Dublin Port Master Plan
Issues Paper

Unitised Trade Trends Report

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March 2011

Issues Paper – Unitised Cargo

Introduction

Dublin Port is the "Key Gateway" for the import and export of goods for the Island of Ireland. The Port lies at the mouth of the River Liffey and is served by the national road and rail network. The largest conurbation in Ireland is Dublin and the activities of the port serve, principally, the natural hinterland but also goods travel to destinations throughout the Island of Ireland.

Dublin Port Company is the owner of the Dublin Port estate and is responsible for the management of the property including the leasing and licensing of land and facilities to terminal operators, stevedores and other companies associated with port activities.

In 2010 Dublin Port handled a total of 28,113,603 tonnes of goods (highest throughput was 30.9 million tonnes in 2007). The port is multimodal and as such handles unitised cargo, liquid bulk, dry bulk, cruise liners and to a lesser extent break bulk and new cars. The port is also a primary gateway for car passengers which utilise the ferry companies which have operations in Dublin Port. The cargo handled can be sub divided into imports totalling 16,930,893 tonnes and exports totalling 11,182,710 tonnes.

This Issues Paper relates to the Unitised Cargo element of the ports business which can be sub categorised into Roll-On Roll-Off (RoRo) and Lift-On Lift Off (LoLo) where cargo is carried in "units" i.e. containers or trailer freight units. It will look at the current infrastructure and current shipping companies within the port that support the Unitised Cargo business. Equally it will look at how these trades may develop in the future and indicate the type of infrastructure improvement may be required to support the growth in trade through Dublin Port.

As can be seen below, the Unitised Cargo trade into Dublin Port during 2010 amounts to some 81% of the total tonnage of which RoRo accounts for 60.85% and LoLo accounts for 20.20%. The category of Liquid Bulk accounted for some 13.47% of the tonnage which includes the importation of refined petroleum products for the energy and transport sectors, liquefied petroleum gas (LPG), molasses and bitumen.

Cargo Type	Tonnes (Import and Export)	Percentage
Roll-On Roll-Off	17,106,804	60.85%
Load-On Load-Off	5,679,369	20.20%
Liquid Bulk	3,787,861	13.47%
Dry Bulk	1,471,087	5.23%
Break Bulk	73,202	0.25%
Total	28,113,603	100.00%

Further subdivision shows that in 2010 the Unitised Cargo amounts to 73.1% of the import and 93.1% of the export trade handled through Dublin Port.

	Import Tonnage	Export Tonnage	Total Tonnage
Total DPC	16,931	11,183	28,114
RoRo Tonnes	9,123	7,984	17,106
RoRo %	53.9%	71.4%	60.8%
LoLo Tonnes	3,246	2,430	5,675
LoLo %	19.2%	21.7%	20.2%
Total Unitised Tonnes	12,369	10,414	22,718
Total Unitised %	73.1%	93.1%	80.8%

The Dublin Port Master Plan 2010 – 2040 is conservatively predicting annual growth at 2.5% per annum which effectively doubles the tonnage handled through the Port by 2040. Therefore there will be a requirement to improve the current infrastructure and initiate plans in order that Dublin Port is able to meet the demands that will be placed upon it. In order to achieve a rounded view there has been preliminary discussion with the shipping companies in order to understand how they may develop their business portfolio through Dublin Port. This has given rise to a number of challenges in future years.

Terminology

There are a number of terms that the reader may not be familiar with and as such they are defined below

- RoRo – Roll-On Roll- Off Ferry
- LoLo – Load-On Load Off Container Vessel
- ConRo – A vessel which is built take a combination of RoRo an LoLo Freight
- Cruise Ferry – A ferry capable of taking a combination of car passengers and freight with a passenger capacity exceeding 500 people
- Ropax Ferry – A ferry capable of taking a combination of car passengers and freight with a passenger capacity below 500 people
- Freight Ferry – A ferry capable of taking freight but with a maximum passenger capacity of 12 people
- Draft – Distance from waterline to keel of the vessel
- TEU – Twenty Foot Equivalent Unit
- Driver Accompanied Freight – A freight vehicle with tractor unit and trailer which travels with a driver
- Unaccompanied Freight – A trailer only (no tractor unit or driver) which is loaded onto the vessel by the ferry operator
- Terminal Footprint – The total area of the terminal
- Link Span – Ship to shore bridge which can be adjusted to form a seamless transition from vessel to shore
- Dwell Time – The time that a freight unit resides at a terminal prior to loading onto the vessel or taken for delivery after discharge from a vessel.
- Gantry Crane – A rail mounted crane adjacent to the quayside primarily used for discharging and reloading a container vessel
- Harbour Mobile Crane – A rubber tyre crane that can be used for discharging and reloading a container vessel. These type of cranes can also be utilised for other port work such as Bulk Cargo discharge
- RTG – Rubber Tyre Gantry used for stacking containers and loading to road truck
- RMG – Rail Mounted Gantry used for stacking containers and loading to road truck
- Reefer Points – Electrical connections for containers that require power for cooling or freezing purposes
- Terminal tractor – A specialist robust tractor unit used in port operations to move unaccompanied trailers on the terminal or to and from a ship.

RoRo Terminals in Dublin Port

The RoRo trade within the Port is accommodated at four terminals all located on the north side of the Port.

A ferry terminal comprises of a vessel berth and a link span which is adjusted according to the tidal conditions and the height of the stern door from the water so as to form an acceptable transition shore to ship. In addition there are passenger and freight acceptance facilities, welfare facilities and passenger car and freight parking areas all within an approved security area.

The following information relates to each terminal, which company operates it and their commercial offering.

- RoRo Terminal T1 – Irish Ferries – Car and foot Passengers, Accompanied and Unaccompanied Freight. Isle of Man Steam Packet Co. – cars and passengers (Summer only)
- RoRo Terminal T2 – Stena Line – Car and foot Passengers, Accompanied and Unaccompanied Freight
- RoRo Terminal T3 – P&O - Accompanied and Unaccompanied Freight, car passengers.
- RoRo Terminal T5 –Seatruck Ferries – Unaccompanied Freight (12 passengers)

Below is tabulation summarising the terminals T1 – T3 and T5 which are currently utilised within Dublin Port. It indicates the key characteristics of the terminals namely berth capabilities, operator, frequency of sailings and the terminal footprint.

Terminal	**T1**	**T2**	**T3**	**T5**
Company	Irish Ferries and Isle of Man Steam Packet Co.	Stena Line	P&O	Seatruck Ferries
Destination	Holyhead and Douglas.	Holyhead	Liverpool	Liverpool and Heysham
Sailing time	Ir.Fer.-3.25 hours and 1hr'- 49 min's. I.O.M. - 2 Hr's - 50 min's.	3.25 hours	8 hours	8 hours and 8.25 hr's
Vessel No	Ir' Fer' – 2 Is.Of Man. – 1.	2	3	3
Ferry Type	I.F. - 1 Cruise and 1 Fast ferry. I.O.M. – 1 fast ferry.	1 Cruise and 1 Ropax	3 Ropax	3 Freight
Sailings/day	Ir. Fer. – 4 I.O.Man. – 1, seasonal.	4	3	3
Area Footprint	6.23 Hectares	6.79 Hectares	9.76 Hectares	10.20 Hectares
Berth Lengths	213m and 175m	205m	238m	200m and 156m
Ramp Lengths	40m and 45m	46m	41m	35m and 48m
Tiers	Double and single	Single	Single	Single
Ramp Widths	20m and 20m	20m	20m	20m and 20m
Weight Limits	180t and 180t	180t	180t	180t and 100t

RoRo operations in Dublin Port

When a ferry arrives at its predetermined berth it is secured to the quayside and vehicle access is gained via a bow or stern door.

The cargo onboard the vessel varies depending on vessel type but in any event the cargo is discharge in the most time efficient manner possible.

Car Passengers and Accompanied Freight drive from the Ferry Terminal immediately upon discharge from the vessel. Foot passengers transfer from the vessels to the terminal buildings via gangways or by special coach. Unaccompanied Freight is discharged into the Terminal and awaits collection. Strict management is required for unaccompanied freight as the dwell time must be minimised in order that the terminal is not gridlocked with freight awaiting collection.

Cargo to be loaded onto a ferry is marshalled in the terminal in three defined areas namely, Car Passengers, Driver Accompanied Freight vehicles and Unaccompanied Freight vehicles. Foot passengers check-in at the terminal buildings and board the vessels via gangways or by special coach. The Car Passengers and Accompanied vehicles are driven by their accompanying driver onto the ferry under the supervision of terminal staff and ships personnel. The Unaccompanied Freight is driven onto the vessel by terminal operatives utilising terminal tractors.

LoLo Terminals in Dublin Port

There are three container terminals based in the Port each of which handles a number of Container Shipping Companies.

Each terminal is equipped with specialist equipment that is capable of discharging and loading of container vessels. In addition, the safe storage of containers that have been delivered to the terminal awaiting export (loading onto a vessel) or awaiting delivery to a haulier that will deliver the container to the end user. The main equipment used for loading and unloading vessels are gantry or harbour mobile cranes. Containers awaiting loading to the vessel or to a truck are kept in containers stacks which are serviced by RTG's or RMG's.

The three terminal operators are as follows

- Dublin Ferryport Terminal (DfT) – Irish Continental Group
- Marine Terminal Ltd (MTL) – Peel Ports Group
- Common User Terminal – Portroe Stevedores (PSL)

Below is tabulation summarising the three LoLo Terminals which are currently utilised within Dublin Port. It indicates the key characteristics of the terminals namely berth capabilities, operator, specialist equipment and the terminal footprint.

Parameters	**DfT**	**MTL**	**Common user**
Berth Length/s	360m + 180m	700m	900m
Berth Depth/s	9.5m + 11.0m	10.2m	10.0m
Cranes (Ship/Shore)	3	3	5
Crane Type	Ship Gantry	Ship Gantry	Harbour Mobile
Gantries (Container)	8	4	6
Gantry Type	RTG	RMG	RTG
Reefer Points	275	270	252
Area (Hectares)	14.0 Hectares	15.1 Hectares	12.3 Hectares

Each of the three terminals has a number of Container Shipping Companies that contract with the terminal to carry out the discharge and loading of the vessels and transfer of the containers onto and off of road haulage.

Dublin Ferryport Terminal (DfT)	Marine Terminals Ltd (MTL)	Common User Terminal (Portroe Stevedores)
* Eucon	CMA -CGM	X-Press Container Line
Samskip/DFDS	MacAndrews	Borchard Lines
MSC	# BG Freightline	APL
	# Coastal Containers	Cardiff Container Line
		C2C

* DfT and Eucon are sister Companies owned by Irish Continental Group
# MTL, BG Freightline and Coastal Containers are sister Companies owned by Peel Ports Group.

Dublin Port is well connected to Global trade in respect of containers. Container Companies each have their own business model. Some companies specialise in Door – Door traffic whereby they provide containers and collect from and deliver to loads the customer. Others companies concentrate on the movement of third party containers from one port to other ports within a network. Finally some companies concentrate on distribution of containers from Deep Sea hub ports to smaller ports such as Dublin Port.

Services that call into Dublin Port are connected with **international hubs** and container ports

- **Rotterdam** – Netherlands
- **Antwerp, Zeebrugge** – Belgium
- **Le Havre**, Radicatel – France
- **Southampton, Liverpool, Felixstowe,** Cardiff **–** United Kingdom
- Iberia and the Mediterranean
- Hamburg – Germany.

LoLo operations in Dublin Port

Containers arrive at a terminal and are taken off the truck by RTG's or RMG's and put into an export stack for storage awaiting shipment.

When a vessel arrives it is discharged and the off loaded containers are put into Import stacks awaiting collection by road transport for onward delivery by road or rail to the customer. Thereafter the export containers are taken to the vessel and loaded onboard and the vessel departs.

It should be noted that the Common user Terminal also accommodates a cargo Ro Ro operation which links Dublin directly with Rotterdam and Zeebrugge. The vessels used are capable of carrying the usual RoRo freight but have been designed to carry two containers on special trailers or "cassettes" compared to only one on conventional ferries. These special trailers or cassettes are driven on and off the vessel using terminal tractors and specialised wheeled units. The vessel is loaded utilising a single tier RoRo ramp but the cargo mix included RoRo Freight, Containers, construction machinery and trade cars; thereby increasing the target market. Cargo taken from the vessel will be driven, if RoRo Freight, to an area allocated for unaccompanied trailers whereas the Container units are removed from the cassettes and stored in a container stack awaiting collection and onward delivery.

This service is a key departure from the cross channel (UK – Ireland) trade as it carries traffic directly from European Hub Ports directly to Ireland by sea. Traditionally RoRo Freight from Continental Europe transits the UK on its way to Ireland.

Below is tabulation summarising the Ro Ro operation at the Common User area of Dublin Port.

Terminal	Common User
Company	CLdN
Destination	Rotterdam and Zeebrugge
Sailing time	36 hours
Vessel No	2
Ferry Type	2 Specialist Ro Ro
Sailings/week	3
Area Footprint	12.3 Hectares
Berth Length	200m
Ramp Length	60m
Tiers	Single
Ramp Width	31m
Weight Limit	220t

Unitised Cargo Statistics and Trends

When analysing the trade through Dublin Port it can be seen that there is a very strong positive trend in terms of overall tonnage handled through the port from 7,923,000 tonnes in 1980 compared to 28,113,000 in 2010. The Dublin Port Master Plan 2010 – 2040 is conservatively predicting annual growth at 2.5% per annum which effectively doubles the Tonnage handled through the Port

Equally the overall percentage of Unitised trade has increased from only 39.4% in 1980 compared to 81.0% in 2010 and throughout this period this sector has become increasingly dominant.

When looking at the trades of RoRo versus LoLo it is noticeable that the RoRo element has increased from 23.8% in 1980 compared to 60.8% in 2010, whereas LoLo has remained fairly constant in percentage terms circa 20%.

Year	Total Port Tonnage	RoRo % Tonnes	LoLo % Tonnes	Total % Unitised	Other Cargo % Tonnes
2010	28,113k	60.8%	20.2%	81.0%	*19.0%*
2007 *	30,963k	55.4%	23.1%	78.5%	*21.5%*
2005	26,923k	55.3%	21.6%	76.9%	*23.1%*
2000	20,999k	54.1%	21.2%	75.3%	*24.7%*
1995	11,882k	41.2%	26.1%	67.3%	*32.7%*
1990	7,636k	31.3%	27.0%	58.3%	*41.7%*
1985	6,428k	34.0%	19.4%	53.4%	*46.6%*
1980	7,932k	23.8%	15.6%	39.4%	*60.6%*

* Peak year prior to the recession

The absolute numbers reinforce the dramatic rise in Unitised Cargo from 1980 to 2010. In 1980 the RoRo element was 108,656 units compared to 727,801 units in 2010. In 1980 the LoLo element was 150,000 TEU compared to 554,120 in 2010.

It should be noted that during 2010 the RoRo units carried were broadly similar to that carried in the peak cargo year of 2007 whereas the LoLo TEU has declined by some 200,000 units.

When we look at the sub categories of Driver Accompanied and Unaccompanied Freight we can see a very strong shift from Driver Accompanied to Accompanied. In the period of 2005 – 2010 there was a rise of some 30,000 accompanied freight units whereas there was a rise of some 77,000 unaccompanied units during the same period or a 3.1 % shift to unaccompanied freight within the RoRo element.

Year	RoRo Units	LoLo TEU's	Driver Accompanied RoRo	Unaccompanied Freight RoRo
2010	727,801	554,120	300,334	427,467
2007 *	733,141	743,947	347,602	385,539
2005	629,747	590,367	279,704	350,043
2000	489,787	437,753	199,125	290,662
1995	205,334	290,537	55,644	149,690
1990	101,943	210,000#	5,182	96,761
1985	112,314	137,540	4,661	107,653
1980	108,656	150,000#	6,390	102,266

* Peak year prior to the recession
# Data not available bur extrapolated from tonnage and lift data

Unitised Cargo Development Issues

The trend towards Unitised Cargo Shipment has been strong and pronounced during the period 1980 – 2010. In percentage terms it has risen from 39.4% in 1980 to 81% in 2010. It is predicted that the Unitised cargo handled in Dublin Port will exceed 90% in future years.

This trend has been driven by businesses cutting inventory and stock levels whereby "Just in Time" deliveries have become the norm in manufacturing. Equally there has been a significant investment by food retailers and multinational service providers throughout the Island of Ireland. This has given rise to the dramatic increase in Unitised Cargo volumes.

It is predicted that during the period 2010 – 2040 the tonnage through Dublin Port will double to some 60,000,000 tonnes. This has serious implications in respect of the current infrastructure of the port in terms of direct investment by the port and also investment by all of the Licence and Lease holders that operate individual terminals.

The port will need to invest in facilities to accommodate the future generations of vessels which are increasing in overall size. This may have implications in respect of navigational access into the port, turning circles within the port and infrastructure such as quaysides, link spans and terminal footprints.

Equally there are implications for the Terminal Operators who will need to invest in state of the art port equipment, Information Technology and Management systems.

Finally, given the predictions in regard to trade to be handled through Dublin Port in the future there is a serious question as to whether the overall Port Estate is large enough to handle the anticipated increase in trade in the medium to long term.

RoRo Development Issues

There are a number of issues that need to be addressed in respect of the RoRo Trade in the context of the 2010 to 2040 Dublin Port Master Plan.

Ferries – Future vessel dimensions

Currently Ferries with scheduled services operating to Dublin have a maximum length of 210m and a freight cargo capacity of some 4,000 lane meters. In order to achieve greater economies of scale ferry companies have designed and built progressively larger vessels. There are examples of vessels which are 240m in length and 5,500 lane meters already trading but these vessels could not be accommodated in Dublin without investment in infrastructure.

Ferries also have to be able to manoeuvre in port and are often required to turn through 180 degrees prior to berthing or upon departure. Therefore there may be an additional requirement to improve the turning circles within the Port by dredging to efficiently accommodate these longer vessels but the current approach channel and berths are sufficiently deep to accommodate these larger ferries as they have a relatively shallow draught.

RoRo Terminals – Dublin Port

The key challenges for Dublin Port in respect of the RoRo Terminals in the next 30 year period are two fold.

The RoRo element is likely to continue to grow in both percentage and absolute number of units. As can be seen from the existing terminal footprints for the 4 RoRo Terminals the land currently occupied is 36.5 Hectares. By 2040, it is expected that the number of Ro Ro units handled annually will reach 1,450,000 units and the current terminal land footprints are insufficient to support this level of trade.

There is a shift from Accompanied RoRo Freight to Unaccompanied RoRo Freight. There are a number of key drivers in this respect such as the tightening of Legislation in relation to Driving Hours, the cost of diesel and a shortage of qualified Heavy Goods Vehicle Drivers. Unaccompanied Freight has a dwell time on the terminal whereas Accompanied does not and therefore as the Unaccompanied Freight element increases the Terminal Footprint or ground area requirements will increase.

The RoRo Freight in 2010 was 727,000 units and at the peak in 2007 was 733,000 units and so already there has been a return to historically high levels RoRo Freight even though the overall tonnage through the port in 2010 was some 2.9 million tonnes below that experienced in 2007.

Whilst the active minimisation of dwell time through excellent management systems can play a part there is a fundamental issue that the existing areas dedicated to RoRo Trade will need to be increased to cope with increasing demand.

Terminal Capacity

There are annual and weekly cycles associated with the RoRo Freight Sector.

The weekly cycle sees traffic flows peak mid week (Tuesday through to Thursday) as the road transport sector has made collection and makes deliveries prior to the end of the week. In this instance whilst the vessels have a very high utilisation much of the traffic is collected from the terminals within hours of discharge for onward delivery to the customer.

There is however a serious issue in terms of terminal capacity during weekend periods whereby there are multiple vessel arrivals but the end user of the goods is closed for business. This means that there is a significant build up of traffic awaiting collection on Monday mornings. This can lead to terminals being virtually gridlocked during weekend periods.

The annual cycle sees the traffic flow peak in September through to November when warehouses are building their Christmas inventories. This period also coincides with the periods of poor weather with high winds during the autumn period. Once again disruption to or cancellation of sailings can cause a dramatic build up of traffic.

LoLo Development Issues

There are a number of issues that need to be addressed in respect of the LoLo Trade in the context of the 2010 to 2040 Dublin Port Master Plan.

Container Vessels – Future vessel Dimensions

Container vessels on a Global Scale have been increasing in capacity which in turn translated in to vessels that are longer, have a greater beam and are of a deeper draft.

The current LoLo services that call into Dublin Port utilise vessels ranging from 260 TEU to 1,000 TEU's capacity. The largest vessels are typically 140m -150m in length with a beam of 22m – 25m and a draft in the range of 7.5m – 9.0m.

The entrance channel In Dublin Port is – 7.8 mtr's at low tide but with a tidal range of up to 4.0 mtr's, the deeper vessels can be accommodated during "tidal windows", i.e. when the additional tide increases the basic channel depth. Accordingly, vessels of up to 10.5 mtr's draught can be accommodated at present, utilising these tidal windows. It is likely that the larger size of feeder container vessels, operating into Dublin Port, will increase in the coming years and it is probable that they will be in the region of 2,000 TEU capacity. These vessels can range in draught from 9.5 mtr's to 13.0 and if such vessels, or even larger container vessels, were to form a significant portion of the number of container vessels visiting Dublin Port in the future, then it may be necessary to consider deepening the approach channel and some localised berths to accommodate these vessels.

LoLo Terminals – Dublin Port

The LoLo Terminals in Dublin Port have a theoretical capacity of 900,000 TEU's providing that the terminals are actively managed with an average container dwell time of no more than 5 days. If dwell time increases the effective capacity can be significantly reduced.

In 2010 the three terminal combined handled a total of 554,120 TEU but it should be noted that in 2007 the number of TEU's handled peaked at 743,947. During the period 2010 – 2040 the prediction is that there will be a doubling of trade through the port. At 2010 levels the trade by 2040 would see a LoLo throughput of 1,050,000 which exceeds the current capacity of the terminal. However if the 2007 peak LoLo trade was doubled the number of TEU's would be 1,500,000 which far exceeds the current capacity.

Whilst the active minimisation of dwell time through excellent management systems can play a part there is a fundamental issue that the existing areas dedicated to LoLo Trade will need to be increased or utilised more efficiently to cope with increasing demand. Improved utilisation can be achieved by investing in the load bearing conditions of the ground and improving the handling equipment. However, even with such improvements, the existing areas will not be sufficient to cater for an expected throughput of 1.5 million TEU per annum.

Terminal Capacity

There are annual and weekly cycles associated with the LoLo Freight Sector.

The weekly cycle is very pronounced whereby peak vessel arrivals are on Sunday an early Monday (Container vessels leave their Continental Port on Saturday morning or afternoons). The aim is to discharge the vessel by 0600hrs on Monday morning which will in turn allow collection and onward delivery on Mondays. This puts significant pressure on the LoLo terminal infrastructure whereby berth space is at a premium.

The annual cycle sees the traffic flow peak in September through to November when warehouses are building their Christmas inventories. This period also coincides with the periods of poor weather with high winds during the autumn period. Once again disruption to or

cancellation of sailings can cause a dramatic build up of traffic. Within the LoLo sector the issue of high wind has a negative effect as the Gantry and Harbour Mobile Cranes as they have safe working limits in terms of wind. Therefore vessel working can be seriously disrupted in high winds.

Ro Ro Developments, directly from Dublin to Europe.

Historically RoRo traffic from Continental Europe would use the UK as a Landbridge whereby there would be an English Channel or North Sea crossing and then drive across the UK followed by an Irish Sea Crossing.

In recent years there has been pressure from the Manufacturing and Retail Industries to reduce both overall cost of the Supply Chain and also reduce their Carbon Footprint. Seaborne transportation is recognised as one of the most effective ways to reduce carbon emissions. Therefore there has been a drive to look at the methods of transportation to achieve the reduction.

There is currently a debate within the UK whereby there may be taxes levied on Hauliers for use of the transport network. If this approach is adopted there would be a marked shift to Direct Services from Continental Europe directly to Ireland.

It should therefore be anticipated that there is a high probability that there will be additional direct European Ro Ro services in future years. This will be driven by the differential between Direct Services versus the Landbridge options. This may also give rise to direct routes to alternative European destinations potentially from France and Iberia.

Other Development Issues

The access to and egress from the Port has improved in recent years as a result of the commissioning of the Dublin Port Tunnel, the upgrading of the M50 and the considerable investment in the national road network. However, consideration will need to be given to the layout and possible upgrading of the internal road network, within Dublin Port, to service the likely increased demands, particularly, from HGV traffic as the unitised throughput increases.