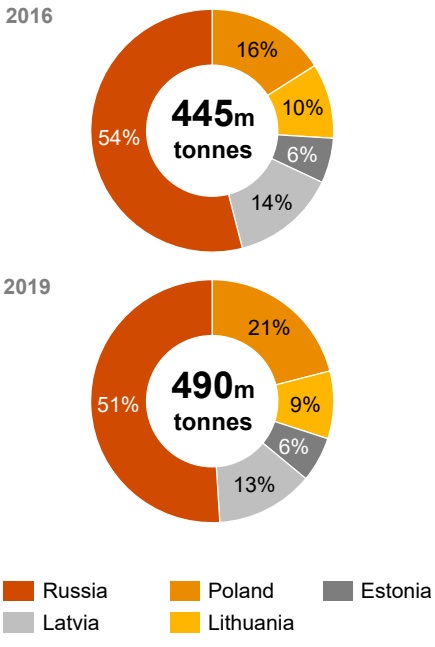
Key trends in the Baltic Sea basin

- Key cargo products in the Baltic basin remain oil, oil products, coal and ferrous metals, which are exported from Russia to the EU and the US. Russian Baltic ports also handle a large cargo flow of mineral fertilisers and forest products to Finland.
- The Baltic countries are successfully developing port infrastructure and deepening their ports. For instance, the Port of Liepaja completed berths deepening to 14 meters in 2019.
- Polish ports have become the leaders in the Baltic market and the main competitors to Northern Sea ports. The Port of Gdansk is one of the fastest growing ports on the Baltic Sea, and it may soon become a transhipment hub that rivals Hamburg. The Port of Gdynia has developed logistics facilities such as roads, railway and warehouse infrastructure and has increasingly become the preferred destination for Chinese freight transport to Europe. Joint cargo turnover in these two ports has increased by 41% over the past five years.

- Competition between Russian ports and ports in Estonia, Latvia and Lithuania is intensifying. Russian ports are mainly competing compete for bulk and liquid cargo flows. The infrastructure of Russian Baltic ports has been upgraded, while its competitors have lost cargo volumes. Thus, Latvian ports handled 62.4 million tonnes in 2019, a 7% drop from 2018. However, competing countries are beginning to attract foreign investors to strengthen their positions on the market. For instance, in 2019, UAE-based Liwathon Ltd. acquired AS VEOS, which is an Estonian oil products terminal operator.

Turnover of main CEE ports in the Baltic Sea basin, million tonnes





Notes: *Part of data was calculated based on data for 9 months of 2019 or on the expected cargo turnover, depending on data from previous years.
Sources: Morcentre-TEK, Rosmorport, Poland statistics, Port of Klaipeda, CSB of Latvia, Estonian Port Association, Port of Tallinn, PwC Analysis

Baltic ports offer multiple investment opportunities that would strengthen their position in international trade

Announced investment plans

Gdansk (2018-2027)
Reconstruction, modernisation and expansion of the port.

Primorsk (2017-2022)
Construction of a new deep-water port in Primorsk, including a container port, by 2022.
The project is part of a strategy of reorienting Russian foreign trade cargo from foreign sea ports to Russian Baltic ports.

Ust-Luga (2017-2024)
Construction of a large complex for producing and handling LNG, grain and general cargo terminals in Ust-Luga. The complex may increase Russian exports of LNG.

St Petersburg (2018-2025)
Reconstruction of a fertilizer terminal, including improvements to the technological infrastructure and the deepening of the water area.

Szczecin (2018-2022)
Reconstruction and modernisation of the technological and transport infrastructure. The deepening of the port and the upgrading of the railroads may result in a spike in cargo flow comparable with the Port of Gdansk.

Bronka (2021-2025)
Expansion of the general and ro-ro cargo terminal, construction of a transport and logistics centre and railway park.

Muuga (2019-2022)
Construction of a dry bulk and mixed cargo terminal in Muuga harbour with the focus on handling and storing round wood, bulk and metal products.

Selected port infrastructure deals

Target name	Ventspils Nafta	Sealand Logistics	Global Ports*	Port of Kunda	DCT Gdansk	AS VEOS
Country	Latvia	Poland	Russia	Estonia	Poland	Estonia
Year	2015	2016	2017	2018	2019	2019
Total value	USD 225m	USD 13m	~ USD 238m	n/a	USD 1588m	n/a
Buyer	Euromin SA	C.Hartwig Gdynia SA	Delo Group	Baltic Maritime Logistics Group	PSA International	Liwathon Ltd.
Share	43.25%	100%	30.75%	100%	100%	100%
Buyer's origin	Switzerland	Poland	Russia	Estonia	Singapore	UAE
Description	Euromin S.A., metals trading company has acquired part of shares of JSC Ventspils Nafta, engaged in the storage, transportation of crude oil and petroleum products.	C.Hartwig Gdynia SA, engaged in providing freight and transportation services, has agreed to acquire Sealand Logistics, engaged in providing transportation services.	Delo group, which is Russia's largest transport and logistics holding, has closed a deal to acquire 30.75% of Global Ports shares.	Baltic Maritime Logistics Group, a holding company engaged in strategic planning has acquired Port of Kunda, which is engaged in handling of cement.	PSA International has agreed to acquire DCT Gdansk S.A., a Poland-based container terminal.	Liwathon Ltd., a UAE-based company engaged in logistics and investment business, has acquired AS VEOS., operator of oil products terminal, from Vopak N.V and Global Ports Investments Plc.

Notes: *Global Ports manages four terminals in the Baltic Sea basin and one terminal in Far East basin.
Sources: Thomson Reuters, Infradeals, ports official data, PwC Analysis

Aegean Sea ports in Greece act as a new gateway to European markets and attract growing investments

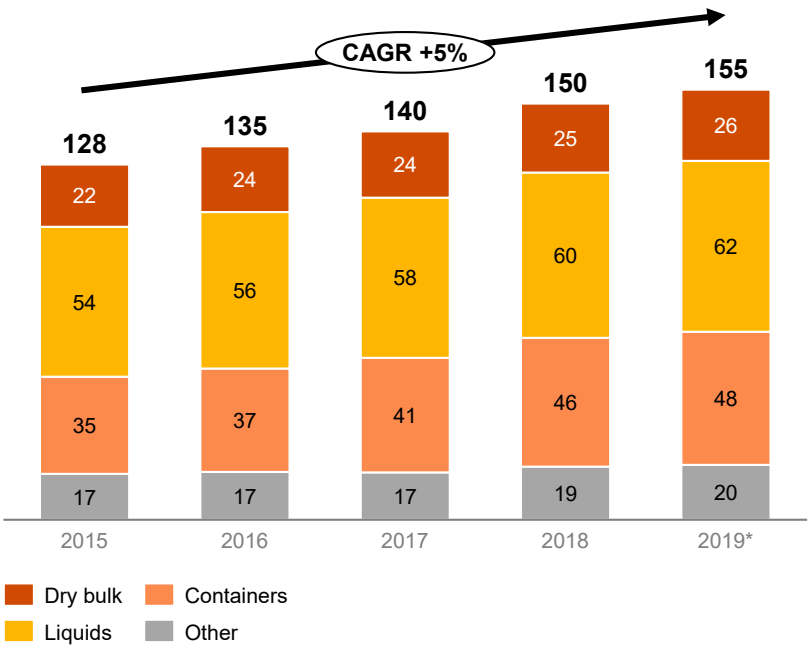
Key trends in the Aegean Sea basin

- The development of Greek ports in the Aegean Sea continues to be a priority. Piraeus, as the major container port in Greece, accounts for the majority of total container traffic, mainly facilitated by the COSCO subsidiary PCT (Piraeus Container Terminal S.A.).
- The next largest project supported by both the COSCO and TEN-T development programme is going to connect Piraeus with Budapest and Prague with a 2,000 km railroad. For more details, see chapters 2 and 4.
- Other ports in Greece are competing for cargo flows in the region. Thessaloniki is the second largest port for container traffic while serving as the major dry bulk port. Thessaloniki closed a deal worth EUR 232 million with a consortium of investors that included CMA-CGM Terminal Link. Given the location of the port between Piraeus and Istanbul and not far from the planned railway to Prague, competition is likely to intensify for the growing cargo flows in the region.

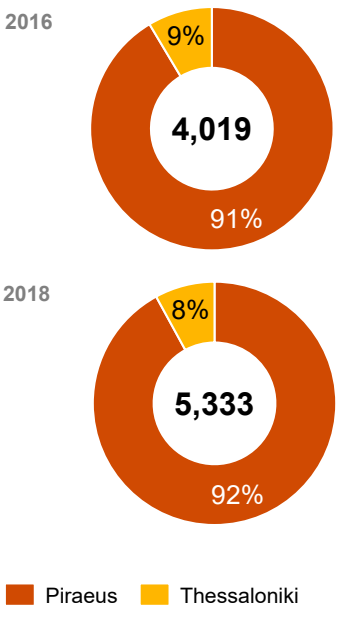
Aegean Sea Basin

- The Hellenic Republic's Asset Development Fund (HRADF) has 100% share ownership of 10 ports in Greece. HRADF intends to work with all 10 port authorities through sub-concessions, master concessions or share sales.
- Liquid bulk cargoes (oil and oil products) are facilitated through private port infrastructure owned by the companies operating the country's refineries. Agioi Theodoroi is an example of private port infrastructure (owned by Motor Oil Hellas).

Turnover at main Greek ports in the Aegean Sea basin, million tonnes



Container throughput, TEU, thousands



Notes: * Part of data was calculated based on data for 9 months of 2019 or on the expected cargo turnover, depending on data from previous years.
Turnover of Greek ports in the Aegean Sea is not included in overall turnover of CEE ports demonstrated in chapter 1 of this report.
Sources: Eurostat, PwC Analysis

Greece and the EU are funding port development in the Aegean Sea, forming a strong competitive position

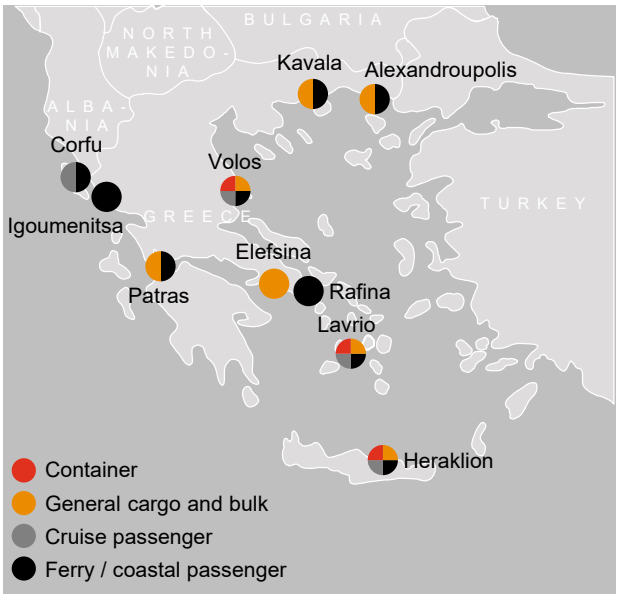
Announced investment plans

Privatisation of up to four port authorities (2020 +)

The Hellenic Republic's Asset Development Fund (HRADF) holds a 100% share in 10 ports in the form of *sociétés anonymes*. HRADF intends to work with all the 10 port authorities through sub-concessions, master concessions or share sales. By 2020, HRADF intends to proceed with share sales of up to four out of the ten port authorities (Alexandropoulis, Kavala, Volos, Patras, Igoumenitsa, Corfu, Heraklion, Lavrion, Elefsina and Rafina).

Piraeus Port (2020-2022)

COSCO plans to turn Piraeus port into the largest commercial harbour in Europe, spending about EUR 600 million (USD 660 million) to boost operations, including mandatory investments of EUR 300 million by 2022. Once concluded, COSCO will have an additional 16% stake in the port.



Alexandropoulis Port and Kavala Port (2018+)

Participates in the SEA-2-SEA project funded by the EU (development of an intermodal transport corridor connecting the North Aegean Sea Greek ports to the Black Sea and Danube River ports)

Selected port infrastructure deals

Target name	Piraeus Port Authority S.A.	Thessaloniki Port Authority
Target country	Greece	Greece
Year	2016	2018
Total value	n/a	EUR 232m
Buyer	China Cosco Shipping Corporation Ltd	CMA-CGM Terminal Link (33%) Deutsche Invest Equity Partners (47%) Private Greek investor (20%)
Share	51%	67%
Buyer's origin	China	Germany, France, Greek
Description	China Cosco Shipping Corporation Ltd, which was the only bidder, bought 51% of the Piraeus Port Authority S.A. (listed on Athens Stock Exchange), with an option for acquiring an additional 16%, accompanying the offered price for this buy with a commitment to a series of compulsory investments. The same year, Law 4389/2016 established a Public Port Authority (PAP) responsible for safeguarding the public goods produced in the country's privatised ports and for supervising the internal market at the ports.	South Europe Gateway Thessaloniki Limited completed the acquisition of a 67% stake in Thessaloniki Port Authority S.A. from Hellenic Republic Asset Development Fund. South Europe Gateway Thessaloniki Limited (SEGT) is a Germany-based consortium of investors, consisting of: • Deutsche Invest Equity Partners GmbH is a Germany-based alternative investment firm. • Belterra Investments Limited is a Cyprus-based investment holding company having interest in companies engaged in operating shipping terminals. • Terminal Link SAS is a France-based company engaged in operating shipping terminals. Thessaloniki Port Authority S.A. is a listed Greece-based state owned company engaged in operation and management of port. Hellenic Republic Asset Development Fund (HRADF) is a Greek-based investment firm, headquartered in Athens.

Sources: HRADF, Piraeus Port Authority, Kavala port, Alexandropoulis Port Authority, PwC Analysis

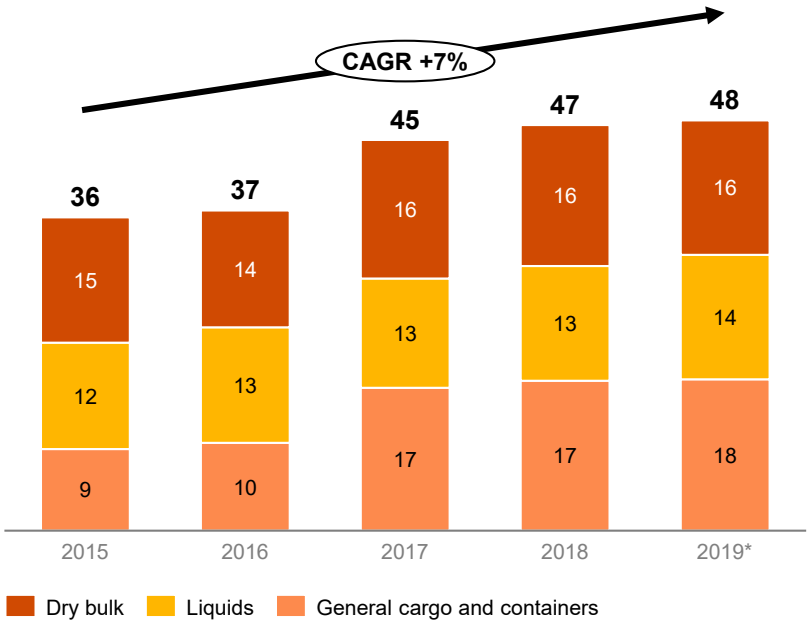
Adriatic Sea ports are increasingly competing for Asian cargo flowing through Piraeus and Black Sea ports

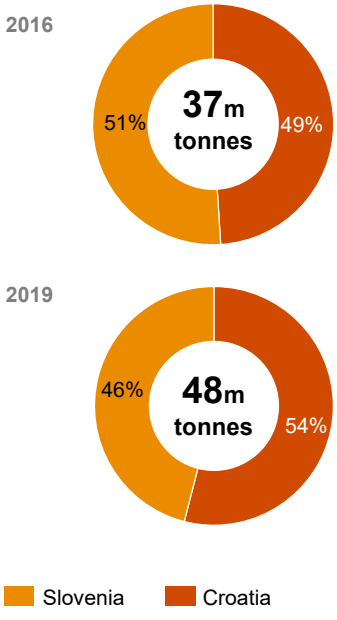
Key trends in the Adriatic Sea basin

- Adriatic sea ports are developing at a significant pace. The leading port on the Adriatic Sea is the Slovenian Port of Koper. From 2016 to 2019, the Port of Koper throughput increased 15% from 845,000 TEU to 959,000 TEU. Port Koper has announced a two-stage plan to add 700,000 TEU of capacity by 2030.
- Ports in the Northern Adriatic region are mainly gateway ports that provide access to Central and Eastern European markets, including large distribution and consumption centres located in commercial hubs such as Vienna, Prague and Budapest, which are expected to continue their growing. These hubs are driving the flow of consumer goods, facilitated by container terminals in the Northern Adriatic.
- The main competitors of Croatian and Slovenian ports in Adriatic Sea are the Italian ports of Northern Trieste, Venice, Ravenna, Southern Bari and Gioia Tauro. These ports are also competing with one another for Asian cargo flows to Europe and with the Greek port of Piraeus (in Chapter 4, we provide an overview of Piraeus). The Black Sea ports of Varna and Constanta are also competing for the same cargo flows.

- To compete for growing cargo turnover in Central and Eastern Europe, Croatia continues to develop its infrastructure. Rijeka is competing with Koper. Both ports announced plans to expand their capacity and to develop hinterland connectivity with the main trade hubs, including Budapest and the TEN-T corridors. The Port of Rijeka announced the concession of a ZDSCT container terminal and active development of container terminal AGCT and LNG terminal.
- At present, the growing capacity of Adriatic ports may surpass the current capacity of rail infrastructure to connect ports with landlocked CEE countries. This may become the main bottleneck in port development.

Turnover at main CEE ports in the Adriatic Sea basin, million tonnes





Notes: * Port Rijeka turnover in 2019 was calculated based on the expected cargo turnover depending on previous years data due to the lack of official data.
Sources: Port of Ploce, Port of Koper, Port of Rijeka, PwC Analysis

Investment plans are focused on increasing cargo flows to inland CEE through Adriatic ports

Announced investment plans

Koper (2020-2025)
Expansion of port capacities, including berth reconstruction and the development of road and rail infrastructure.

Ploče (2015-2025)
Construction of new liquid cargo and liquid gas terminals and a pier for liquid cargo transhipment.

Zalaegerszeg Yard (2022-2023)
Construction of a new dry terminal in the west of Hungary. The terminal will include an intermodal yard with two 650-metre rail sidings, a container depot, truck parking, offices and warehouse areas. It may become the closest Hungarian terminal to Trieste, Koper and Northern Italy.

Rijeka (2020-2023)
Improvement of the infrastructure in the Port of Rijeka, including construction of a new container terminal ZDSCT and reconstruction of existing Adriatic Gate Container Terminal (AGCT), railway tracks and accompanying communal infrastructure.

LNG terminal on Krk island (2019-2021)
Construction of a new LNG terminal, including a floating terminal, storage and regasification unit. The LNG terminal may deliver gas to the Croatian national transmission network, which is connected with Slovenia, Italy and Hungary.

Šibenik (2018-2021)
Construction of a new terminal for the transhipment of raw oil.

Trieste (2020-2022)
Construction of a new multipurpose terminal at Noghere. The port and logistics base that Hungary is establishing in Trieste may strengthen both countries.

Venice (2022-2037)
Renovation of Venice Port.

Selected port infrastructure deals

Target name	Luka Bar	Luka Rijeka	Noghere, Trieste Port
Target country	Montenegro	Croatia	Italy
Year	2016	2017	2019
Total value	USD 7.4m	USD 12m	USD 31m
Buyer	OT Logistics SA	OT Logistics SA	Hungarian government
Share	30%	11.75%	100%
Buyer's origin	Poland	Poland	Hungary
Description	OT Logistics SA, a transportation and logistics services provider, has agreed to acquire a 30% stake in Luka Bar, an operator engaged in handling and storing goods.	OT Logistics has settled the acquisition of a 11.75% share in Luka Rijeka, bringing its total stake to 32.56%.	A public Hungarian company has acquired an area at Noghere (or Aquila area), Trieste port, of 320,000 m², from two Italian private businesses, Teseco and Seastock, which should lead to the construction of a new multipurpose terminal, a further investment of EUR 100 million.

Sources: Port of Constanta, Port of Durres, Port of Vlora, Port of Koper, Infradeals, PwC Analysis based on the BMI Risk–Reward Index

Black Sea ports are increasing export cargo volumes and growing transit between Asia and Europe

Key trends in the Black Sea basin

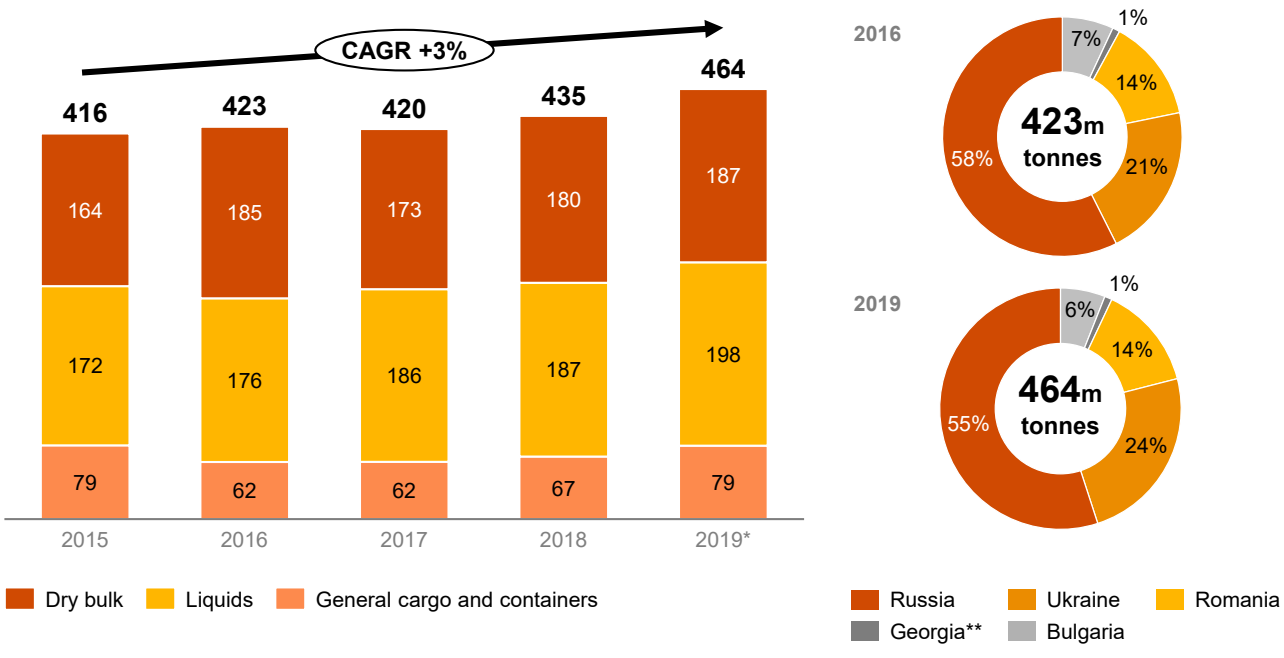
Export

- Since 2013, the Ukrainian government has sought to privatise Ukrainian ports. However, the first deals were made only in 2019, with the adoption of a law regulating concessions. In 2019, more than one hundred private operators worked at 13 Ukrainian ports. Newly signed concessions resulted in the growth of overall turnover, especially of dry cargo flows. Over the last three years, Ukrainian port turnover has increased by 26% (or 23 million tonnes). The State Property Fund of Ukraine is planning to put the seaports in Skadovsk, Belgorod-Dniester and Ust-Dunaisk up for privatisation.
- Increased exports of Ukrainian and Russian cargoes, which, along with the extension of trade routes and the increasing size of vessels, have boosted the development of the Taman and Novorossiysk ports. The main cargo includes oil, oil products and grain.

Transit

- The Black Sea is an important part of the Southern Belt-Road corridor. Chinese investors have started looking at new Black Sea assets to expand their business. In 2019, China Machinery Engineering Corporation signed a contract to develop Bulgaria's Port of Varna.
- As mentioned in Chapter 2, the new alternative Bulgaria logistics corridor from Asia to CEE through the Port of Varna is planned to be completed in 2024. The aim of the project is not only to redirect a large part of international trade flows from Asia to CEE through Bulgaria, but also to develop special zones in Bulgarian cities.
- The Port of Constanta has previously handled higher volumes of transhipment container traffic, but currently handles mainly developing import-export cargo flows. DP World is investing in both yard capacity expansion and additional container handling equipment. However, construction on the planned LNG terminal has not yet begun.

Turnover at main CEE ports in the Black Sea basin, million tonnes



Notes: * Data of several ports turnover in 2019 was calculated based on the expected cargo turnover depending on data from previous years due to the lack of official data.
** Only Port of Batumi is shown as Georgian port.
Sources: Morcentre-TEK, Rosmorport, CCB of Ukraine, Agency of Sea Transport of Georgia, Port of Poti, Port of Varna, Port of Burgas, PwC Analysis

Expansion projects at Black Sea ports are aimed at strengthening the basin's transit position

Announced investment plans

Port of Taman (2019-2024)

Russia's infrastructure development programme contains a plan to increase the capacity of Russian seaports by building dry cargo terminals at the Taman seaport by 2024. The project includes construction of a dry bulk terminal, a fertilizer terminal, a grain terminal and an LPG terminal.

Port of Varna (2020-2023)

Development of port infrastructure and warehouses facilities. The project is financed by the Chinese corporation CMEC.

Port of Anaklia (2018-2021)

Construction of a new deep-water port with the Anaklia Development Consortium, the port's container terminal operators and the free industrial zone's operators.

The project partners moved the deadlines several times due to the lack of guarantees of future deliveries from cargo owners. Due to non-compliance with the project deadlines, its implementation was postponed for a certain period.

Port of Poti (2019-n/a)

Construction of a new bulk terminal according to the PACE project, including development of the land, dredging of the harbour up to 12 m depth and capacity increasing.

Selected port infrastructure deals

Target name	North Star Shipping	Oiltransterminal	Novorossiysk Port	Mykolayiv Sea Port
Target country	Romania	Ukraine	Russia	Ukraine
Year	2015	2017	2018	2019
Total value	USD 76m	USD 7.5m	USD 1630m	39m
Buyer	ADM Co	EVERI Company	AK Transneft	POSCO Daewoo Corporation
Share	n/a	n/a	25.05%	75%
Buyer's origin	USA	Ukraine	Russia	South Korea
Description	ADM Co, engaged in merchandising agricultural commodities, has agreed to acquire an undisclosed majority stake in North Star Shipping, engaged in providing shipping agency and freight forwarding.	Terminal operator EVERI Company has acquired Oiltransterminal, which is a Ukrainian oil export terminal.	AK Transneft, a state owned company engaged in oil and gas transportation, has acquired a 25.05% stake in Novorossiysk Commercial Sea Port.	POSCO Daewoo Corporation, engaged in importing and exporting Korean goods, has agreed to acquire a 75% stake in the Mykolayiv Sea Port grain terminal.

Target name	Taman Grain Terminal Complex
Target country	Russia
Year	2020
Total value	USD 68m
Buyer	VTB Group
Share	50%
Buyer's origin	Russia
Description	Demeter Holding LLC (part of VTB Group) has acquired a 50% stake in Taman Grain Terminal Holdings Limited, which owns a 100% stake of Taman Grain Terminal Complex LLC, a deep — water specialized grain handling terminal.

Sources: Thomson Reuters, Infradeals, Rosmorport; ports official data, PwC Analysis

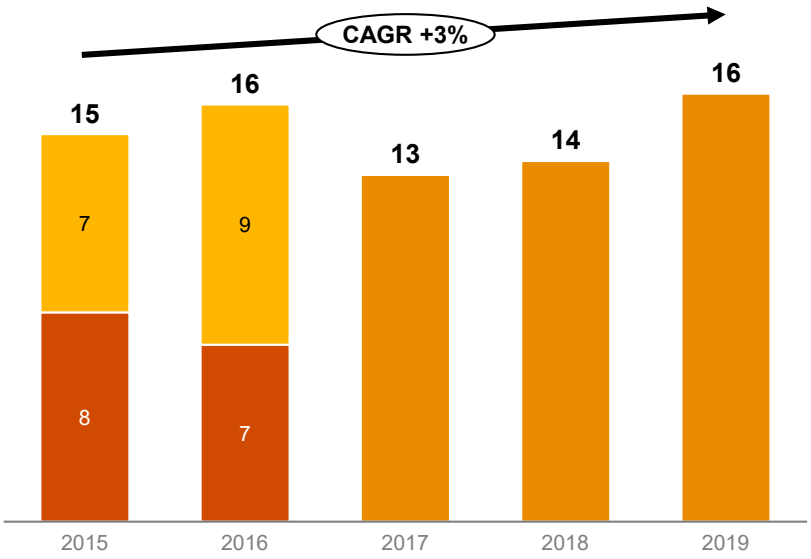
North-South and East-West transportation routes are driving port development on the Caspian Sea

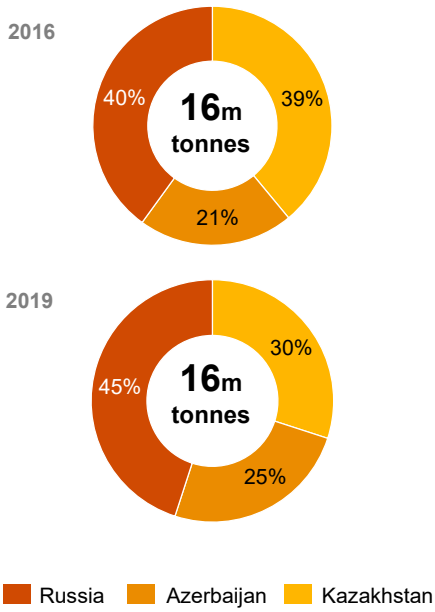
Key trends and investment projects in the Caspian Sea basin:

- The development of the Caspian region as a potential hub on the North-South and East-West routes is driving the potential growth of Caspian ports.
- The Port of Baku, which started operations after being rebuilt in Alat in 2018, has already handled more than 4 million tonnes in 2019. The Port of Baku stands on the crossroads of the Southern corridor of the Belt Road route (Asia to Europe) and of the North-South transportation corridor (Middle East and South Asia to Northern Europe / Russia).
- Kazakhstani ports are also expanding their transit cargo flows through the Caspian Sea. In 2019, Aktau and Kuryk handled a total of about 5 million tonnes of cargo. To support the Belt Road initiative, a regular ferry line was launched between Baku and Kuryk several years ago. . Growth of Caspian transit traffic is also connected with a regular container feeder line from Aktau to Baku and back. During the year since the start of feeder line operations more than 12 th. TEU were transported.
- The Russian infrastructure development programme aims to increase the capacity of Caspian Sea ports. In addition to developing the existing Russian ports of Astrakhan, Makhachkala and Olya, Russia is also planning to build a new deep-sea port near the city of Kaspiysk in Dagestan by 2025.

- Turkmenbashi is a gateway port for Central Asia, especially Afghanistan, Tajikistan and Uzbekistan. Turkmenbashi mainly handles exports of oil and oil products. However, data on cargo turnover and future plans have not been published in recent years.
- In 2019, Iran announced its readiness to invest in Belt Road projects and become part of the trade route from China to Europe. China is already investing in the development of oil industry and inland transport infrastructure in Iran. However, no port development plans have been announced yet.

Turnover at main CEE ports in the Caspian Sea basin, million tonnes*





Notes: *Data available on the ports of Russia, Azerbaijan and Kazakhstan.
Sources: Morcentre-TEK, Rosmorport, Port Baku, Port Aktau, Port Kuryk, PwC Analysis

Russia develops export and transit cargo flows strengthening the Far East basin's competitive position

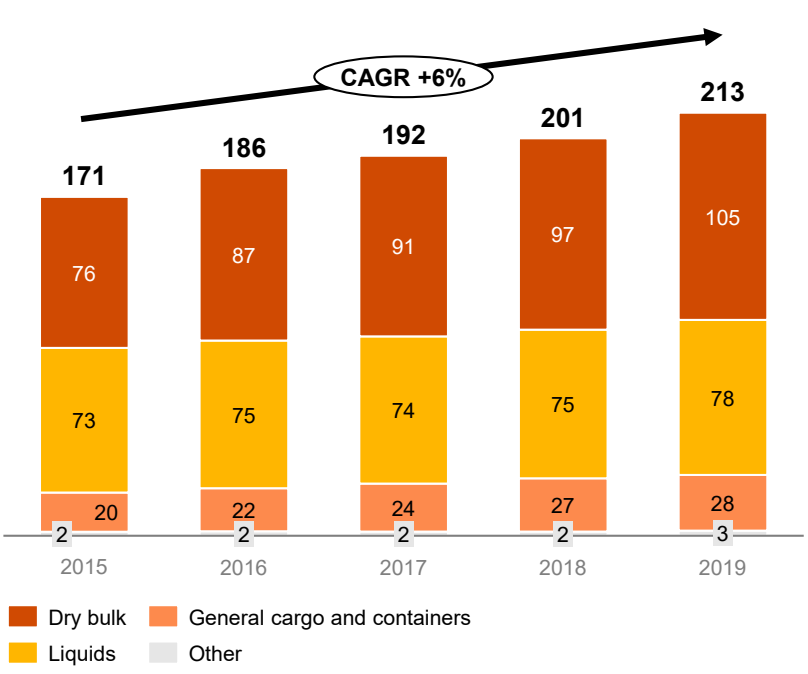
Key trends and investment projects in the Far East basin:

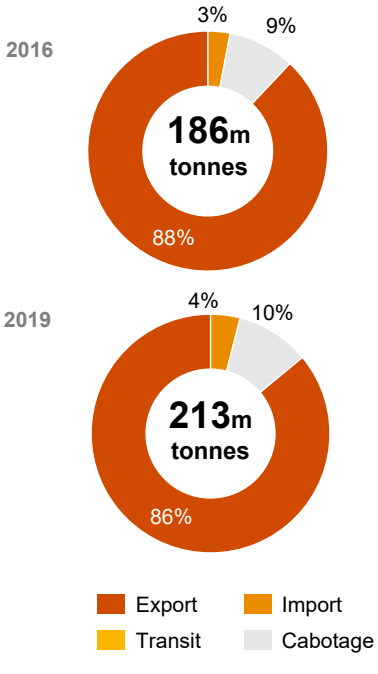
- The Far East basin is of crucial importance for Russian export cargo flows, especially coal. Coal share in Far Eastern ports turnover is 47%. In 2019, the growth in the coal handling was 8.5%. However, railways near ports are overloaded, and their development is slower than the growth of the coal flow. Russia's infrastructure development programme includes construction projects for a coal transhipment complex in Muchka Bay near Vanino and the Vostochny-Nakhodka transport hub.
- The Russian-Chinese international transport corridor project (Primorye 1 and Primorye 2) is also important for the development of the basin's cargo turnover. It is expected that these corridors will increase the transit flow of goods from Northern China to Russian Far East ports for further export to Japan, South Korea and the US. The full transit corridor capacity of 45 million tonnes is expected to be achieved by 2030.
- Primorye 1 is designed to handle cargo via Vladivostok bound for the West coast of the United States and Europe, while Primorye 2 is constructed to handle regional shipments between China and Russia and through South Korea and Japan.

Selected port infrastructure deals

Target name	Nakhodka Trade Sea Port
Target country	Russia
Year	2017
Total value	USD 354m
Buyer	Lanebrook Limited
Share	100%
Buyer's origin	UK (investments origination – Russia)
Description	Investment holding Lanebrook Limited has agreed to acquire EVRAZ Nakhodka Trade Sea Port.

Turnover at Russian ports in the Far East basin, million tonnes





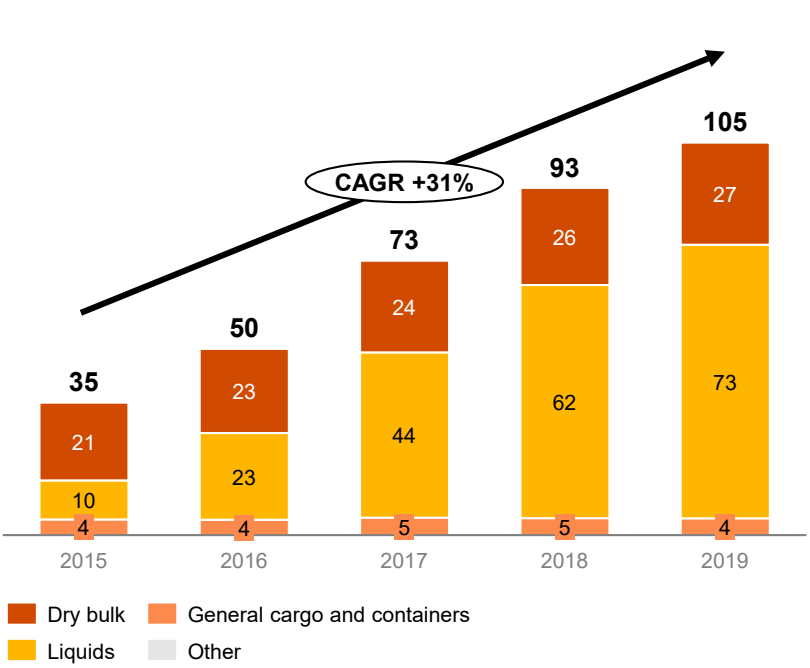
Sources: Morcentre-TEK, Rosmorport, PwC Analysis

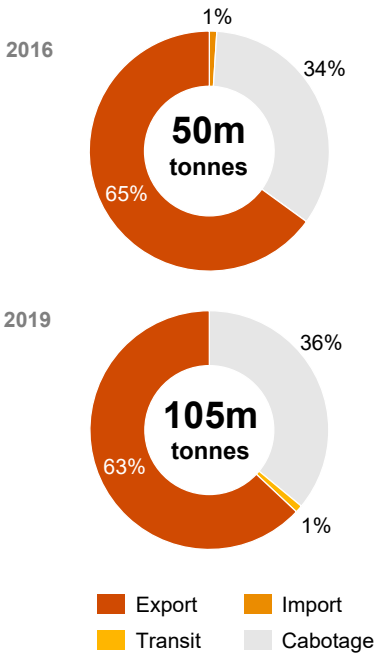
Arctic ports' export cargo flows grow, while the Northern Sea Route is expected to expand transit

Key trends and investment projects in the Arctic Sea basin:

- The development of Arctic port infrastructure is mainly being driven by oil and gas mining. After the Yamal LNG project was commissioned in 2017 by a joint venture between the Russian Novatek, French Total, China National Petroleum Corp. and Chinese Silk Road Fund, shipments doubled within a year. In 2018, exports of LNG, gas condensate, oil and oil products accounted for almost 90% of shipments or 17 million tonnes.
- In 2019, Novatek announced that the China National Petroleum Corporation and China National Offshore Oil Corporation would also be investing in a second Arctic Circle LNG project, with an annual processing capacity of about 2 million tonnes. In addition to investing, seven Chinese manufacturing companies also participated in the modular construction of the Yamal project. COSCO Shipping Energy Transportation Co., Ltd., a subsidiary of China COSCO Shipping, joined forces with Mitsui O.S.K. Lines, Ltd. to invest, construct and operate the ARC7 ice-class LNG carriers tailored for the Yamal project.
- Transit cargo flows accounted for less than 1% of the traffic in 2018. Transit volumes on the Northern Sea Route have been around 200,000-300,000 tonnes per year. Maersk and COSCO have made several trial passages through the NSR.
- In 2018, the NSR development project was added to Russia's infrastructure modernisation and expansion plan with a budget of over RUB 580 billion (USD 9.25 billion) for the next five years. The plan includes the expansion of road capacity to ports in the Western and Eastern Arctic basin. The planned target capacity is 20,000 units per day.
- Developing the icebreaker fleet is another part of the core plan for the Arctic basin, including replacement of eight icebreakers and construction of four new LNG-powered icebreakers.

Turnover at Russian ports in the Arctic Sea basin, million tonnes





Sources: Morcentre-TEK, Rosmorport, PwC Analysis

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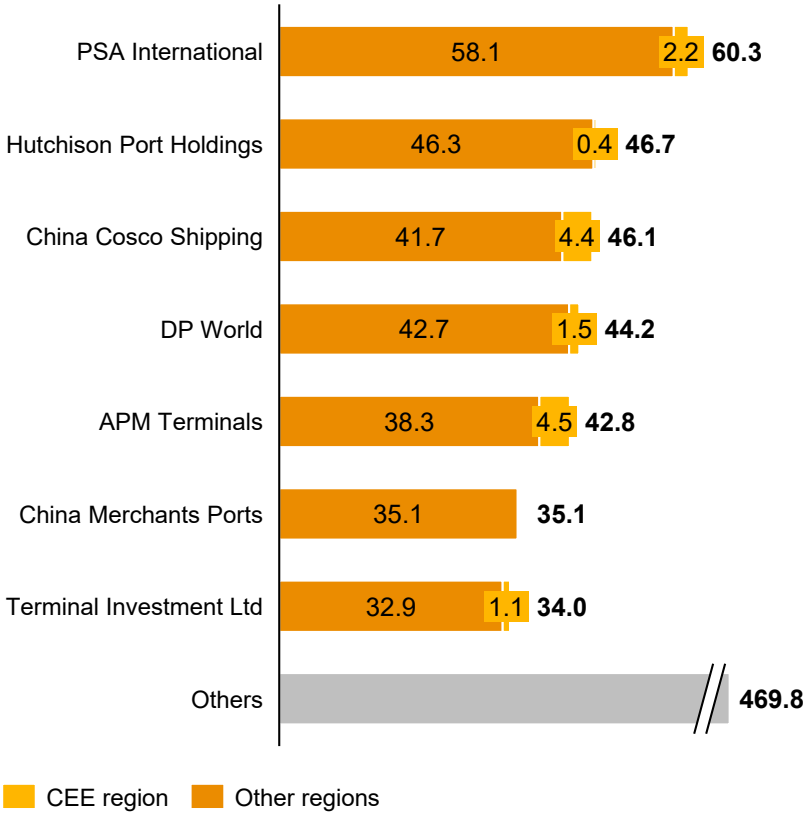
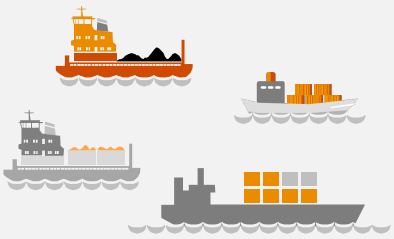
Global operators of port terminals in the CEE region

Major players in the container transportation market continue to grow with mergers and acquisitions

Leading global terminal operators by throughput 2018, million TEUs





The seven leading global terminal operators accounted for nearly 40% of global throughput in 2018.

To improve their efficiency, subsidiary terminals have integrated with shipping lines. Terminal Investment Ltd has integrated with MSC, for example. Independent operators have also integrated with shipping lines under long-term agreements, such as the agreement between Maersk and APM Inland services.

Examples of M&A deals between lines, terminal operators, inland transportation and logistics companies in the last three years

2017	2018	2019	2020
COSCO + KTZE-Khorgos Gateway	PSA + Ashcroft Terminal	APMT Inland Services + Maersk	Hapag-Lloyd + TC3
COSCO + Zebrugge terminal	DP World + Unifeeder	DP World + P&O Ferries	Hutchison Port + APM Terminals Rotterdam
TIL + TTI	HHLA + TK Muuga	CMA CGM + CEVA logistics	China Merchants Ports + Terminal Link

Terminal operators, dry ports operators, shipping lines and inland logistics companies are cooperating on expanding the geography of operations and simplifying the supply chain.

By setting up alliances and possessing their own terminals, shipping lines can improve their competitive position and benefit from economies of scale by cutting their costs on terminal services as the margins go down.

Closer collaboration between players in the container transportation market has reduced complexity and eliminated service overlaps and costs. All brands can now focus on their core strengths and provide greater value and a better experience to customers.

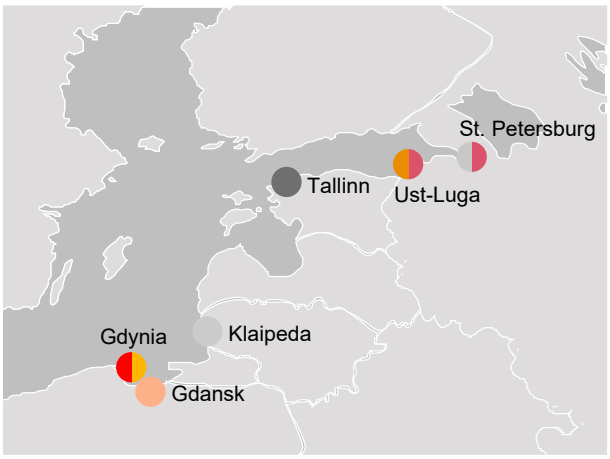
Consolidation offers certain benefits for cargo owners, too. These include less fluctuation in freight rates and more efficient and extensive services.

Sources: Statista, Port.today, PwC Analysis

The Baltic Sea and Black Sea basins have the most significant numbers of leading terminal operators

CEE ports owned or partly owned by leading container terminal operators

Baltic Sea basin



Black Sea basin

Adriatic Sea basin

Aegean Sea basin

Global terminal operators

- PSA International
- APM Terminals (incl. Global Ports)
- DP World
- China COSCO Shipping
- Terminal Investment Ltd
- Hutchison Port
- ICTSI

Leading local operators in EU

- Eurogate
- HHLA

The Baltic Sea and Black Sea basins have the largest number of global and leading local operators in the CEE region.

The Adriatic and Aegean Seas attracted more recent attention from global companies due to their gateway role and opportunities for multimodal transportation in Europe from Piraeus, Rijeka and other ports.

Sources: Drewry, OECD, sites of companies, PwC Analysis

Port development within Belt Road initiative brings to the region Chinese and Middle Eastern investors

The Belt Road Initiative, launched in 2013, is aimed at facilitating trade flows between China and Europe by developing transport connections between regions. Over the past three years, the initiative has produced its first results. Ports with a Chinese presence are going to be renovated and developed into new major hubs for Chinese access to the European market. Investors are mainly developing sea ports located around the CEE region on the coasts of the Mediterranean and North Seas, which are part of the key trade route from China to Europe.

Strategic investments in European and Mediterranean ports

Chinese investments in ports

The largest Chinese market players in shipping and port operating (COSCO, CM Port and Hutchison Ports) have invested in 20 European ports, including in the CEE region (Poland, Greece). These ports are located on a main trade route between Asia and Europe. The flow of Chinese investments into ports is aimed at developing them into key hubs for Chinese access to European markets (for example, the largest Greek port, Piraeus, is mostly owned by COSCO).

Middle East investments in ports

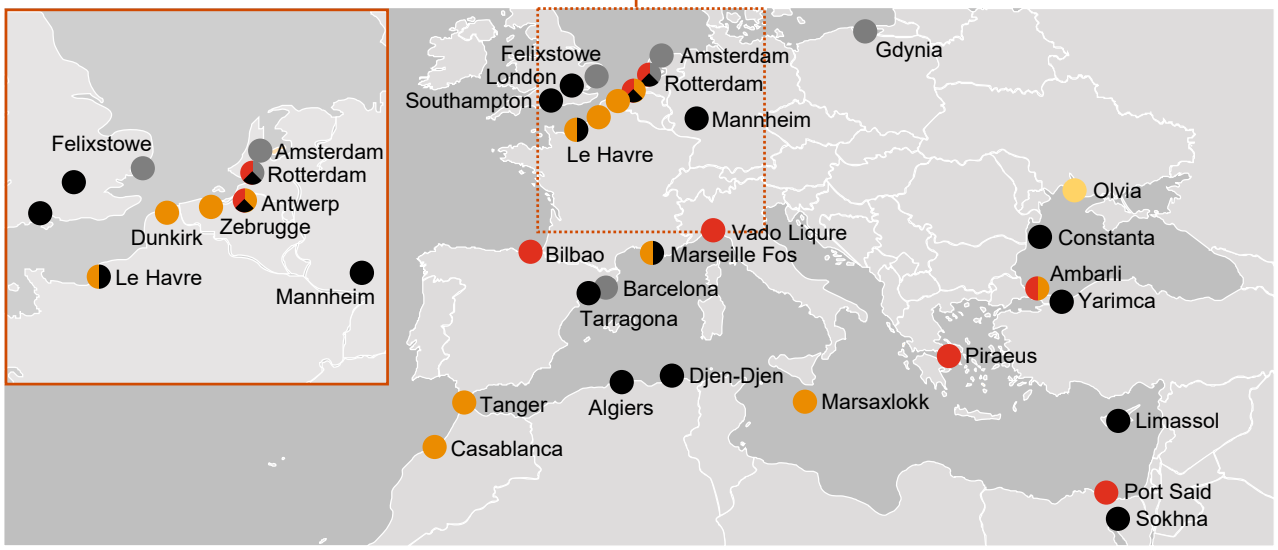
DP World currently owns an inland logistics hub in Mannheim (Germany) and runs the DP World Network on the Rhine, which connects its deep sea ports with its inland terminals (Rotterdam, Liege, Mannheim and Stuttgart, etc.). Regional investors such as QTerminals also strengthen their positions. In the coming years, Middle Eastern investments will continue competing with Chinese investments for the same cargo flows.

Chinese investors (> 20% ownership)

- COSCO
- CM Port (incl. Terminal Link)
- Hutchison Ports

Middle East investor (> 20% ownership)

- DP World
- QTerminals



The European Union is interested in protecting its trading environment from increasing influence of China. In March 2019, the European Commission presented a plan that should balance the relationship between the European Union and China.
Considered measures included the following aspects connected with ports and shipping industry:

- reforming the World Trade Organization, in particular on industrial subsidies and forced technology transfers, to ensure a level playing field;
- integration of the new rules on the participation of third country bidders and goods in the EU procurement market, including security, labor and environmental standards and state aid rules;
- implementation of the Regulation on screening of foreign direct investment to detect and raise awareness of security risks posed by foreign investment in strategic assets, technologies and infrastructure.

Sources: COSCO, CM Port, Hutchison Ports, news, PwC Analysis

Development of inland infrastructure in the CEE has become a new focus of Chinese investment

CEE ports are highly important entry points for Chinese goods to the European market. To ensure the further development of trade and expand their presence in Europe, Chinese companies are investing in the Belgrade-Budapest high-speed railway from Piraeus to consumption centres.

Construction of a new high-speed railway Belgrade-Budapest

Completion of the 370-km Belgrade-Budapest high-speed railway is planned for 2023. The total length of the road from Prague to Piraeus will be 2,146 km.

The project is expected to cost over USD 2 billion.

Annual cargo turnover from Asia to Europe through all ports, 2019*

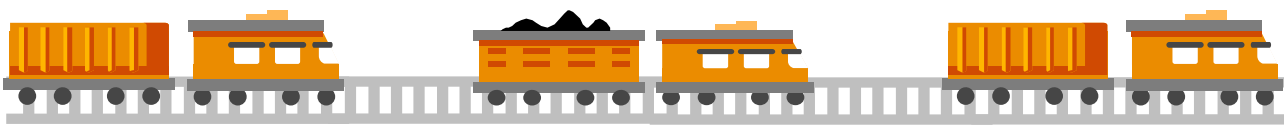
In May 2020, the Hungarian government officially secured a Chinese loan to bankroll the anticipated project. After securing the loan from China, which should fund up to 85% of the project, the Hungarian government moved to declare all the documents linked to the scheme as state secrets for ten years. According to the optimistic estimates, the total investment should be at least 2.1 billion dollars.

The project will construct a new high-speed railway that would connect the Greek seaport of Piraeus, which is mostly owned by COSCO, with the key Balkan cities of Skopje and Belgrade, facilitating the flow of goods directly from the Black Sea to Budapest, one of the largest trade hubs.

The Port of Piraeus, operated by COSCO, is the only European port operated by a Chinese company. It is expected to become the largest Mediterranean hub. The port handled 5.65 million TEUs in 2019.

The advantages of the route include the following factors:

- Piraeus is the closest major Mediterranean port for ships arriving via the Suez Canal;
- The port's maximum draft of 18m makes it possible to serve deep sea ships;
- One of the largest players in maritime transport is involved in developing the port.



Notes: * annual cargo turnover from Asia to Europe is a forecasted value from Drewry report
Sources: Drewry, COSCO, news, PwC Analysis

The development of Croatian container ports is another strategic priority for Chinese investors

Chinese port operators and funds are investing in Croatian ports to increase the efficiency of cargo delivery to European centres of commerce. Chinese investors are also interested in developing the regional airport and such transport corridors as the Adriatic–Ionian Highway.

Chinese interest in Croatian ports

● The Adriatic Gate Container Terminal has annual capacity of 450,000 TEU.

○ The Zagreb Deep Sea Container Terminal is a new project with an expected capacity of 1 million TEU in 2023.

Ningbo Port, Tianjin Port and the China Road and Bridge Company (CRBC) consortium has a high probability to win the tender for construction of the new container terminal of ZDSCT in Rijeka.

Based on the successful example of Piraeus in Greece, Croatia became a potential hub in 2018 for port infrastructure development as part of the Belt Road Initiative due to its proximity to the main trade hubs and transport corridors.

Croatia is located much closer to the geographic centre of Eastern Europe. Delivering goods from Croatia takes less time than from Greece and Turkey, which are relatively far from the trade centres.

The AGCT working terminal has a strong competitive position thanks to the diversity of multimodal transport to Eastern and Central Europe and its ability to handle Post-Panamax vessels.

Since inland infrastructure development projects, including the Belgrade-Budapest railway, might be launched simultaneously with the new ZDSCT in 2023, ZDSCT might expect a moderately growing cargo flow.

Other recent Chinese investments in the CEE region

Year	Project description
2016	China Everbright Group, a state-backed financial firm, bought all the shares in Albania's airport operator, hailing the deal as part of China's push to build trade links with Europe.
2017	CCCC flagship China Road and Bridge Corporation (CRBC) signed agreements to invest in highway projects including one linking Belgrade to the port of Bar in Montenegro.
2018	China Railway Engineering Corporation joined private-sector builder Pacific Construction to invest in the Albania section of the Blue Corridor project (Adriatic-Ionian Highway) as part of a PPP.

Sources: Infradeals, AGCT, ZDSCT, news, PwC Analysis

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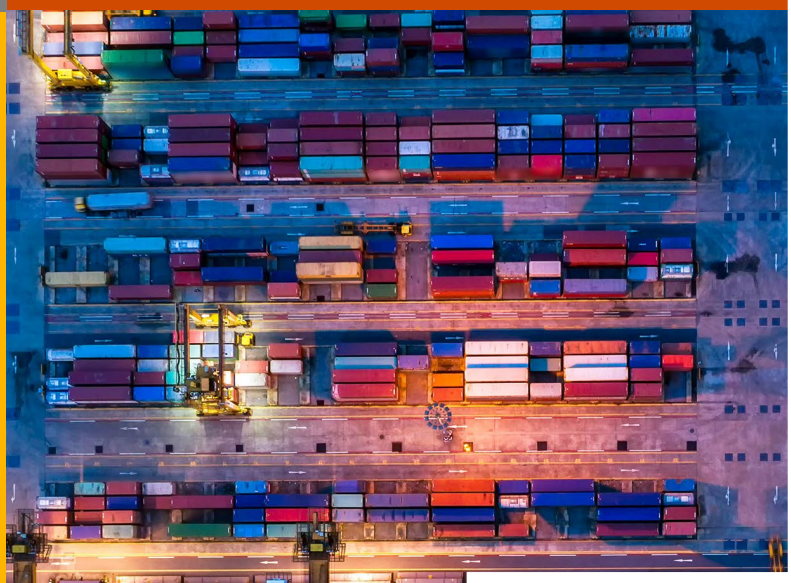
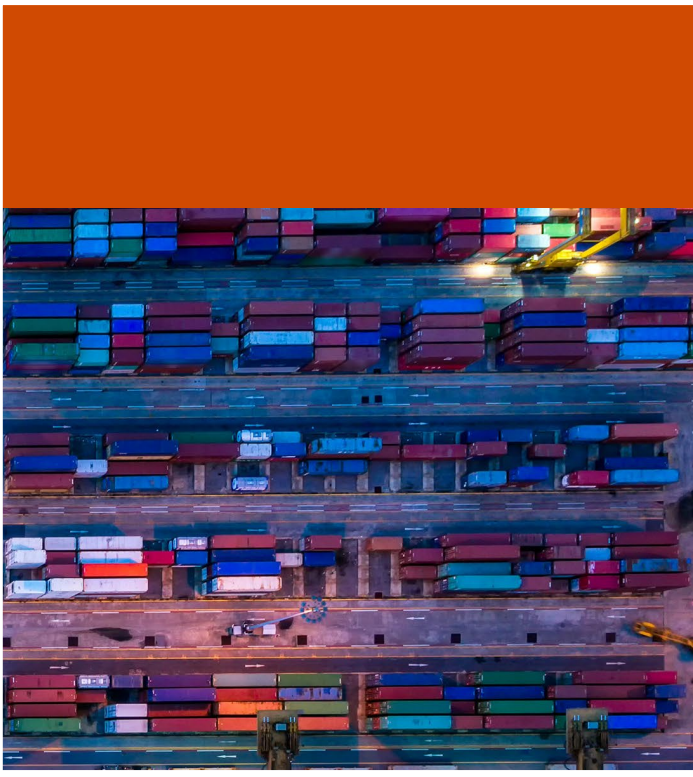
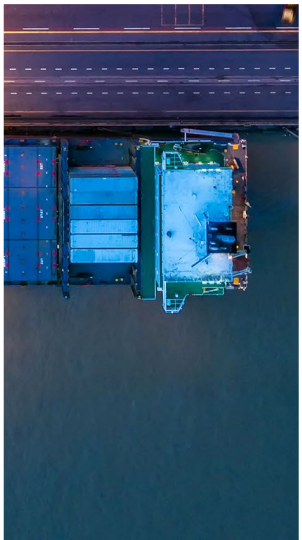
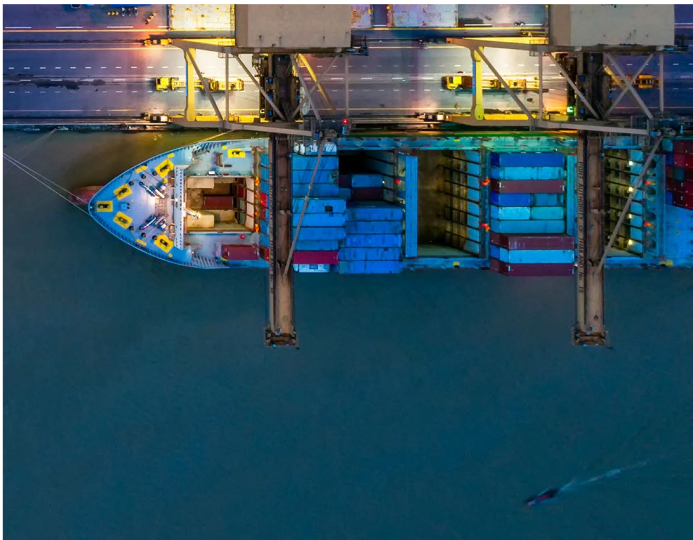
Digitalization of ports









Having a single digital platform has become a strategic priority for ports

The Smart Port concept has become one of the key technology trends in port transformation and digitalization. Bringing all players in the global supply chain into a single network of smart ports has become a key priority for port operating models, as this enables instant data exchange and effective decision making.

Digitalisation is one of the most prominent changes in the transportation and logistics industry. Digital technology can drive seamless and efficient operation of the supply chain for the benefit of consignors. The main purpose of port digitalisation is to bring smart ports together in a global network.

The first step of digitalisation can include digitalisation of some supply chain participants and their consolidation within a single port community system (PCS).

Participants integrated into a PCS will able to share data, collaborate on addressing business challenges and improve general port operations.

The next step should include consolidation of numerous port systems into a single Smart Port Network that would underlie the global logistics chain. In the longer term, the Smart Port Network would consolidate several types of transport and enable participants to reduce costs, increase cargo delivery speed, become more competitive and enhance their readiness to adopt further innovations.

Big data processing

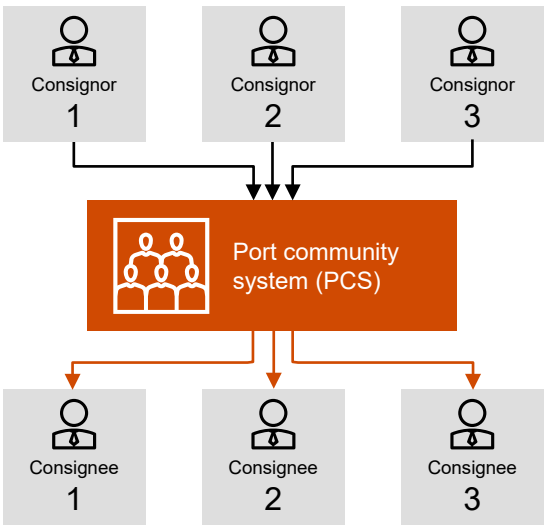
Utilisation of transport infrastructure and resources will improve due to more efficient data collection and exchange between all transportation stakeholders in real time.
Collection and analysis of data from sensors installed on vehicles, equipment, mechanical appliances and cargo will help decision-makers to identify and analyse patterns, improve operations and prevent delayed cargo deliveries.

Data handling also increases the efficiency of port asset management. By monitoring the actual state of infrastructure and maintenance requirements, port terminal executives can take timely investment decisions, improve operational safety and increase the technical availability of equipment.

Port community system (PCS)

A significant number of players are involved in daily port operations to service cargo traffic. These independent public, private and state-owned stakeholders build a port community where all players are interrelated and share a common interest in marine and multimodal shipping.

The key objective of a PCS is to ensure efficient coordination and collaboration between participants for proper operation of supply chains. Cargo should be safely delivered to its destination on time and at a competitive price.



Data exchange parameters

Data exchange requires broadband networks with a high bandwidth capacity, including Wi-Fi and 5G. International Data Corporation projects an increase in the number of 5G connections from around 10m in 2019 to 1.01bn in 2023.

PCS adoption is a complex process, but it brings benefits to all participants

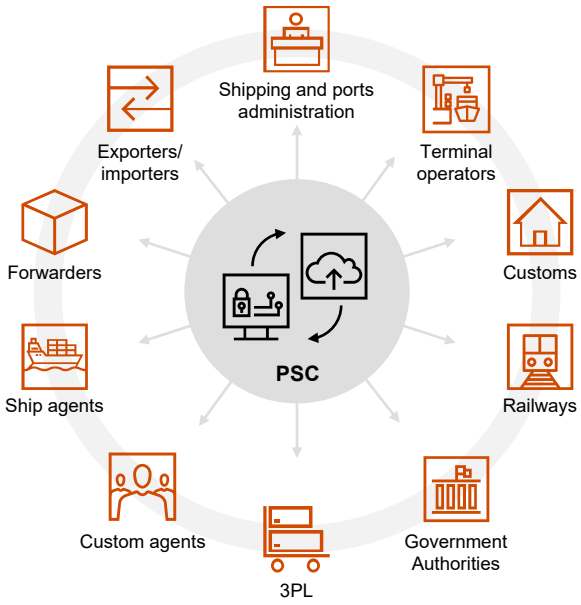
Successful PCS adoption at global ports (in particular, the EU) depends on the resolution of technical issues, as well as on the willingness of supply chain participants to change their established processes and share data as part of collaborative operations.

During implementation, most port communities face challenges that hinder fast adoption of the PCS platform. These include a low level of automation, incompatible interfaces of different IT systems, complicated data validation, significant manual controls, diverse data collection technologies, duplication of information, data losses and data corruption.

Tackling these challenges requires a coordinated efforts from all supply chain participants within the port community to share data, change established business processes and migrate to consistent IT standards.

This will ultimately improve performance of all supply chain parties and ensure ability to adapt to the evolving market environment. Successful PCS implementation will enable the following general benefits:

- Improved utilisation of port terminal infrastructure and resources.
- Reduced time of cargo handling in the port.
- Increased productivity of terminals in port waters.



- Accelerated declaring and obtaining of trading permissions.
- Reduced number of errors in carriage documents.
- Optimised transport traffic in the adjacent area.
- Improved safety of vessel traffic in the port waters.

Port digitalisation in the European Union

The EU TEN-T policy aims to close the gap in transport connectivity, remove bottlenecks and technical barriers, and strengthen social, economic and territorial cohesion in the EU. The policy sets the basis for transformation and integration of ports in a Europe-wide multimodal network. The majority of projects involve the construction of infrastructure (see Chapter 2), but the policy also provides for future application of innovations, state-of-the-art technologies and digital solutions for all modes of transport.

TEN-T projects include digitalisation of port operations (digital twins of ports), real-time business analytics, autonomy of transport vehicles and AI testing.

TEN-T case studies

iTerminals 4.0 (EU, including Greece)
Digitalisation of port operations and implementation of modern technologies to control container traffic: The programme includes upgrading of sensor networks of the port equipment and application of AI, as well as provision of dynamic KPI reporting models in real time.

Implementation of smart multimodal transportation systems (Sweden, Gothenburg)
Solution design for autonomous container transportation from a loading site to a port terminal: The project includes implementation of a cloud data warehouse to manage autonomous electric cars and port refurbishment (traffic control station, smart gates, machine vision, loading/unloading/storage areas).

PCS generates notable economic benefits in many EU countries

PCS implementation in EU ports ensured improved effectiveness of operations and the service level for consignors and consignees, simplified business processes and notable savings.

Examples of successful PCS implementation in EU countries

Port name	System description	Key benefits
Port of Valencia – PAV (Valencia, Sagunto, Gandia)	System: ValenciaportPCS. The system was put into operation in 2006. Development costs came to EUR 10 million and annual operating costs to EUR 1.6 million. More than 400 users are connected to the system: transportation companies, port terminals, container yards, freight forwarders, railway operators, customs authorities, consignors, consignees. The system is owned and managed by PAV port authority. Technical support is outsourced (50% of the system support costs are borne by the port authority, and 50% – by the members of the port community).	• Container terminal savings: EUR 500,000 per year; • Transportation company savings: EUR 40,000 per year; • Freight forwarder savings: EUR 35,000 per year; • Improved operations efficiency and competitive performance of the port (more than EUR 23 million per year based on estimates)
Port of Antwerp	System: APCS. In 2011, APCS was implemented by the Port of Antwerp – port authority and ALFAPORT (an alliance of five industry associations of port and logistics companies) based on early system development of electronic messaging and document exchange, Seagha (purchased in 1986). More than 800 users are connected to the system: customs authorities, consignees, shipping companies, shipping agents, freight forwarders, port terminals, transportation companies, consignors, logistics operators. APCS is managed by a steering committee with members from the public and private sectors of the port community. The clearing centre is managed by a strategic partner, Descartes Systems Group (formerly known as Porthus).	• Standardisation of information exchange (based on EDIFACT UN standards) • Securing the data privacy of private companies, customs and port administration (users use unique identifiers) • Message archiving capability (minimum of 10 years) • Improved communication between supply chain members • Reducing costs and time through improved efficiency of cargo handling operations
Port of Rotterdam Port of Amsterdam	Systems: Portbase. The Portbase system was created in 2009 as a result of merging Infolink and Portnet, the systems of the Port of Rotterdam and the Port of Amsterdam. More than 3,600 users are connected to the system: transportation companies, consignees, shipping companies, shipping agents, railway operators, customs authorities, container yards, freight forwarders, terminals, consignors, controlling authorities. Portbase is a non-profit organisation. The Portbase shareholders include the Port of Rotterdam and the Port of Amsterdam – port authorities , as well as members of the business community. The Board is responsible for the system development of the port community. The Advisory Board of the port authority consists of the representatives of the port business community.	• The added value for the members of the community is up to EUR 245 million per year • Eliminates the need for 30 million telephone calls, 100 million e-mails and 30 million km of excess freight traffic annually • Improved accuracy of operation planning for the members of the community • Reduced time of cargo handling operations • Reduced number of errors in documents and reusability of data

Other active port community systems in the EU:
AP+, (Port of Marseille, 2005),
PORTIC (Port of Barcelona, 1999),
DAKOSY (Port of Hamburg, 1983)

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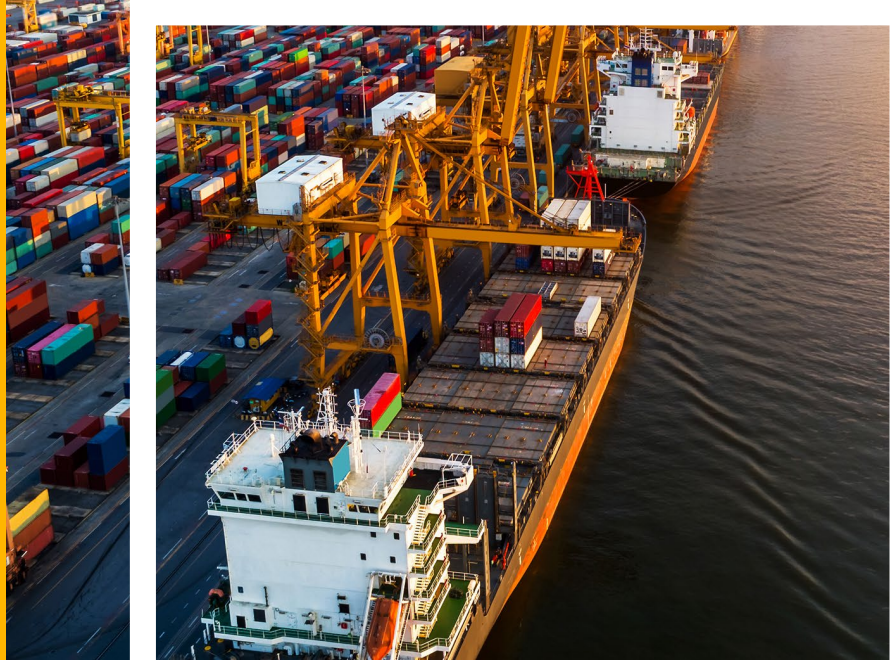
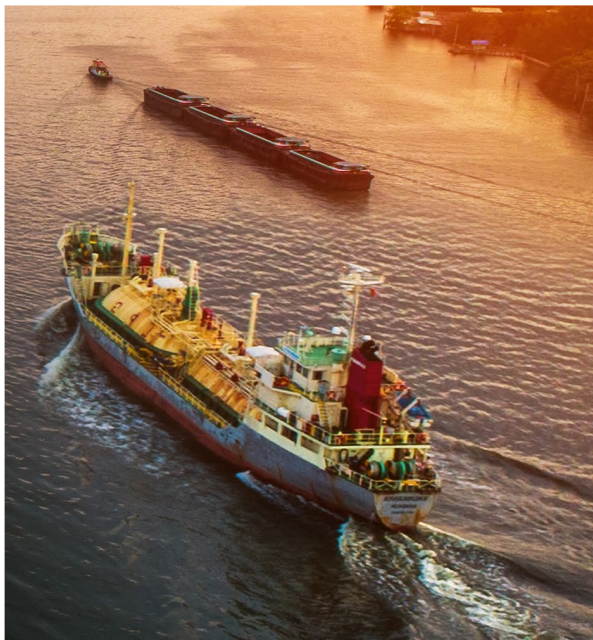
Brief list of greenfield and brownfield investment opportunities





Key investment opportunities: 1/2

Country	Basin	Dates	Project name	Description	Investment requirements
Poland	Baltic Sea	2018-2027	Gdansk	Modernisation and expansion of the road and rail network in the outer port, the development of access infrastructure to the outer port from the waterfront, extending the quays and deepening the fairway in the inner port, development of a deep-water bulk cargo terminal and a concept for developing another area of the port in the deep waters of the Gulf of Gdansk.	USD 2.15-2.69bn
Poland	Baltic Sea	2018-2022	Szczecin	Reconstruction and modernisation of the technological and transport infrastructure. The deepening of the port and the upgrading of the railroads promise a spike in cargo flow comparable with the Port of Gdansk.	USD 1.08bn
Russia	Baltic Sea	2017-2022	Primorsk	Construction of a new deep-water port complex in Primorsk, including a container port. The project is being implemented as part of the strategy to reorient Russian foreign trade cargo from foreign ports to Russian Baltic ports.	USD 1.55bn
Russia	Baltic Sea	2017-2024	Ust-Luga	Construction of a large complex for producing and handling LNG and grain and of general cargo terminals in Ust-Luga. The launch of the enterprise may increase Russian exports of LNG.	USD 0.8bn
Russia	Baltic Sea	2018-2025	St Petersburg	The project includes reconstruction of a fertilizer terminal and a container terminal, including improvements to the technological infrastructure and the deepening of the water area.	n/a
Russia	Baltic Sea	2021-2025	Bronka	The project includes the expansion of the general and ro-ro cargo terminal and construction of the transport and logistics center and the railway park. Plans for the development of the logistics centre include the commissioning of new warehouses for open and covered cargo storage.	USD 0.1bn
Estonia	Baltic Sea	2019-2022	Muuga	Construction of a dry bulk and mixed cargo terminal in Muuga Harbour with the focus on handling and storing round wood, bulk and metal products.	n/a
Slovenia	Adriatic Sea	2020-2025	Koper	Expansion of port capacities, including reconstruction of the berths, road and rail infrastructure development.	n/a
Hungary	Adriatic Sea (inland)	2020-2023	Zalaegerszeg Yard	The project includes construction of a new dry terminal in the west of Hungary. The terminal will include an intermodal yard with two 650-metre rail sidings, a container depot, truck parking, offices and warehouse areas. It may become the closest Hungarian terminal to Trieste, Koper and further to Northern Italy.	USD 0.04bn
Croatia	Adriatic Sea	2015-2025	Ploce	The project includes construction of a new liquid cargo and liquid gas terminals and pier for liquid cargo transhipment.	USD 0.11bn
Croatia	Adriatic Sea	2017-2022	Rijeka	The project will upgrade the infrastructure at the Port of Rijeka, including reconstruction of the existing pavement and storage areas, railway tracks, crane tracks and accompanying communal infrastructure.	USD 0.04bn
Croatia	Adriatic Sea	2019-2021	LNG terminal on Krk island	The project includes construction of a new LNG complex, including a floating terminal and a storage and regasification unit. The LNG terminal may deliver gas to the Croatian national transmission network, connected with Slovenia, Italy and Hungary.	USD 0.18bn
Greece	Aegean Sea	2020-n/a	Privatization of up to four port authorities	The Hellenic Republic's Asset Development Fund (HRADF) holds a 100% share in 10 ports in the form of sociétés anonymes. HRADF intends to work with all the 10 port authorities through sub-concessions, master concessions or share sales. By 2020, HRADF intends to proceed with share sales of up to four out of the ten port authorities (Alexandropoulis, Kavala, Volos, Patras, Igoumenitsa, Corfu, Heraklion, Lavrion, Elefsina and Rafina).	n/a
Ukraine	Black Sea	2020-2038	Yuzhny (Pivdenny)	Within the Yuzhny port development plan, 25 investment projects will be implemented, including projects for dredging the port's water area, improving the infrastructure of sea terminals, and building new berths and transshipment facilities. It is also planned to implement projects for the development of the road and railway infrastructure of the port.	n/a

Sources: official data of the ports; Portnews, Rosmorport; PwC analysis.

Key investment opportunities: 2/2

Country	Basin	Dates	Project name	Description	Investment requirements
Russia	Black Sea	2019-2024	Taman	The Russian infrastructure development programme contains plan to increase the capacity of Russian seaports, including the creation of a dry cargo terminal at Taman Port. The project includes construction of a dry bulk terminal, a fertilizer terminal, a grain terminal and an LPG terminal.	USD 1.3bn
Bulgaria	Black Sea	2020-2023	Varna	The project includes development of port infrastructure and warehouses and is financed by the Chinese corporation CMEC.	USD 0.14bn
Georgia	Black Sea	2018-2021	Anaklia	The project includes construction of a new deep-water port with the Anaklia Development Consortium, the port's container terminal operators and the free industrial zone's operators.	USD 2.5bn
Georgia	Black Sea	2019-n/a	Poti	The project includes construction of a new bulk terminal (PACE project specifications), including developing the land, dredging the harbor up to 12m in depth and increasing port capacity.	USD 0.12bn
Russia	Far East	2015-2022	Vanino	The project includes construction of a specialised coal transhipment complex on Muchke Bay, including underwater hydraulic structures and navigation infrastructure.	USD 0.42bn
Russia	Far East	2018-2022	Vera	The project includes development of a new coal terminal at Vera. The terminal is mainly focused on transhipment of coal from the nearest field, but may also serve other Russian exporters.	USD 0.14bn
Russia	Far East (inland)	2019-2024	Vostochny-Nakhodka	The project includes development of Vostochny-Nakhodka transport hub. The goal of the project is to develop a year-round transport hub for cargo processing, including coal transhipment, integrated into the Transsib international transport corridor, both by increasing port capacity and optimizing the operation of the transport infrastructure.	USD 1.5bn
Russia	Far East (inland)	2017-2030	Primorye-1, Primorye-2	The project will develop the Primorye-1 and Primorye-2 international transport corridors. Primorye 1 will handle cargo via Vladivostok bound for the West coast of the United States and Europe, while Primorye 2 will handle regional shipments between China and Russia and through South Korea and Japan.	USD 5.1bn
Russia	Arctic Sea	2018-2022	Murmansk	The project entails the comprehensive development of the Murmansk transport hub, including the construction of the Lavna coal terminal.	USD 2bn
Russia	Arctic Sea	2019-2021	Tanalau	The project includes the construction of the Tanalau Oil Terminal, which will develop the necessary transport infrastructure for the surrounding oil fields.	USD 0.2bn
Russia	Arctic Sea	2019-2021	Chaika	The project includes the development of the Chaika Coal Terminal at Port Dikson. This terminal will support the export of coal from a nearby field.	USD 0.3bn
Russia	Arctic Sea	2019-2024	Utrenniy	The project includes the construction of the Utrenniy LNG and Gas Condensate Terminal at Sabetta Port, including underwater hydraulic structures, ice protection structures, navigation infrastructure and reconstruction of the navigable channel to the port.	USD 1.6bn
Russia	Caspian Sea	2017-2030	Kaspiysk	In the Republic of Dagestan, the project will create a new deep-water sea port in the Eastern district of Kaspiysk, with containers and grain as the key cargo.	n/a
Russia	Caspian Sea	2018-2021	Olya	The project will construct and rebuild port infrastructure, including specialised terminals and cargo areas.	USD 1.2bn

Sources: official data of the ports; Portnews, Rosmorport; PwC analysis.

With special thanks to

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PwC is a leading advisor in the transport and logistics sector in the CEE region. Over the last five years, our team has consulted on more than 35 transport and logistics projects.

We are a one-stop-shop advisory practice for infrastructure and project financing projects. Our project portfolio is diverse and includes projects from all phases of the capital project lifecycle from market demand and feasibility assessment, technology and OPEX review and traffic forecasting to project finance structuring, partner and investor search.