

The Sustainability of Transport and Logistics in the Mediterranean

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The concept of sustainability, although opened to many interpretations, can be understood as based on two elements. The first is the transport network, which is, at European level, fundamentally structured by the work carried out in recent years by the European Commission (EC) on the Trans-European Transportation Network (TEN-T) and which necessarily conditions that of its neighbouring countries, and therefore by extension Mediterranean countries. The transport network is one of the three networks that are essential for economic and social development. The second element is made of the energy and telecommunications networks, which are elements of the digitalisation process. The transport network is dependent on the other two, both in terms of efficiency and sustainability.

The efforts to advance the concept of sustainability are based on the approval by the United Nations (UN) Assembly of the 2030 Agenda in September 2015, structured by the 17 Sustainable Development Goals (SDG). Sustainable development cannot be understood without simultaneously taking into account the interrelationship between the different goals. Spending more time trying to scrutinise the aspects related to Goal 13 on climate change, or Goal 9, which deals with industry, innovation and infrastructure in this article would not be wise, as they depend to a broad extent on the other 15 goals and their mutual interactions to reach the targets. It is most likely that the problem to solve is not pollution or sustainability but the consequences we are facing from our actions in the past two centuries. The underlying problem is our way of life and the habits we have acquired. This is where the COVID-19 pandemic has forced our societies to look at themselves in the mirror. It can now be understood that another way of organising our societies is possible and that everything is more ephemeral and fragile than previously thought.

Sustainability has become one of the critical factors in shaping the policies of all countries. The United Nations, with its Agenda 2030 initiative, and the European Union (EU) with the Green Deal, has set the course for a low-carbon society in 2050. The COVID-19 has further strengthened the need to carry out this sustainability revolution. The road ahead will not be easy and will inevitably lead to drastic changes in the configuration of the transport and logistics sector.

A World in Transition

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The COVID-19 appeared in the middle of a period of strong transition. Time will tell if there is a change of cycle, leaving behind the silicon and information period, and moved towards robotics, artificial intelligence, and simulation models in virtual environments. Now, the systems we are developing are prepared to aggregate much more data than we have ever had. The programmes can analyse it and simulate scenarios on which to base decisions, much more accurately than those we would have been able to make without their help. This transition is taking place in the three networks previously identified (transport, energy and telecommunications) and as a result of their evolution.

The Energy Transition

The Mediterranean, like the rest of the world, faces the need to seek out renewable energy sources. The consumption of hydrocarbons and energy produced with fossil fuels is reaching the end of the cycle. Governments face the need to seek alternatives that will maintain economic activity while reducing the environmental impact of emissions. Energy efficiency and the progressive penetration of renewable energies must enable economic reactivation in the short term and, at the same time, allow for the consolidation of the value chain associated with their deployment. They are also the pillars of decarbonisation, which gives a boost to the rest of the sectors while improving business and industrial competitiveness through a downward price path.

The energy transition also promotes the implementation and development of new technologies, which are fundamental for managing the demand for electricity and the supply of security in a 100% renewable system, in an industry segment in which the Mediterranean has the potential to acquire leading positions.

The development of hybrid plants allows for more flexibility. Different types of technologies can coexist in the same system, which can already be seen, for example, in wind power plants utilising solar panels. In such cases, the energy can be distributed using the same connection point and the access capacity already granted, provided that the technical requirements are met.

According to the Observatoire Méditerranéen de l'Energie (OME), “it is estimated that energy demand per capita will increase by 62% in the Southern and Eastern Mediterranean countries by 2040 (using 2018 as the reference year). The Mediterranean region is also experiencing intense industrialisation and growth in tourism, putting additional pressure on available energy resources” (UfM, 2019).

These regional challenges, if adequately addressed, can be turned into business opportunities that can contribute to a sustainable energy transition. The Mediterranean is rich in renewable energy sources, such as wind, sun and water. Therefore, it has the potential to promote the transition to more sustainable

and low-carbon energy systems. There is also the potential to increase energy efficiency through the development of new technologies that allow, for example, energy-saving and storage. Moreover, the development of gas and energy transmission interconnections will lead to the progressive integration of energy markets in the region, which is an opportunity for countries to better address the energy security challenges.

The problem is addressed from various perspectives depending on the "community" from which it is analysed. The most visible today is the city, which is currently undergoing a process of significant changes due to the evolution of distribution caused by the rapid growth of e-commerce (further accelerated by the COVID-19).

Ports have initiated determined shifts towards an energy transition in their territories. This has led to the emergence of professions such as officers in charge of the energy transition. The working programmes go through the different elements that make up energy consumption and their sources of production.

The first issue is a legislative framework that has been developed to force the transition while maintaining a certain rate of deployment. A second point relates to savings and efficiency policies, as these are aspects that can be applied immediately and with excellent results if used correctly. A third issue relates to energy sources, and significant changes have already been made in recent years in this regard. Gas has played a leading role in the last ten years, and during this period gas-powered ships have been built, supply systems for trucks have been developed, and some tests with port machinery have been established.

One of the critical aspects that condition the implementation process of low-sulphur fuels with low CO₂ emissions is the possibility of the Mediterranean being declared an Emission Control Area (ECA). This is one of the most rapidly changing scenarios for the future. The Mediterranean will be an ECA area no later than 2024, as decided at the meeting of the Contracting Parties to the Barcelona Convention (COP21) held in December 2019 in Naples. The agreement will lead to the presentation of the proposal at the Marine Environment Protection Committee (MEPC) of the International Maritime Organisation (IMO) in 2022.

This is a significant challenge for the shipping companies, which have been working on the emission reduction aspects for years. In 2018, the IMO adopted Resolution 304(72) on the initial strategy for the reduction of greenhouse gas (GHG) emissions from ships, which set a reduction of 40% by 2030 and 70% by 2050. The lifespan of a vessel is approximately 30 years, so times should be calculated taking this into account (IMO, 2018).

Today's large fuel families are also in transition. Liquefied natural gas is evolving towards biomethane and hydrogen, biodiesel to second and third-generation biofuels, liquid petroleum gas to biogases, and bioethanol to synthetic ones. In all cases, it will be necessary for ships to dedicate more space to storage, as the energy power is lower, and they will need a higher quantity for a result similar to what is attained using traditional fuels.

Maritime transport in the Mediterranean is considered to be “Short Sea Shipping”, which in turn represents 80% of the world's fleet and one of the main contributors to air quality in port cities. Ports in the Mediterranean are generally located in big cities and operate alongside them, seeking a balance between the advantages of having a port that provides a service and the disadvantages of port-related operations. What is clear is that Short Sea Shipping is configured as a network in the area in which it operates. Ships from the Southern Mediterranean work with the countries of the North and vice versa. Therefore, the regulations that will be implemented will necessarily affect practically all operations. It seems clear that governments will use coercive measures to force a rapid move towards carbon-neutral solutions.

At present in Spain, gas is at the forefront with a prepared infrastructure that will make it possible to reach 2035 without the need to invest in this concept. For operators, it is profitable because they must bear a significant initial investment to adapt their ships. Still, the cost of fuel is more economical, allowing a return on investment in a relatively short time.

In recent months, hydrogen has been gaining ground as an alternative to traditional fuels in maritime transport for several reasons. It is abundant and available everywhere. In a fuel cell, the generated waste is O₂ and water. As a fuel, it has zero emissions, is not toxic, is not a greenhouse gas, can be produced from renewable resources, and is a source for other fuels such as e-fuels and blue fuels. We will have to get used to new nomenclatures such as "Green Hydrogen" produced from renewable energies or "Blue Hydrogen" generated from gas, which generates CO₂ in the production process that is captured and stored in underground deposits. Hydrogen has the disadvantage of being difficult to store and transport, and involves complementary elements such as ammonium, ethanol and octane. Ammonia stands out as it is a substance that does not contain carbon in its molecule and therefore does not generate CO₂ emissions during its decomposition reaction, besides being the second most-produced chemical compound worldwide after sulphuric acid.

Research is currently underway for the subsequent decomposition of ammonia for its use with catalysts. These include graphene, which due to its characteristics could be an ideal candidate. From a Mediterranean point of view, it is clear that energy sources based mainly on solar energy and gas

provide a significant competitive advantage, as the changes that are expected to occur are relatively rapid.

The Digital Transition

To understand what is happening in telecommunications systems, it is worth analysing the role that they have played during the pandemic. It is no longer a question of seeing how technology evolves in the field of communications and how it will affect us. It is about realising that society has been re-structured around a different way of making and maintaining relationships, driven at this time by the pandemic, which, we all assume, will remain as a new form of interaction. The pandemic has accelerated the digital transition, thus reconfiguring human and environmental relationships. At the expense of proximity, some interactions have been enhanced and our environmental impact reduced. During this period, a reasonably high level of educational activity has been successfully maintained. International projects have been supported, many people have teleworked, and the reality is that it seems that quite a few will continue to do so, even if only partially, for the foreseeable future (if not forever). Interestingly, none of this would have been possible without a significant development in digitalisation.

Two clear consequences of this pandemic have been the drastic reduction in mobility and the exponential increase in e-commerce and door-to-door sales. All of it was possible, based on a working system supported by telematics and the digitalisation of documentation and associated information. Everything that was being developed in the world of transport has accelerated rapidly, and where before everyone was putting obstacles in the way, now everyone is looking for solutions. If something could be done telematically, it was done, whether it was administrative boards or family meetings. Some changes will be more disruptive, such as the 5G technology that will allow exchanges of information in real time. This is understandable as there will be no latencies in communications. This is linked to the important development of robotic processes.

Another essential aspect linked to the energy network is its management and use. The "Smart Grid" concept is based on a form of efficient electricity management that uses computer technology to optimise the production and distribution of electricity, to better balance supply and demand between producers and consumers, and to improve the security and quality of supply following the requirements of the digital age. Better energy management will make it possible to create energy communities that will self-manage their production and consumption. Initiatives in this direction are being considered in the Port of Barcelona itself, but the idea goes further. This capacity for knowledge and management that a computerised world allows gives rise to different systems of governance, dependence and

resilience. Fortunately, it is not a question of technologies that are difficult to access for the countries of the Mediterranean basin, which already have the necessary energy and know-how.

Digitalisation has a fundamental impact on transport. Advances in digital mapping systems, fleet and transportation management and the development of mobility management networks are transforming its landscape. Each transport system has its network. For land transport, the European Commission is working with the "Intelligent Transport System", which enables an integrated system of information for traffic, safety, efficiency and sustainability. In short, it is working on the efficient management of the transport network based on the mass collection of data and interaction with the vehicles and drivers themselves.

In the maritime world, the Safe Sea Net, the vessel traffic monitoring in EU waters, managed by the "European Maritime Safety Agency", is gaining importance. Through it, it is possible to monitor the movement of ships in the Mediterranean, which in turn makes it possible to control environmental aspects with the Clean Sea Net service. The European Commission has continued to improve single window systems with a new initiative born at the height of the pandemic, namely the "EU Single Window Environment for Customs", which aims to facilitate the actions of the various public administrations involved in the clearance of goods entering and leaving the Union.

The ports have entered a period of digitalisation of all their operations and territories. The Internet of things (IoT) has made it easier to have a massive amount of information available, which in turn has made it possible to create a knowledge base on which to support much more efficient management systems. Ships have become sophisticated centres of sensors and data generators, producing and transmitting information from anywhere, often in real time. At the same time, advances in satellite communications are improving connectivity, allowing for massive increases in the volumes of data transferred at an ever-lower cost.

The Transition of the Transport Network

Finally, the transition of the transport network, supported by infrastructure and physical characteristics, and which include ships, trains and trucks, and structured around energy and information, needs to be addressed. When talking about transport in the Mediterranean, we need to discuss what the European Commission defines as the Motorways of the Sea and Short Sea Shipping. The Commission is considering the creation of a single European maritime space and, in a way, a Mediterranean space. For the Commission's Motorways of the Sea Coordinator, Kurt Bodewig, the second pillar of the three pillars of its strategy stresses the need to ensure smooth maritime transport by improving multimodal

connectivity, and thus ensuring better connections to the TEN-T corridors and better links with neighbouring countries (European Commission, 2020). This programme was launched in July 2020. It reflects the principles of the new legislature of the European Parliament adopted in June 2019, and the guidelines set by the President of the European Commission, Ursula von der Leyen, and the "Green Deal" programme, which is already setting the agenda for all the countries of the Union. It is important to note that the transport sector has been dramatically affected by the measures to contain the pandemic. The continuity of services has been ensured by transport workers under challenging conditions, showing that their role is critical in serving the essential needs of the population. By extension, the transport sector will also be crucial in supporting the post-COVID-19 economic recovery. This will particularly rely on the maritime and port transport sectors, with cruise, ferry and Ro-Pax operators being the most affected.

The sector faces two significant challenges: on the one hand, an evolution towards a concept of mobility as a service, which implies the integral management of information systems and means of transport oriented to the service of mobility; and, on the other, and always under the same principles, synchro modality and the physical Internet. These challenges are two new ways of visualising freight and passenger transport in which digitalisation, and clean energies will play a fundamental role.

Conclusions

The transitions in the energy, telecommunications and transport networks pose a disruptive change in the transport sector. Companies will have to reconfigure their strategies because they will have to change their means to adapt to the new situation, and management systems will be increasingly based on the digitalisation of operations, with artificial intelligence applying to their day-to-day activities. This brings about new opportunities for companies and the entry of new players from different markets. These new players may have competitive advantages over the rest, something that has already been witnessed in other sectors. Mobility will continue to be a fundamental element in development but will be adapted to a new reality that has emerged from the COVID-19 pandemic. Companies will have to reconfigure many of the professional profiles to adapt them to the new reality and to favour the new skills that will be required for a circular economy. These are what we call "Blue Skills". Training to cope with this transition will be a crucial factor in facilitating that transition.

Energy prices will change very significantly. Solar energy will gain prominence, giving a competitive advantage to countries with deserts, where solar energy performance is very high. This is an excellent advantage for the Southern Mediterranean countries. These price fluctuations will doubtlessly cause instability for a certain period.

Sustainability becomes the driver towards economic recovery. The challenge of building a new sustainable society will mark the agendas and efforts of the post-COVID-19 generation, which is much more open and aware of the challenges that we will have to face.

It is too soon to know how the COVID-19 will affect public transport. It still seems that the pandemic will last for some time, although more hope has emerged with the emergency approvals of the new vaccines in some countries, which should help overcome it. Transport will change, above all, because it already had to change with or without the COVID-19. It will do so with environmentally friendly mobility and be more adapted to serving people and goods thanks to non-polluting fuels and artificial intelligence digitalisation processes. Change is on the Blue Horizon ahead, so let us sail towards it sustainably together.

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