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Sector analysis on water transport

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Executive summary

- This sector analysis on the water transport sector (NACE Class H50) accompanies the EURES Report on labour shortages and surpluses 2024. This analysis focuses on the main determinants and causes of labour market imbalances in the water transport sector.
- In 2024, the water transport sector was made up of approximately 22 000 enterprises directly employing around 297 000 individuals. At the EU level the water transport sector does not have any severe imbalances as a similar number of countries report shortages and surplus. However, on the country level, there are noticeable labour market imbalances of ship's engineers, deck officers and pilots, deck crews and related workers.
- The water transport sector is becoming increasingly reliant on highly skilled workers, with a growing share of employees possessing advanced qualifications. Meanwhile, the proportion of medium- and low-skilled workers has declined.
- The water transport sector is undergoing a transformation with automation and digitalisation, requiring workers to adapt to new technologies and processes. While automation offers benefits like allowing seafarers to live closer to home, it reduces crew sizes and demands advanced IT and technical skills. The sector needs to focus on enhancing technical competencies for younger workers and providing reskilling opportunities for older employees.
- The push towards sustainability, especially in Inland Waterways Transport (IWT), necessitates significant upskilling and reskilling to operate low-emission, energy-efficient vessels. Climate risks such as low water levels and flooding highlight the need for the adoption of new technologies like smart navigation and sustainable propulsion systems. However, the high costs of transitioning to green fleets and a shortage of skilled workers pose challenges to achieving climate adaptation and sustainability goals.
- Women remain significantly underrepresented in seafaring professions due to poor work-life balance, challenging onboard conditions, and inadequate infrastructure. These factors contribute to chronic fatigue and insufficient rest, making the profession less attractive. The requirement to spend extended periods away from home particularly affects female captains, making it difficult to balance family and work responsibilities.
- Eastern European countries are seeing significant labour migration to Western Europe, driven by better wages and working conditions. This has worsened staff shortages in regions like the Danube, while the mutual recognition of qualifications across inland navigation the EU facilitates mobility. On the other hand, this trend may create surplus of workers in countries with more attractive wages and working conditions.
- A major challenge in addressing current and future skills shortages in the waterborne transport sector is the underdeveloped coordination between the public and private sectors to upskill and reskill the workforce. Further improvements to qualification recognition systems across regions, could help address skills shortages.
- The sector faces reputational challenges due to poor working conditions, including inadequate onboard facilities such as storage, lighting, and temperature control. Small, family-run businesses often struggle to offer competitive benefits, and the sector's transnational nature complicates fair labour enforcement. Stakeholders suggest improving noise reduction and accommodation standards to enhance worker satisfaction and address chronic fatigue.
- The sector relies on employment structures that reduce administrative burdens for businesses but create significant challenges for workers. Flags of convenience and open registries allow shipowners to operate under different jurisdictions, recruit through foreign agencies, and issue contracts under distinct national regulations. This fragmented framework leads to inconsistencies in employment conditions, wage disparities, and barriers to social security access.
- Various initiatives are being implemented, including strengthening training programmes in line with technological advancements and green practices. Strategic partnerships between employers, educational institutions, and industry organisations are being formed to develop solutions for workforce challenges. Efforts are being made to improve the sector's attractiveness, such as public awareness campaigns highlighting career opportunities and the industry's role in the transport and energy transition, with a focus on engaging younger generations.

1.0 Introduction

This sector analysis accompanies the EURES Report on labour shortages and surpluses 2024, with this year's edition focusing on the transport sector. The purpose of this analysis is to investigate labour market imbalances in the water transport sector, with a particular focus on understanding their determinants and causes.

Based on the NACE classification (Class H50), the water transport sector is divided between maritime and inland water transport (IWT), with the location of the activity acting as an indicator of separation, and the type of vessel used as a deciding factor. The maritime sub-sector encompasses the water transport of either passengers or cargo overseas, coastal waters, great lakes and similar waters where appropriate vessels are used. The IWT sub-sector covers the transport of passengers and cargo via rivers, canals, lakes and other inland waterways, including inside harbours and ports, with vessels unfit for sea transport. Activities of the sector can include operations for excursions, cruises, sightseeing, ferries, water taxis, fishing trips, freight, as well as renting vessels with crews for pleasure. These classifications exclude the conduction of restaurant and bar activities on board ships, with the condition of these being carried out by separate units (European Commission, 2008). Therefore, occupations included in these activities typically are boatmasters, skippers, engineers, mechanics, crew workers.

An overview of the sector is provided in Chapter 2. The labour market imbalances were analysed in relation to the following macro topics:

- Influence of sectoral trends on labour market imbalances (Chapter 3)
- Recent global crises: implications for the labour market (Chapter 4)
- Workforce demographic and related issues (Chapter 5)
- Labour migration and mobility (Chapter 6)
- Working conditions and impact on industry's reputation and the role of social dialogue (Chapter 7)
- Recruitment practices to fill labour and skill gaps (Chapter 8)
- Skills and qualifications gaps (Chapter 9)
- Measures to tackle labour market imbalances (Chapter 10)

This study draws on a comprehensive literature review conducted at both EU and national levels, supplemented by insights from a focus group (held online on 26 November 2024) and an interview comprising key stakeholders, including from trade unions and organisations representing employers. Further data were provided by EURES National Coordination Offices (NCOs) who identified occupations within the sector experiencing shortages and surpluses. Additionally, Eurostat data were used to highlight key indicators related to workforce profiles.

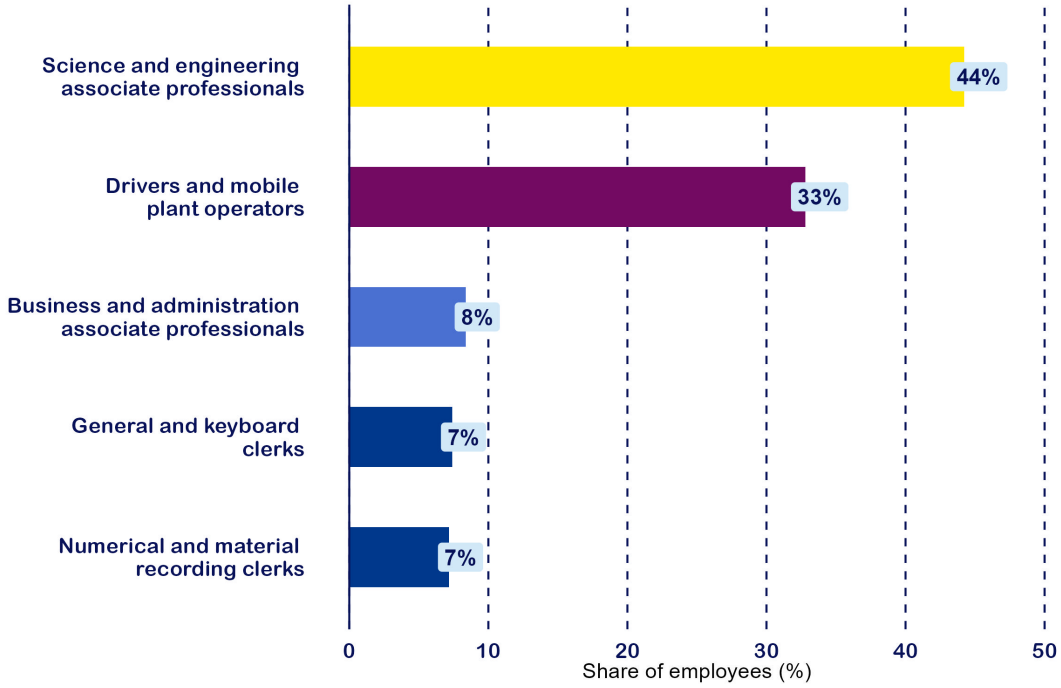
2.0 Overview of the water transport sector

In 2023, the water transport sector in the EU countries employed approximately 297 000 individuals aged 15-64 years, representing 0.15% of total employment. Four countries - Greece, Italy, the Netherlands, and Poland - accounted for 30.5% of the sector's total employment (Eurostat, 2024a).

With around 22 000 enterprises, the sector is mainly composed of micro and small-sized enterprises (92% are micro-enterprises with 0-9 employees and 5% are small enterprises with 10-49 employees) (Eurostat, 2024b).

Figure 1 shows the most common occupations in the water transport sector in 2023 were science and engineering associate professionals (44%) and drivers and mobile plant operators (33%), making up for 77% of the sector employment. Other common occupations include business and administration professionals, and general or numerical clerks.

Figure 1 - Share of employment represented by the five most common broad occupations in the water transport sector, 2023



Source: Eurostat (2024). Labour Force Survey special extractions.

Table 1 shows the number of countries reporting labour shortages and/or surpluses for selected water transport occupations. Key positions are identified in these lists, such as ships' engineers, deck officers and pilots, as well as operational crew members and deck workers.

Table 1 - Countries reporting labour shortages and surpluses for selected water transport occupations, 2024

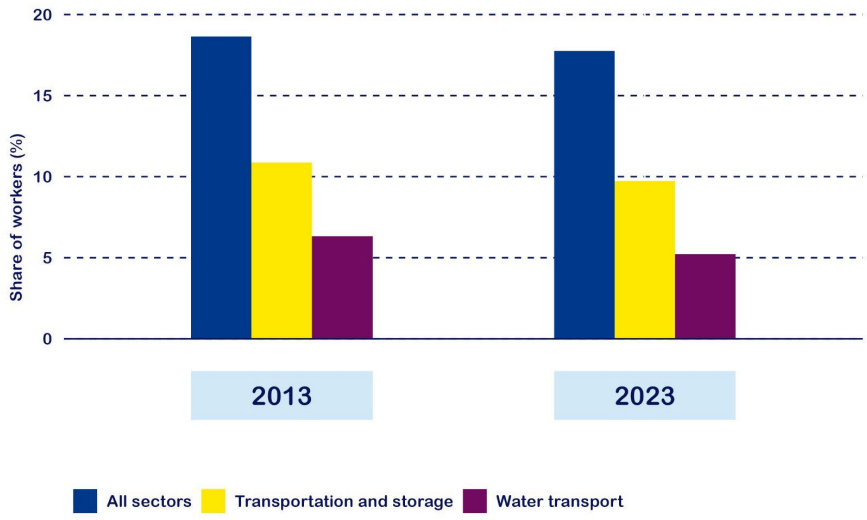
Occupation	Countries reporting surpluses	Countries reporting shortages

Ships' engineers	6 countries (BE, DK, EE, ES, NL, SK)	5 countries (FI, HU, LV, AT, RO)
Ships' deck officers and pilots	6 countries (DK, ES, FI, LV, AT, RO)	5 countries (BE, DE, MT, NL, SK)
Ships' deck crews and related workers	8 countries (CZ, DE, DK, ES, FI, LV, AT, RO)	8 countries (BE, BG, CY, EL, IT, MT, NL, SK)

Source: NCO data. NCOs may report both a shortage and a surplus for a given occupation due to differences at regional level.

Figure 2 shows a partial reduction in the share of part-time employment in the water transport sector between 2013 and 2023, and a greater reduction rate compared to all other sectors and transportation and storage.

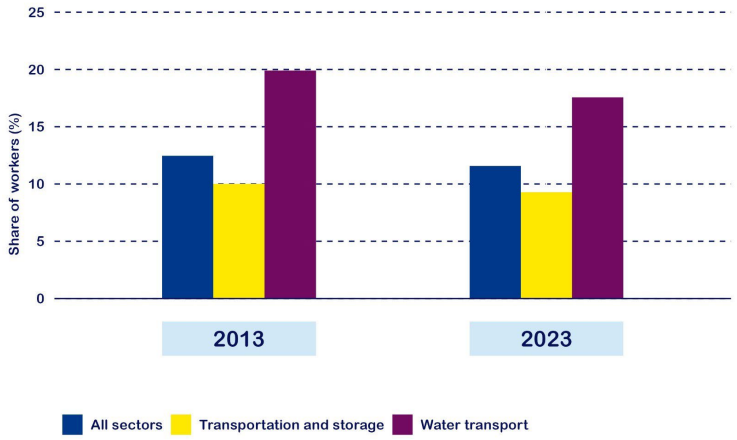
Figure 2 - Part-time employment in the water transport sector, the transportation and storage sector and the overall economy in the EU-27, 2013 – 2023



Source: Eurostat (2024). Labour Force Survey special extractions.

Figure 3 describes the slight reduction in temporary employment in the water transport sector between 2013 and 2023 in the EU. In comparison, the transportation and storage, as well as all other sectors, have had a much smaller decrease rate.

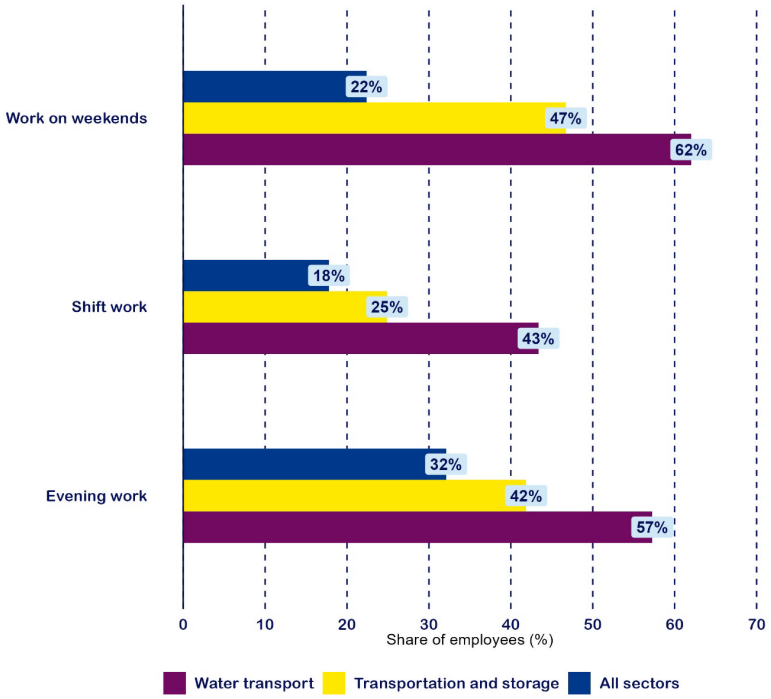
Figure 3 - Temporary employment in the water transport sector, the transportation and storage sector and the overall economy in the EU-27, 2013 – 2023



Source: Eurostat (2024). Labour Force Survey special extractions.

Figure 4 describes patterns of non-standard work schedules in the water transport sector in the EU. The share of employees doing atypical working hours is significantly higher for the water transport sector than for transportation and storage and all other sectors. Over 60% of employees in water transport conduct work on weekends, 58% work in the evenings and over 40% work in shifts.

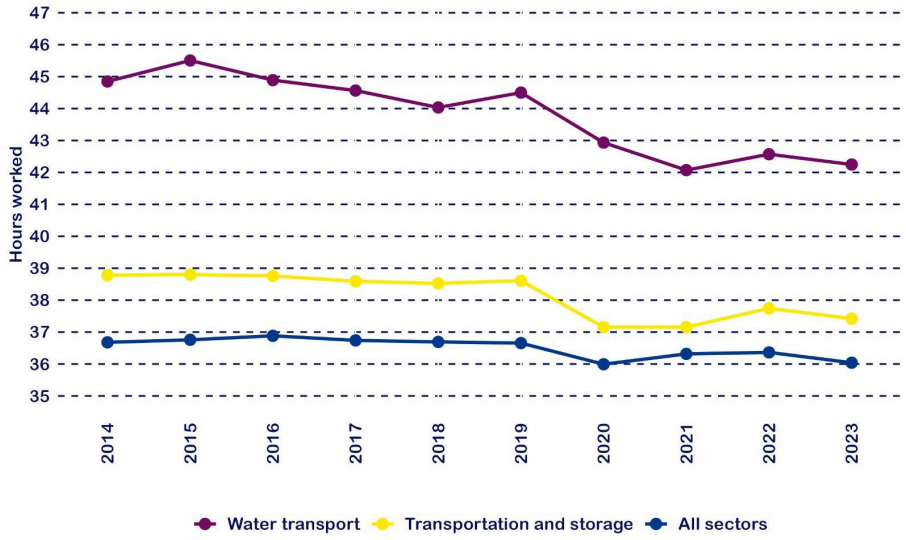
Figure 4 - Non-standard work schedules in the water transport sector, the transportation and storage sector, and the overall economy in the EU-27, 2023



Source: Eurostat (2024). Labour Force Survey special extractions.

Even if the number of working hours per week has decreased by three hours between 2014 and 2023, working hours in the water transport sector remain much higher compared to those in the broader category of transportation and storage by roughly four hours, and by close to six hours in comparison to all other sectors (Figure 5).

Figure 5 - Hours worked per week in in the water transport sector, the transportation and storage sector, and the overall economy in the EU-27, 2014 - 2023



Source: Eurostat (2024). Labour Force Survey special extractions.

3.0 Influence of sectoral trends on labour market imbalances

Key determinants of labour market imbalances in relation to sectoral trends:

- The rise of automation and digitalisation in the water transport sector demands advanced technical skills, creating a need for workers with expertise in operating and maintaining sophisticated digital systems.
- High costs of greener technologies surpass the capacity of the sector, delaying the twin transition and affecting workers' employment stability.

The water transport sector is undergoing significant transformations driven by two major trends: automation and digitalisation, alongside the increasing push for greening and sustainability. These changes are reshaping the nature of work in the industry, influencing workforce composition, skill requirements, and operational practices.

Automation and digitalisation

The automation of the industry is generally seen as an opportunity for improving both off-shore and on-shore jobs, potentially enabling seafarers to live closer to their families and have improved social lives, whilst maintaining competitive wages. This trend also creates more possibilities for expert seafarers who may possess advanced IT or technical competences. However, this shift also calls for the provision of adequate training to upskill and prepare the workforce for operating highly sophisticated vessels. As an example, while automated engine rooms can run autonomously, emergencies or faulty mechanisms still require the presence of specialised technicians on board (European Commission, 2020). However, as automation reduces the need for manual operations, it is likely to decrease the overall crew size required on vessels. In fact, with more tasks being handled by digital systems, traditional seafaring roles may decline, leading to smaller but more highly specialised crews. Digital systems onboard ships are already highly complex and require extensive knowledge and expertise to operate. Thus, the digitalisation of the shipping industry is transforming the nature of work in the water transport sector, and this shift is also redefining the skill set and qualifications expected for young seafarers commencing their career in the industry as well as for older workers who may need to adapt to new technologies and processes (International Labour Organization, 2023).

Greening trends

The greening of the sector complements the digitalisation trend, both in terms of opportunities and challenges to be tackled. Reflecting on the impact of the twin transition on water transport, the sector will need to train workers to operate green fleets effectively, with special focus on the IWT sector where climate adaptation is critical. This is especially relevant as waterways-dependent operations face risks from low water levels, floods, or river erosions (France Travail, 2024).

However, the high costs associated with greener alternatives, such as for the transition to sustainable fleets, can exceed the current financial capacity of the sector (International Labour Organization, 2023). The Baltic and International Maritime Council (BIMCO), one of the largest organisations for shipowners, charterers, shipbrokers and agents with members in 130 countries covering 62% of the global fleet, asserts this through their forecast on maritime supply and demand for the coming years. The demand for crude tankers and product tankers, for instance, is expected to increase by 3.5% in 2025 compared to 2024, which requires growth in fleet numbers and supply (Rasmussen, 2024). Several factors are contributing to the demand increase, including longer sailing distances, congestion in ports, and increased business activity creating an earlier than expected peak season for which the supply end was not prepared (Vessels Value, 2024). As a large part of the current fleet is unlikely to be converted to low emission propulsion, vessels operating on conventional petroleum or oil products will continue to be in use while awaiting the transition to a greener fleet. This could have a significant impact on the workforce if businesses are unable to manage the associated costs and are forced to cease operations (International Labour Organization, 2023).

The shift towards sustainability and reducing greenhouse gas (GHG) emissions will likely necessitate the introduction of new measures and policies to address these changes. This is likely to impact the workforce with a potentially widening skills mismatches due to the demand for expertise in technical areas such as batteries for electric ships, fuel cells for onboard power production, as well as for ship design. Although the production and chartering of low-emission vessels is already ongoing, the adoption of renewable energy and low carbon fuel remains limited in both waterborne transport sectors, with 98.7% of fuel still in use being made of conventional oil and petroleum products (Directorate-General for Mobility and Transport, 2024).

4.0 Recent global crises: implications for the labour market

Key determinants of labour market imbalances in relation to recent global crises:

COVID-19 pandemic:

- The pandemic led to an increase in older workers within the workforce, while younger workers exited the labour market, creating an imbalance in age distribution and exacerbating labour shortages.
- While freight transport recovered quickly after the pandemic, passenger services experienced a slower recovery, further straining the workforce in certain segments of the sector.

Russia's war of aggression against Ukraine:

- The ongoing conflict has forced the rerouting of freight traffic, creating longer, more costly routes and disrupting established operational practices.
- In response to the loss of local workforce, companies have increasingly relied on foreign workers, often under unclear or unstable employment conditions, which adds to uncertainty and instability in the labour market.

Lingering impacts of the COVID-19 pandemic on the labour market

Freight waterborne transport saw limited disruption to operations during the COVID-19 pandemic, with activity declining by only four percentage points in 2020 and rebounding with a raise of five percentage points in 2021 (Directorate-General for Mobility and Transport, 2024). However, the IWT sector faced severe challenges due to the pandemic's safety measures and lack of regional coordination in the initial stages (International Labour Organization, 2023). Restrictions caused prolonged waiting times at borders, disruptions to crew organisation and situations where workers were stranded aboard vessels for extended periods, unable to claim shore leave for essential supplies, such as food and medicine. The pandemic required increased safety and hygiene duties, thus several countries had to temporarily relax legal requirement related to crew numbers and working hours (International Labour Organization, 2023). While these changes were necessary, they further exacerbated fatigue among waterborne transport crews, particularly as extended hours and reduced rest periods took a toll on seafarers' physical and mental health. Post-pandemic, these challenges continue to affect the workforce, with persisting high workload and high levels of chronic fatigue (Bathia et al., 2024).

Stakeholders consulted in the focus group for this study confirmed that the COVID-19 pandemic remarkably impacted employment in the waterborne transport sector, highlighting the disparities between passenger and freight transport, as well as variations across countries. In Finland, for example, the passenger vessel workforce shifted demographically with a noticeable increase of employees over 60 years of age. Before the pandemic, the dominant age group was 45 to 50 years, but younger workers have since largely exited the labour market. Stakeholders noted that, in contrast, employment in the cargo sector remained stable and returned to pre-pandemic levels shortly after restrictions ended.

German stakeholders highlighted a significant decline in marginal employment (i.e. precarious or temporary positions) in the passenger transport sector. Workers with contracts including social security were less affected while those in precarious or temporary jobs were disproportionately impacted. According to stakeholders, this was a trend observed across the EU: while nautical staff, predominantly from Western Europe, were retained to maintain ships, many Eastern European workers in passenger services, considered more disposable, lost their jobs. Emergency funds provided during the pandemic often excluded precariously employed workers, exacerbating their financial vulnerability.

Russia's war of aggression against Ukraine

The Russian war of aggression in Ukraine has significantly disrupted the freight transport sector, generating numerous challenges that have strained its functionality. The security risks associated with the ongoing conflict have caused numerous rerouting operations in the Baltic Sea and other waterways, often leading to longer and more expensive routes (Kiss, 2022). The war is damaging Ukraine's transport infrastructure, including key ports, stalling vast amounts of exports and further worsening global supply chains. Rising fuel costs put pressure on maritime freight, while EU ports have faced congestion due to rerouted traffic (Pape et al., 2022).

Stakeholders consulted through the focus group observed how grain exports, a major Ukrainian trade, have been particularly affected. Blockades in Ukrainian territory have led to a shift of operations, with stakeholders reporting that 3% of vessel capacity has moved from Rhine to the Danube region to facilitate grain shipments between Romania and Ukraine.

Sanctions issued against Russia have added further complexity. These measures include banning ships that docked in Russia from entering EU ports and prohibiting the refuelling of EU ships from Russian ports or bunkering vessels (Pape et al., 2022). These restrictions have disrupted established logistics and operational practices, yet they are part of the measures adopted by the European Union to target non-EU tankers of the Russian shadow fleet or vessels supporting the war in different ways. Over 50 vessels originating from third countries have been targeted on these grounds in the Council of the European Union's (2024) latest press release, raising the total of banned vessels to 79.

In response to the labour shortages caused by the departure of Ukrainian and Russian workers to join military operation, European companies have increasingly recruited TCNs, often under unclear employment and social security conditions (Broughton et al., 2024). Stakeholders consulted through focus group noted that this shift has further complicated workforce dynamics as the recruitment of workers from outside Europe can exacerbate uncertainty around workers' rights and employment stability in the sector.

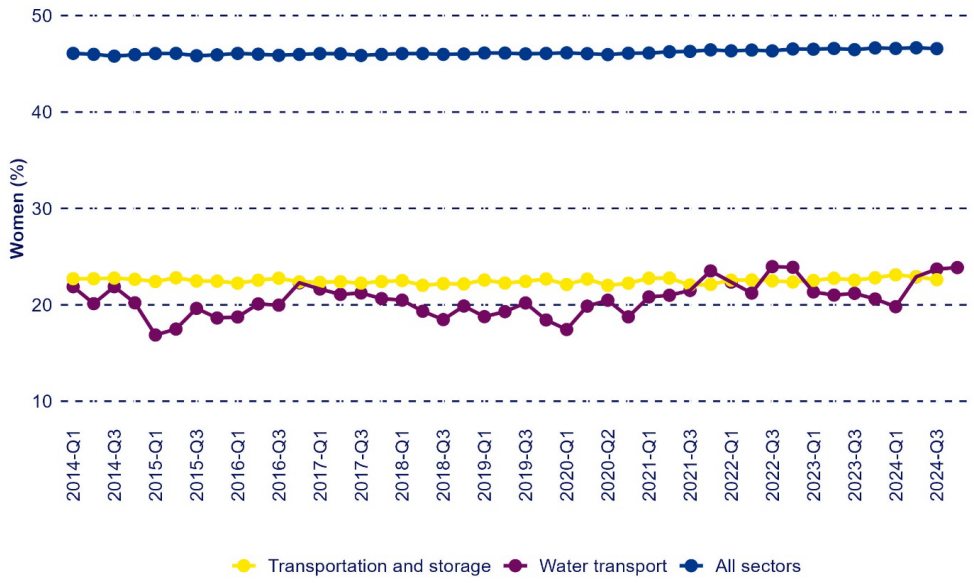
5.0 Workforce demographic and related issues

Key determinants of labour market imbalances in relation to workforce demographic:

- The low representation of women in the sector is driven by challenges like poor work-life balance, long periods away from home, and difficult onboard conditions which hinder female participation.
- The water transport sector faces labour shortages due to an ageing workforce, with a growing number of older workers nearing retirement and fewer younger workers entering the profession.
- The imminent retirement of experienced professionals, including boatmasters and technical crew, will exacerbate labour shortages in the water transport sector.
- Younger generations are less inclined to pursue maritime careers, attracted instead to onshore roles offering better work-life balance and better working conditions.

One of the main barriers hindering female participation in the seafaring professions seems to be lack of work-life balance, compounded by poor working conditions onboard and inadequate infrastructures. (Pike and Terpilowski, 2022). This exacerbates the already high levels of chronic fatigue and poor rest hours amongst the global seafarer workforce (World Maritime University, 2024) and can contribute to further deterring women from engaging with the profession. The requirement to spend long periods on-board vessels and away from home makes it increasingly difficult for female captains to reconcile work and family needs. As a consequence, the share of female employment in the water transport sector (24% in Q4 2024) is substantially lower and more volatile than in the overall economy (47% in Q3 2024) (Figure 6).

Figure 6 - Share of female employment in the water transport sector, the transportation and storage sector and the overall economy in the EU-27, 2014 Q1 –2024 Q4



Source: Eurostat [lfsq_egan2, lfsq_egan22d]

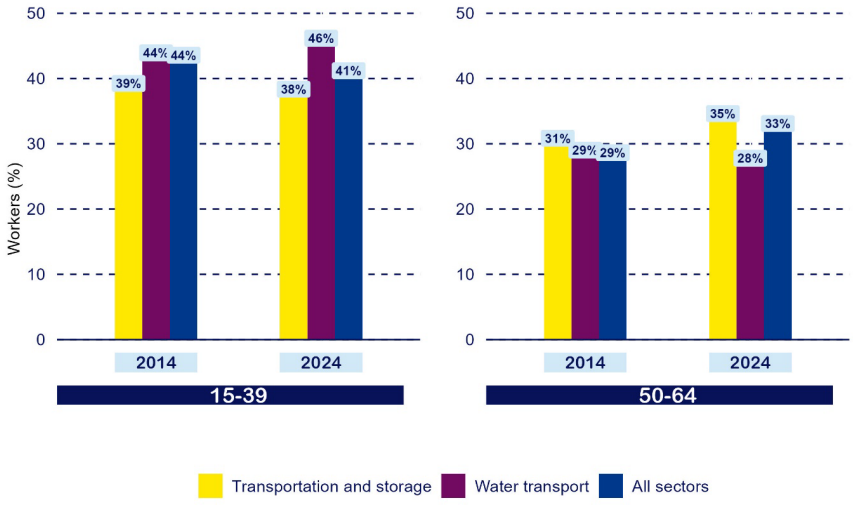
Eurostat data indicate, as shown in Figure 7, that water transport jobs attract relatively more younger workers than in the overall economy or the transportation and storage sector. In 2024, workers aged 15-39 years accounted for 46% of water transport workers, five percentage points more than the overall economy and eight percentage points more than the average in the transportation sector. Moreover, the share of workers aged 15-39 years increased by two percentage points between 2014 and 2024. This slight increase is different to general trends and could indicate the sector is slightly more attractive to youth than other sectors. Despite the increase, the water sector, much like other transportation sectors indicate struggling with attracting and retaining young workers.

The share of workers aged 50-64 years in the water transport sector has remained relatively stable, decreasing by one percentage points between 2014 and 2024. At 28% in 2024, this group accounted for respectively eight percentage points less than in the transport sector and five percentage points than in the rest of the economy.

Despite the relatively stable numbers of older and younger workers, the sector faces challenges due to the ageing workforce as experienced professionals, such as boatmasters and technical crew members, are expected to retire soon. This trend is evident across all transport sectors and may further exacerbate workforce shortages, especially as onshore jobs with more attractive conditions, such as regular hours and more leisure time, draw workers away from seafaring.

Taking into account the swift advancements of technology through digitalisation and automation, as well as the rise in technology-based jobs in the industry, such as smart navigation and integration into seaports logistics, shortages may persist. However, similarly to other sectors, there may be shortages in more technically advanced roles as qualification requirements develop. To address this, the sector must improve conditions for seafaring and IWT to make the profession more appealing for all current and incoming workers and students (European Commission, 2020). They

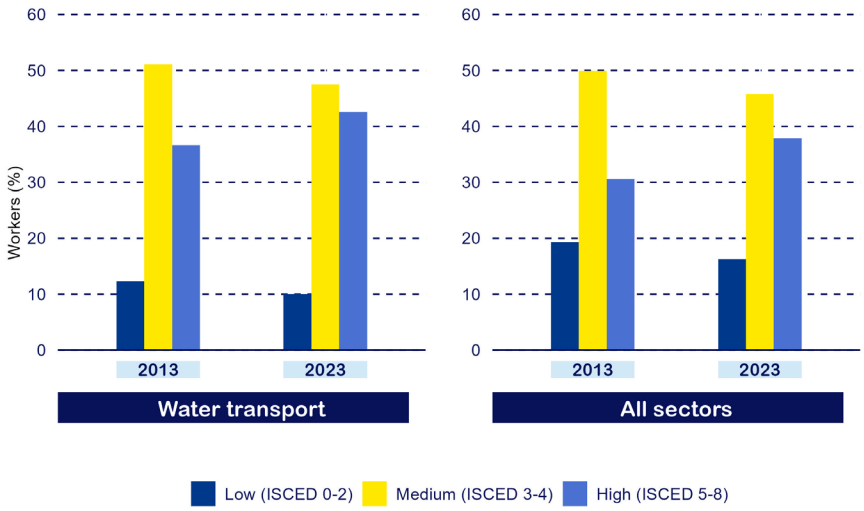
Figure 7 - Employment age structure in the water transport sector, the transportation and storage sector and the overall economy in the EU-27, 2014 and 2024



Source: Eurostat [lfsq_egan2, lfsq_egan22d]

The qualification profile of the water transport sector's workers shows that it is relying relatively more than the overall economy on high-skilled workers (see Figure 8) who represented almost 42% of workers in 2023, but 38% across all sectors. In 2023, the sector employed relatively fewer low-skilled workers than the overall economy, as they accounted for respectively 10% and 16% of their workforce. The share of low-skilled workers in the water transport sector employment has diminished by two percentage points from 2013 to 2023, while for medium-skilled workers it decreased from 51% to 47%. On the other hand, the proportion of high-skilled workers in the sector increased by six percentage points, from 37% to 43%, between 2013 and 2023.

Figure 8 - Education structure in the water transport sector and the overall economy in the EU-27, 2013 and 2023



Source: Eurostat (2024). Labour Force Survey special extractions.

6.0 Labour migration and mobility

Key determinants of labour market imbalances in relation to labour migration and mobility:

- Workers from Eastern Europe migrate to Western Europe seeking better wages and working conditions, leading to regional labour shortages.
- Significant differences in labour costs and wages across countries reduce equitable competition and create imbalances in workforce distribution.
- The sector relies on TCN to fill immediate labour gaps. However, professional advancement in inland navigation requires specified hours in lower ranks which many TCNs struggle to achieve, leading to career stagnation.
- Complex and inconsistent regulations across countries and flag states are hindering clarity regarding social security contributions, discouraging workers.

The migration of the workforce is an ongoing trend which poses significant challenges in the Eastern European labour market, with better working conditions and higher wages being the driving factors for workers' migration to Western Europe (European Transport Workers' Federation, 2023). In particular, this impacts staff shortages in the Danube region due to crews from Poland and Romania leaving their countries. Directive (EU) 2017/2397 represents a central factor enabling this mobility through the implementation of mutual recognition of qualifications across the EU, the Rhine and the Danube. The mobility of crew members, both from countries inside and outside Europe, has contributed to counter the impacts of labour shortages over the last decades (Central Commission for the Navigation on the Rhine, 2024). On the other hand, this can create surplus of workers in countries with more attractive wages and working conditions.

Countries with busy waterways, like the Netherlands and Germany, host major employers in the industry and often draw workers from other EU Member States due to higher wages and better working conditions. The high volume of goods transported through these countries' waterways creates a strong demand for labour. The focus group discussion highlighted the situation in Germany, where the most common nationalities of foreign employees in the inland navigation sector include Polish, Czech, Romanian, Dutch, Bulgarian, and Slovakian workers (Central Commission for the Navigation of the Rhine, 2024). To address sectoral shortages, many companies have increasingly turned to the recruitment of TCNs, often for short-term assignments.

The migration flow of workers in the European Union has further increased by the disruptions caused by the COVID-19 pandemic and the Russian war of aggression in Ukraine (Pape et al., 2022).

Consulted stakeholders also noted a shift in the inland navigation workforce. Whereas previously the sector relied heavily on workers from Eastern Europe, an increasing number of TCNs are now entering the industry. While this has helped fill immediate labour shortages, it has also introduced challenges to workforce development and progression. For example, in inland navigation, professional advancement typically requires accumulating a specified number of hours in lower ranks to qualify for higher positions, such as captain. However, TCNs often face barriers to career progression through the ranks, leading to a stagnation in career development. This lack of upward mobility not only limits their individual earning potential but also hinders the broader development of a competitive and skilled workforce in the industry

The transnational nature of work in the water transport sector, coupled with the migrant status of many workers, created unique challenges related to social protection, wage disparities and the risk of malpractices or exploitation (International Labour Organization, 2023). In fact, seafarers tend to retain their original residency or nationality even when their work involves mobility across different countries or on vessels registered under foreign flags, which complicates the determination of benefits eligibility. The reliance on residency status for social security rights exacerbate these issues, as workers operate under diverse flag states governed by inconsistent or unclear regulations (European Transport Workers' Federation, 2022). Under the Maritime Labour Convention 2006 (International Labour Organization, 2006), employers frequently prioritise the seafarer's place of residence when determining mandatory insurance coverage. For example, countries like Norway, Latvia, Poland, and Romania have adopted more flexible approaches, linking social security rights to workers' residency rather than the flag or vessel. Similarly, Croatia ensures that resident seafarers are covered under the national social security system, regardless of the vessel's flag (European Transport Workers' Federation, 2022).

As regards the IWT sector, where the flag state principle applies, migrant workers may face limited protection or even denial of basic rights due to the regulatory complexity. The reliance on short-term benefits, such as those for sickness or maternity leave, without provisions for long-term support can have detrimental and cumulative impacts for the workforce. This situation is likely to exacerbate even further the already existing risks to health, safety and well-being-being, underscoring the need for more robust and equitable social protection frameworks (Eurofound, 2018).

Consulted stakeholders highlighted that the social dumping is closely linked to issues related to contractual arrangements, particularly self-employment, and working conditions. Exploitation and precarious working conditions are exacerbated by practices such as flying flags of convenience[1] and recruiting cheaper labour from third countries for cost-efficiency. These practices not only undermine the legitimacy of workers' basic rights but also diminish the long-term attractiveness of careers in the sector. This challenge is compounded by the difficulties many workers face in advancing through shipping ranks, whilst labour costs and employment arrangements across the global maritime landscape further erode the prospect of a levelled played field for all industry stakeholders (World Maritime University, 2024; International Labour Organization, 2023).

[1] Flag state requirements represent the first instance of defence against substandard shipping. Under the Paris memorandum of understanding on harmonised port state control, certain flags are maintained on grey and black lists which renders them 'flags of convenience'. These specific national flags are used by ships to incur limited controls and avoid expenditure on taxes, labour, or conservation measures. Currently, there is no binding international framework governing the flag registration process, therefore each country determines their own set of laws and regulations (Gullentops, 2024)

All vessels must be registered and fly the flag of the country where they are registered. Countries can also operate with open registries which are open to all vessels regardless of origin or owners' nationality. Open registries are also known as flags of convenience. The International Transport Workers Federation maintains a list of these based on a set of criteria including their ability and willingness of the flag state to enforce international minimum social standards on its vessels and the degree of ratification and enforcement of ILO conventions. At the beginning of 2023, the list included 42 shipping registries (International Transport Forum, 2023)

7.0 Working conditions and impacts on industry's reputation

Key determinants of labour market imbalances in relation to working conditions:

- Poor working conditions, including long hours and extended periods at sea, are driving seafarers away from the profession.
- Limited resources in small, family-run businesses in IWT often prevent the offering of competitive benefits, exacerbating recruitment and retention challenges.
- Non-compliance with work-rest regulations is common, with many workers exceeding permissible working hours, increasing health and safety risks
- Insufficient rest and chronic fatigue among seafarers are leading to higher accident rates and operational inefficiencies.
- The lack of adequate infrastructure on ships, such as poor accommodation and noise disturbances, worsens fatigue and impacts seafarers' well-being.
- Fragmented social security and regulatory frameworks in the maritime industry leave workers without sufficient protections, exacerbating labour shortages.
- Economic pressures and overworking seafarers increase the risk of accidents, further reducing the appeal of maritime careers.

Demanding physical working conditions

The European water transport industry has seen a decline in its reputation due to the poor working conditions experienced by the maritime workforce.

The majority of businesses in the IWT sector are small, often family-run operations, which might struggle to offer the same level of benefits, due to the more limited resources. Since the sector operates across borders, workers are often exposed to complex employment agreements where they are hired under different countries' laws and regulations. The enforcement of fair labour standards risks therefore to be compromised (Central Commission for the Navigation of the Rhine, 2024).

Globally, seafarers commonly report prolonged periods on board vessels, with companies typically offering schedules such as three months on board, followed by three months off-duty (World Maritime University, 2024). Alternative crew management models, such as spending 26 consecutive weeks onboard followed by 26 weeks off annually, are also in use. Stakeholders consulted through the focus group noted that while this model may appeal to younger workers because it allows for extended time off after working on board, its practicality is doubtful due to poor working conditions that harm mental and physical well-being.

Heightened fatigue levels among seafarers are a significant concern, posing risks to both worker safety and operational efficiency (World Maritime University, 2024). Increased workloads, often due to insufficient crew staffing, exacerbate sleep deprivation and physical fatigue, further increasing accident rates. Monitoring work-rest schedules is particularly challenging, with many workers exceeding permissible working hours multiple times per month. Over 2 000 marine accidents and incidents occur yearly in spite of high safety levels and requirements in EU waterways (Gullentops, 2024). According to the European Maritime Safety Agency (2024), 2 560 maritime casualties involving 2 769 vessels were reported in 2023 alone, which resulted in 792 workers injured and 27 losing their lives. Out of the total number of casualties, 44% have been labelled as navigational incidents.

On average, seafarers record seven instances of non-compliance with work-rest regulations per month, with 16.5% of the global workforce experiencing over 10 such violations monthly (World Maritime University, 2024). Given that typical working days on board ships last between 10 and 14 hours, addressing these violations is critical for workers' health, safety, and overall job satisfaction (World Maritime University, 2024).

Measures and difficulties addressing difficult physical working conditions

The Seafarers International Research Centre (2021) has issued several recommendations for vessel accommodation, in addition to the International Maritime Convention (2006) minimum standards, to address the current precarious conditions affecting the industry's reputation. Issues include inadequate or insufficient storage space, lack of light or temperature control inside cabins, as well as provisions for recreational activities and disturbances caused by noise or vibrations on ships. The Seafarers International Research Centre (2021) suggests noise reduction cabin systems should be of the same quality and capacity as those commonly used in cruise vessels. Inadequate infrastructure can worsen the negative effects of insufficient rest and chronic fatigue among seafarers (World Maritime University, 2024).

Consulted stakeholders pointed out that efforts are being made to establish safe and appropriate crew requirements for water transport operations. However, they emphasised that accurately determining the necessary number of crew members for safe navigation and operational workload is a complex challenge due to the diverse range of vessel types, operational conditions, and working environments across the sector. Despite these challenges, documenting and proving instances of overwork remains a hurdle, leaving workers vulnerable to fatigue and its associated risks. Freight vessels also face serious safety concerns. In some countries, the economic pressures on the sector have led to a troubling trend where individuals are allowed to navigate alone, significantly increasing the risk of accidents.

Sleep deprivation and poor rest contribute to long-term physical and mental health issues, compromising job performance and increasing treatment costs (Munafo et al, 2018). Specialised software is widely used to track work-rest schedules, yet regulatory inconsistencies and enforcement challenges persist. Comprehensive measures are urgently needed to mitigate fatigue-related risks, including improved monitoring systems and more robust staffing requirements (World Maritime University, 2024).

The role of social dialogue

At the European level, the ETF is the most representative European trade union in the IWT (Eurofound, 2018). A similar representativeness study of industrial relations and social dialogue for Maritime transport is set to be published in 2025 (Eurofound, 2025).

In some Member States, sectoral-level bargaining is prevalent, leading to standardised agreements which cover a broad range of issues, including wages, working conditions and safety protocols. However, other countries may rely more on company-level negotiations, resulting in tailored agreements based on specific organisational contexts. Collective bargaining can therefore play a crucial role in ensuring fair labour practices. In inland navigation in France, for example, there are three collective labour agreements for employees, respectively for passenger transport, freight transport, as well as for shore-based personnel (Central Commission for the Navigation on the Rhine, 2024).

The challenges of national social partner organisations comprise declining union membership numbers in certain regions, the rise of atypical employment arrangements or the automation, digitalisation and greening of the sector. Trade unions and employer organisations have a key role in engaging with stakeholders to effectively address these challenges and prepare the workforce accordingly (Eurofound, 2018).

Regarding employer organisations, the European Community Shipowners' Association is one of the main EU level actors, representing 22 employers from the EU and Norway and advocating for competitiveness and sustainability in the European shipping industry. In their ECSA Strategic Priorities 2024-2029 (2024), they outline the priorities of the industry in several categories, including trade, ship finance and competitiveness, as well as the green and digital and climate and energy transitions. The European Barge Union (EBU) and the European Skippers Organisation (ESO) are also representative bodies for employers in the water transport sector. The EBU represents the interest of large inland shipping companies and national associations, whereas the ESO advocates for the concerns of smaller businesses as well as individual boatmen. Both organisations engage in lobbying for favourable regulatory conditions, promoting the economic interests of the sector and engage in social dialogue with trade unions.

The International Labour Organization (2023) indicates how the degree and quality of the involvement of social partners at national level can vary significantly among countries, and how this can be a challenge for the IWT sector given its composition of numerous microenterprises and informal workers. Indeed, microenterprises (up to nine employees) are typically family-owned businesses with relatively high rates of informal employment (International Labour Organization, 2023). Their involvement in social dialogue is also vital for shaping national strategies and influencing policy. Representative workers' organisations should include informal workers, while employers' organisations should support the transition of informal businesses into the formal economy. Social dialogue among governments, workers' and employers' organisations can be a primary tool to address informality.

These organisations interact within institutional frameworks to negotiate agreements and steer EU regulatory efforts to address sector-specific challenges in the water transport sector. The European Sectoral Social Dialogue Committee for Inland Water Transport, for example, serves as a formal platform for discussion between employers and workers at European level. This committee enables social partners to collaborate on issues such as working schedules, health and safety standards or strategies to enhance competitiveness in the sector. It is equally important that outcomes of European-level negotiations are respected and implemented across Member States to foster operational cohesion.

Social actors also interact with international organisations such as the Central Commission for the Navigation of the Rhine or national bodies like the Dutch Association for Inland Shipping to contribute to setting industry standards, provisions of training programmes and for advocating for improved regulatory frameworks. The Central Commission for the Navigation of the Rhine has a committee focused on Social Issues, Employment and Professional Training (Eurofound, 2018). It has actively facilitated dialogue between various stakeholders including industrial, political and civil society representatives (Central Commission for the Navigation of the Rhine, 2014).

8.0 Recruitment practices to fill labour and skill gaps

Key determinants of labour market imbalances in relation to recruitment practices:

- Flags of convenience enable shipowners to reduce costs; however, they often result in inconsistent labour conditions, as workers are subject to varying national laws, impacting wages and benefits.
- Intermediary agencies are increasingly relied upon, creating complex employment structures that make it harder to ensure fair wages and benefits for workers.
- The use of self-employment is linked to the growing shortages of qualified personnel.

Recruitment practices identified in the waterborne transport sector indicate the usage of employment methods for simplifying bureaucratic procedures which can be potentially detrimental to workers' employment conditions.

As regards inland water transport operations, flags of convenience are being used to reduce the administrative burden for businesses, leading to an increase in river vessels in the European Union flying the Maltese flag, whilst crewing agencies from Cyprus supply workers (European Transport Workers' Federation, 2022). Shipowners can operate under the flag of a country other than that of their nationality, recruit workers through an agency based in another distinct state and employ through contracts issued and bound by the legislation of yet another country. Consulted stakeholders highlighted the growing reliance on intermediary agencies in the maritime industry which function as part of the flags of convenience system.

The complex structure of shipping operations, often governed by multiple national labour laws, creates loopholes that can be exploited to weaken workers' rights, including fair wages and social security protection. This undermines compliance with existing European regulations and contributes to the declining attractiveness of the maritime industry (European Transport Workers' Federation, 2023). Crew members of the same rank may receive unequal pay or benefits despite performing similar tasks, raising serious concerns about operational legitimacy, safety standards, and social protection.

Open registries provide benefits to shipowners by reducing business costs, especially for workforce expenses, with around 50% of EU-owned vessels registered under such systems (International Transport Forum, 2023). For example, ships registered in Norway under the Norwegian International Ship Registry can hire foreign workers based on their national collective agreements, allowing TCNs to contribute to their home country's social security system while working on vessels (Court of Justice of the European Union, 2019). This simplified process makes it easier to fill vacancies, particularly for essential roles where there are shortages, such as technical positions at management level on ships (International Chamber of Shipping, 2021).

With regard to the IWT sector, only some countries (Belgium, Slovenia, Italy, the Netherlands and Austria) have reported levels of self-employment in the industry higher than 20%, indicating that this recruitment practice is concentrated in specific areas (Eurofound, 2018). Staff shortages are expected to be exacerbated among the self-employed ageing population, where self-employment represents the typical method of recruitment in the IWT sector. This will contribute to a rising shortage of staff with valuable knowledge and expertise in both passenger and freight inland navigation fields, particularly with respect to qualified personnel in management positions needed to oversee technical aspects of vessels which may be harder to replace.

9.0 Skills and qualifications gaps

Key determinants of labour market imbalances in relation to skills and qualifications:

- As the twin transition requires advanced green and digital skills, there is a growing demand for education and training, but participation remains below average, especially among an ageing workforce.
- The need for climate adaptation in IWT, including low-emission vessels and smart navigation, adds further complexity to the workforce training requirements.
- Automation and digital technologies introduce new technical demands that the current workforce is not fully equipped to meet, requiring upskilling and reskilling and creating a labour shortage in specialised roles.
- Many businesses face challenges in providing in-house training, especially for emerging technologies.
- A lack of specialised educators in maritime schools limits the ability to offer high-quality education and training.
- Inadequate training infrastructure and facilities in some countries limit access to maritime education and hinder workforce development.
- Differences in certification requirements between IWT and maritime sectors create barriers to mobility.

Increasing demand for skills and education for the twin transition

The IWT sector is critical to the circular economy and green transition, yet it faces significant challenges in the adequate training of its workforce with the skills to meet energy consumption reduction and climate goals. The International Labour Organization (2023) emphasises the importance of better vessel utilisation, modern propulsion systems, improved hydrodynamics, smart navigation, and the integration of IWT with seaport logistics to secure the future of waterborne transport. Furthermore, it will need to adapt to climate risks related to low water levels, flooding, and river erosion.

Despite the increasing demand for higher education and vocational skills in the workforce, key industries crucial for the twin transition, like water transport, report below-average worker participation in education and training, especially amid an ageing population (Directorate-General for Employment, Social Affairs and Inclusion, 2023). The European Economic and Social Committee (2024) reported that many businesses face difficulties in providing in-house training and professional development opportunities, even as technological developments demand specialised skills in green technologies and digitalisation.

Training for the new, greener fleets will require significant investment which may exceed the sector's current capacity (International Labour Organization, 2023). Upskilling and reskilling the current workforce to operate sophisticated green vessels will be essential and require enhanced training programmes. Additionally, trends such as supply chain optimisation, increased autonomy, and smart ship development are driving digitalisation and automation in the sector (Inland Navigation Europe, 2025). The water transport sector is increasingly adopting innovations to decarbonise vessels and cutting greenhouse gas emissions (Directorate-General for Mobility and Transport, 2024). A critical component of the twin transition involves selecting future fuel types and establishing EU-wide regulations for their distribution, ensuring a level playing field. This will enable operators to implement appropriate training for the workforce in line with the sector's evolving demands. As these transformations accelerate, preparing the workforce for the twin transition becomes essential (Hildre et al., 2022).

The rise of technical jobs onshore offers opportunities for both seafarers and IWT crew members, potentially filling positions with underrepresented groups in the workforce (Pike and Terpilowski, 2022). To support this, investments in training for the twin transition are essential, as the European Commission (2020) points out the lack of infrastructure and training facilities as bottlenecks in some countries, hindering access to maritime academies. Maritime education and training institutions must adapt to future skill requirements and updated standards. Stakeholders consulted through the focus group emphasised the importance of training programmes in equipping workers with the necessary skills to navigate the sector's challenges. Current initiatives focus on integrating new technologies, such as liquefied natural gas (LNG), methanol, and electric propulsion, into existing training programmes for vessel masters. It was also pointed out that many seafaring schools suffer from a shortage of teachers for specialised subjects, underlining the need for increased funding and resources to expand training capacities and ensure students have access to high-quality education.

Addressing current and future skills shortages in the water transport sector will require the integration of specialised talent, particularly among women and younger professionals, where gaps are most evident (European Transport Workers' Federation, 2022). An ageing workforce, especially in regions with high levels of self-employment, further compounds these challenges (International Labour Organization, 2023). At the same time, the growing role of automation introduces uncertainty regarding future workforce demands and its implications for the traditional role of young seafarers (European Commission, 2020). While automation has the potential to ease labour shortages, it also threatens conventional jobs, highlighting the need to improve working conditions, social protections and labour rights to both upskill the current workforce and attract new, qualified entrants (European Transport Workers' Federation, 2023). Despite human oversight, incidents involving remotely controlled vessels are anticipated. Stakeholders stress that such risks must be incorporated into professional development strategies, particularly for younger workers pursuing environmentally sustainable maritime careers.

Certification gaps between IWT and seafaring

The SkillSea project (2023), a pan-European initiative involving various stakeholders in the sector, highlighted the need to address gaps in current occupational profiles and create new ones for the future. Key areas of focus include sustainability, climate protection, the integration of new technologies like automation and blockchain in the industry, and the increasing need for entrepreneurial and soft skills.

One major challenge identified is the sector's cyclical nature which creates uncertainty around career and skills paths, weakening efforts to attract and retain talent. Different vessels require specific skills and equipment, creating distinct work routines. As a result, a worker's competence on one vessel may not transfer directly to another, especially with the introduction of green or automated fleets (Zec et al., 2023).

In the IWT sector, the mobility of workers is enabled by Directive (EU) 2017/2397 as it mandates the EU-wide recognition of professional qualifications through a harmonised system applying to all crew members. Thus, EU workers can work in a transnational environment in any of the EU Member States, facilitated by intra-EU mobility. Therefore, training for obtaining certifications is a key factor in easing the mobility of workers, as well as for addressing shortages by opening up to the Union market (International Labour Organization, 2023).

Stakeholders pointed out the complexity of qualification requirements in IWT across different countries. While there is a EU certificate that allows workers to navigate most waterways in the EU, not all Member States have fully harmonised their educational systems and certification processes. Larger and more relevant Member States have adapted, but smaller Member States lag behind, this creating inconsistencies in qualification recognition across the sector. Another aspect discussed was the need for digitalisation of certificates to streamline the process and transfer certificates.

Consulted stakeholders agree that the complex procedures for transitioning from seafaring to inland navigation pose a significant barrier to mobility, causing labour shortages in the sector. The issue stems from the lack of equivalence between certifications and the differing skill requirements of the two sectors. IWT and sea transport operate under distinct frameworks: IWT typically requires EU certifications, often with additional regional qualifications, while maritime transport follows the international Standards of Training Certification and Watchkeeping. In terms of skills, inland navigation demands specific knowledge of regional waterways and the ability to handle vessels in narrower spaces, whereas seafaring requires advanced navigation skills for open-ocean voyages, including the use of GPS and the ability to navigate in adverse weather conditions.

Another important aspect is that seafarers pursuing vocational programmes do not earn any ECTS credits, henceforth are facing barriers to ensuring continuity in their educational development and professional progression. The SkillSea project identified this to be a structural weakness in the industry, as 'a majority of seafarers have to restart their education at the tertiary level (Oksavik et al., 2023, p. 19).

10.0 Measures to tackle labour market imbalances

Key determinants of measures to tackle labour market imbalances:

- To strengthen training initiatives, companies are investing in upskilling and reskilling programmes to equip workers with emerging skills, particularly for green technologies and evolving maritime demands.
- Through strategic partnerships, employers, authorities, and educational institutions are collaborating to address labour shortages with shared knowledge and joint workforce development efforts.
- By improving the sector's attractiveness, awareness campaigns and unified communication platforms are promoting career opportunities, especially to younger and environmentally conscious workers.

To address labour shortages across various sectors, industries are implementing a range of strategic measures focused on improving skills, enhancing workforce mobility, promoting inclusivity and creating more attractive working conditions.

Strengthening training initiatives

The need for reskilling and upskilling the workforce is a well-documented need for the water transport industry (International Labour Organization, 2023). In light of the EU's water transport sector labour shortages, employers are implementing various strategies to attract and retain qualified personnel. In maritime transport, companies are investing in training programmes to equip seafarers with emerging skills in line with technological developments. For example, the Danish shipping and logistics company, Maersk, provides maritime courses, trainings and certificates (Maersk Training, n.d.). Maersk also invests in efforts focusing on environmental compliance and decarbonisation technologies for responsible practices to minimise the environmental impact and meet global regulatory standards. Given the assessment of the Maritime Just Transition Task Force regarding the need to train 800 000 seafarers by the mid-2030s to operate green fleets, a dedicated training project for the decarbonisation of the shipping industry will be conducted in a joint effort between the task force and the International Maritime Organization (International Transport Workers' Federation, 2023).

Strategic partnerships

Employers in the IWT sector are investing in efforts together with national authorities, educational institutions and industry organisations to develop solutions for labour shortages. A notable initiative was conducted in Romania by the European IWT Platform, an extension of the European Barge Union and the European Skippers Organisation which advocates for inland navigation in European and national transport policies. The initiative was a fact-finding mission for collecting information regarding labour shortages and the state of training material available in the IWT sector in Romania (Sahitava, 2023). The objective of the mission was to prepare for building collaborative strategies to strengthen the workforce and enhance career opportunities in the EU.

Improving the sector's attractiveness

The Pro Binnenschifffahrt campaign[2] in Germany aims to boost the appeal of inland waterway navigation, attract more people to the sector, and unite companies and institutions under a single communication platform to raise awareness of the industry. The campaign includes the development of a central information platform for inland navigation, ensuring a strong social media presence, and facilitating cross-company industry communications. Its goal is to inform the public about career opportunities in the sector, the transport and energy transition, freight and passenger shipping, and the industry's economic and ecological significance. These efforts are focused on engaging younger generations by promoting sustainable, future-oriented careers in a dynamic industry. The campaign is being carried out in collaboration with the Federal Union of German Inland Navigation (Pro Binnenschifffahrt, n.d.).

[2] Pro Binnenschifffahrt (n.d.) *Campaign,* Available at: https://pro-binnenschifffahrt.de/kampagne/

References

Bathia, B. S. et al. (2024). *Quantifying an inconvenient truth: Revisiting a culture of adjustment on work/rest hours.* World Maritime University. Available at: https://www.wmu.se/scholarly-books/quantifying-an-inconvenient-truth

Broughton, A., Tanis, J., Brambilla M. (Ecorys), Voss, E. and Vitols K. (wmp consult), (2024). *Research for TRAN Committee – Trends, challenges and opportunities in the EU transport labour market*. European Parliament, Policy Department for Structural and Cohesion Policies. Available at: https://www.europarl.europa.eu/thinktank/en/document/IPOL_STU(2024)747266

Central Commission for the Navigation of the Rhine (2014). CCNR engages dialogue with social partners to look into the need to modernise rules on crew composition and rest time (Press Release). Available at: https://www.ccr-zkr.org/files/documents/cpresse/cp20141119en.pdf

Central Commission for the Navigation of the Rhine (2024). *Thematic Report: The Labour Market of the European Inland Navigation Sector.* Available at: https://inland-navigation-market.org/wp-content/uploads/2024/03/Livret_EN_A5_Labour-market-2024_web_bd.pdf

Council of the European Union (2024). *Russia's war of aggression against Ukraine: EU adopts 15th package of restrictive measures.* Press Release. Available at: https://www.consilium.europa.eu/en/press/press-releases/2024/12/16/russia-s-war-of-aggression-against-ukraine-eu-adopts-15th-package-of-restrictive-measures/

Court of Justice of the European Union Press Release (2019). *Judgment in Case C-631/17.* Available at: https://curia.europa.eu/juris/liste.jsf?nat=or&mat=or&pcs=Oor&jur=C%2CT%2CF&num=C-631%252F17&for=&jge=&dates=&language=en&pro=&cit=none%252CC%252CCJ%252CR%252C2008E%252C%252C%252C%252C%252C%252C%252C%252C%252C%252C%252Ctrue%252Cfalse%252Cfalse&oqp=&td=%3BALL&avg=&lg=&page=1&cid=28956223

Directorate-General for Employment, Social Affairs and Inclusion (2023). *Employment and social developments in Europe 2023.* Publications Office of the European Union, Luxembourg. Available at: https://op.europa.eu/en/publication-detail/-/publication/680d6391-2142-11ee-94cb-01aa75ed71a1

Directorate-General for Mobility and Transport (2024). *Transport in the European Union: Current trends and issues.* Publications Office of the European Union, Luxembourg. Available at: https://transport.ec.europa.eu/news-events/news/new-eu-transport-report-current-trends-and-issues-2024-06-27_en

Eurofound (2018). *Representativeness of the European Social partner organisations: Inland water transport sector.* Dublin: Eurofound. Available at: https://www.eurofound.europa.eu/system/files/2018-11/ef18062en.pdf

Eurofound (2025). Representativeness study: Maritime transport. Available at : https://www.eurofound.europa.eu/en/publications/2025/representativeness-study-maritime-transport

European Commission (2008). *NACE Rev. 2: Statistical classification of economic activities in the European Community.* Publications Office of the European Union, Luxembourg. Available at: https://ec.europa.eu/eurostat/web/products-manuals-and-guidelines/-/ks-ra-07-015

European Commission (2020). *Study on social aspects within the maritime transport sector: Final report.* Publications Office of the European Union, Luxembourg. Available at: https://op.europa.eu/en/publication-detail/-/publication/a14413d7-bf30-11ea-901b-01aa75ed71a1

European Community Shipowner's Association (2024). ECSA Priorities 2024-2029. Available at: https://online.fliphtml5.com/vwkwp/tvck/

European Economic and Social Committee (2024). *Labour and skills shortages in transport, energy, infrastructure and the digital sector.* Available at: https://www.eesc.europa.eu/en/news-media/press-summaries/labour-and-skills-shortages-transport-energy-infrastructure-and-digital-sector

European Maritime Safety Agency (2024). *Facts & Figures 2023.* Available at: https://www.emsa.europa.eu/publications/item/5176-emsa-facts-figures-2023.html

European Transport Workers' Federation and World Maritime University (2023). *Social security rights of the European resident seafarers.* Available at: https://www.etf-europe.org/resource/social-security-rights-of-the-european-resident-seafarers-a-joint-report-of-the-european-transport-workers-federation-and-world-maritime-university/

European Transport Workers' Federation (2023). *Labour shortages in IWT.* Available at: https://www.etf-europe.org/resource/position-paper-final-labour-shortage-in-iwt/

Eurostat (2024a). *Water transport employed 297,000 people in 2023.* Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20240625-1#:~:text=In%20the%20EU%2C%20297%20000%20people%2C%20aged%2015-64%2C,were%20men%20%2879%25%20men%20compared%20with%2021%25%20women%29.

Eurostat (2024b). *Enterprise statistics by size class and NACE Rev. 2 activity (from 2021 onwards).* Available at: https://doi.org/10.2908/SBS_SC_OVW

France Travail (2024). *Transport et logistique: Les évolutions d'un secteur clé.* Available at: https://www.francetravail.org/accueil/actualites/2024/transport-et-logistique-les-evolutions-d'un-secteur-cle.html?type=article

Gullentops, M. (2024) *Revision of the Flag State Requirements Directive*, Available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/751432/EPRS_BRI(2023)751432_EN.pdf

Hildre, P. H., et al. (2022). *Future skills and competence needs.* Available at: https://www.skillsea.eu/index.php/results/public-deliverables

Inland Navigation Europe (2025). Digitalisation. Available at: https://www.inlandnavigation.eu/eu-topic/digitalisation/

International Chamber of Shipping (2021). *New BIMCO/ICS Seafarer Workforce Report warns of serious potential officer shortage.* Available at: https://www.ics-shipping.org/press-release/new-bimco-ics-seafarer-workforce-report-warns-of-serious-potential-officer-shortage/#:~:text=Launched%20today%2C%20the%20new%20Seafarer%20Workforce%20Report%20from,in%20the%20total%20supply%20of%20officers%20by%202026.

International Labour Organization (2006). *Maritime Labour Convention 2006.* Available at: https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:91:0::NO::P91_ILO_CODE:C186

International Labour Organization (2023). *Decent and sustainable work in the inland waterways sector: Report for the Technical Meeting on Decent and Sustainable Work in the Inland Waterways Sector.* Geneva. Available at: https://www.ilo.org/publications/decent-and-sustainable-work-inland-waterways-sector#:~:text=Chapter%203%20describes%20the%20challenges%20and%20opportunities%20for,at%20work%2C%20minimum%20requirements%20for%20work%20on%20board

International Transport Forum (2023). *Water Transport Employment in Europe: The Role of Governance.* International Transport Forum Policy Papers, No. 118. OECD Publishing. Paris. Available at: https://www.itf-oecd.org/water-transport-employment-europe-role-governance

Kiss, M. et al. (2022). *Russia's war on Ukraine: Implications for transport.* Available at: https://www.europarl.europa.eu/RegData/etudes/BRIE/2022/733536/EPRS_BRI(2022)733536_EN.pdf

Maersk. (n.d.). Maersk Training | Empowering a Skilled, Confident Workforce for Tomorrow. Available at: https://maersktraining.com/

Maritime Labour Convention (2006). Available at: https://normlex.ilo.org/dyn/nrmlx_en/f?p=NORMLEXPUB:55:0::NO::P55_TYPE%2CP55_LANG%2CP55_DOCUMENT%2CP55_NODE:REV%2Cen%2CC186%2C%2FDocument

Munafo, D. et al. (2018). *Sleep deprivation and the workplace: Prevalence, impact, and solutions. American Journal of Health Promotion*, 32(7), 1644–1646. Available at: https://pubmed.ncbi.nlm.nih.gov/30099896/

Okvasvik, A. et al. (2023). *Identification of mismatches on a structural basis.* Available at: https://www.skillsea.eu/index.php/results/public-deliverables

Pape, M. et al. (2022). *Russia's war on Ukraine: Implications for EU transport.* Available at: https://www.europarl.europa.eu/RegData/etudes/ATAG/2022/729307/EPRS_ATA(2022)729307_EN.pdf

Pike, K. and Terpilowski, S. (2022). *Enhanced participation of women in European shipping: The opportunity to increase gender balance in the EU maritime sector.* Available at: https://eumaritimewomen.org/wp-content/uploads/2022/11/Enhanced-participation-of-women-in-European-shipping-NOV-2022-web-version.pdf

Pro Binnenshifffahrt (n.d). *Wofür unser Herz schlägt.* Available at: https://pro-binnenschifffahrt.de/kampagne/

Rasmussen, N. (2024). *Tanker Shipping Market Overview & Outlook November 2024.* Available at: https://safety4sea.com/wp-content/uploads/2024/08/BIMCO-Tanker-Shipping-Market-Overview-Outlook-August-2024_08.pdf

Sahitava, Y. (2023). Addressing the IWT Labour Shortage: Building Collaborative Solutions. IWT. https://www.inlandwaterwaytransport.eu/labour-shortage-romania/

Seafarers International Research Centre (2021). Recommended standard of accommodation for seafarers working on board cargo vessels. Cardiff University and Lloyd's Register Foundation. Available at: https://orca.cardiff.ac.uk/id/eprint/171534/1/Recommended-standard-accommodation-seafarers.pdf

SkillSea (2025). 'Futureproof Skills for the Maritime Transport Sector'. Available at: https://www.skillsea.eu/

Vessels Value (2024). *Shipping Market Outlook 2024: Q4 2024 Outlook.* Available at: https://blog.vesselsvalue.com/shipping-market-outlook-q4-2024-forecast/

Zec, D. (2023). Current Skill Needs: Reality and mapping. SkillSea. Available at: https://www.skillsea.eu/images/Public_deliverables/D1.1.2-Current-skills-needs-final_28-06-2023.pdf