Ports and the energy transition

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The petro-chemical sector and the port sector are closely interlinked. Oil and oil products are important commodities for ports and many of the largest ports have reserved considerable parts of their port area for the petro-chemical industry. Refineries and storage facilities are located in or next to some of the world's largest ports, such as in Singapore, Rotterdam and Houston.

Global oil sector

A global restructuring of the industry is ongoing. Refineries are increasingly located in oil-producing countries and refineries close to consumer markets are being rationalised. Refineries in OECD countries have to deal with overcapacity and competition from other parts of the world where energy costs are lower. Ports are impacted by these developments. Refineries in many port areas have closed in ports such as Rotterdam, Marseille and Milford Haven.

This is a trend that will continue. According to the World Energy Outlook 2035 of the International Energy Agency (IEA), refineries will be confronted with a complex set of challenges, with nearly 10 million barrels per day of global refinery capacity are at risk, with refineries in the OECD countries, and Europe in particular, among the most vulnerable.

This restructuring of the industry has clear economic impacts on port regions. Our analysis of ports in North-West Europe indicates that the economic linkages between the petro-chemical sector and ports are stronger than the linkages of any other sector, as illustrated by the inter-industry linkages apparent from multi-regional input-output analyses that we have undertaken for various countries. In some ports, the petro-chemical cluster provides strong cluster effects with many industrial interlinkages within a port region. Therefore, a lot of economic value has been added and jobs are at risk from this ongoing restructuration.

Oil port to energy port

Port authorities are generally well aware of this and are moving towards diversification: from oil port to energy port. Ports as diverse as Rotterdam, Gothenburg, Oostende, Marseille and Dunkirk all market themselves as energy ports; as increasingly green and sustainable. In practice, 'energy port' can mean different things. We will distinguish three different strands often found in these energy ports:

- To stimulate renewable energy sources
- To use existing infrastructure for new energy sources
- To use 'waste' as energy

New renewable energy

Various ports have been active in introducing renewable energy sources to power their activities. Port planners have installed solar panels on warehouses and other buildings in their ports. Wind turbines have become a familiar sight in many ports; e.g. the Eurogate-terminal in Hamburg has its own wind turbines to provide energy for powering its terminal. However, renewable energy sources are not limited to providing power within the precincts of the port: some ports, such as Bremerhaven, have managed to become centres of a whole new off-shore wind energy sector, that brings new activity and employment to the port area.

For some of the smaller ports, this form of service provision seems to have provided a source of revitalisation complementary to handling regular cargo. In many cases new renewable energy sources go hand-in-hand with handling and maritime services; many of the ports specialising in LNG facilities and storage also plan to provide LNG bunkering and possible other applications; the port of Hamburg will from Spring 2015 operate a LNG power barge, that transforms LNG into electricity used to power cruise ships.

Utilising existing infrastructure

Industrial restructuring has given an impetus to using existing infrastructure for new energy sources. The port area of Amsterdam has two biodiesel plants using organic residues and rapeseed oil, making use of existing infrastructure and facilities. Oil terminals can fairly easily store bio-fuels, whereas coal-fired energy plants can blend bio-mass. In the Port of Venice, the refining scheme of a refinery of ENI was converted in a 'green cycle' to process high-quality bio-fuels starting from biological feedstocks.

So, there are interesting examples of the use of existing infrastructure for greener energy, but much more could be done, considering the potential of ports as nodes of the relevant infrastructures, industrial processes, flows of feedstocks and knowledge.

Use of 'waste'

We hear a lot these days about the 'circular economy' and how this should be stimulated. Various ports have decades-long experience with such initiatives that basically come down to using residual products from one sector as an input for other sectors. An example is Dunkirk, where the industrial heat from the Arcelor industrial plant in the port area has been used to provide district heating to 16,000 homes since 1986.

In the port-industrial zone of Fos, industrial synergies take place between the LNG terminal Fos Tonkin and Air Liquide since 1972. However, the crisis of the refinery sector and the decline of fossil-based energy has put circular energy on the agenda with more urgency than in the past. This provides possibilities to generate economic activity whilst at the same time improve environmental performance.

As such, ports could be exemplary drivers of urban green growth, where the port complex provides utility services to the city: such as in the Port of Amsterdam in which a waste and energy plant transforms urban domestic waste into electricity and heat via a district heating system, while sewage and sludge is treated and transformed into bio-gas and bio-LNG that could be used to power cars and ships.

The role of ports

Ports have a role to play in facilitating this energy transition. Most port authorities have now evolved into landlords, mainly engaged in negotiating and monitoring concessions or other contracts with terminal operators and industrial actors. Staging an energy transition requires efforts beyond this landlord role. It means, first of all, a very clear mapping of existing industrial linkages within the port-industrial area must be taken in order to discern what the flows of inputs, outputs and residual products are that could possibly be used in a circular way. A nice example of this is the mapping done in Dunkirk a few years ago.

The next step is the creation of a platform in which the different relevant actors are brought together in order to continuously explore potential synergies. This is essential to create trust between companies that could be each other's competitors. Such a network also helps to better define investments needed to reap new synergies; this could be investments in infrastructure, for example; pipelines needed to bring residual products such as steam from one firm to another.

In short, in order for this to work, port authorities would need to become more entrepreneurial and develop into some sort of a network manager. If a port and its stakeholders manage to realise a real energy transition, they will also have made an important step to improve the acceptability of the port vis-à-vis the citizens of the port-city, as the port will continue to be a driver of local economic growth, and vitally, it will have reduced the adverse environmental impacts.

About the author

Olaf Merk is Administrator, Ports and Shipping, at the International Transport Forum (ITF) at the OECD. He has directed studies on ports, port-cities, and port regulation and governance. He is the author of various OECD books, most notably "The Competitiveness of Global Port-Cities". He is also lecturer at the Institute for Political Science (Sciences Po) in Paris. Prior to the OECD, he worked for the Netherlands Ministry of Finance. He holds a Master's degree in Political Science from the University of Amsterdam.

About the organisation

International Transport Forum

The International Transport Forum (ITF) at the Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organisation with 54 member countries. It acts as a strategic think tank for transport policy and organises an Annual Summit of Ministers. The next Annual Summit will take place 27-29 May 2015 in Leipzig, Germany.

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