



DEFRA PROJECT FO0108

**RESILIENCE OF THE FOOD SUPPLY TO
PORT DISRUPTION**

**FINAL ANNEX REPORT 3:
IMPORT CORRIDOR: DOVER & CHANNEL
TUNNEL**

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1. EXECUTIVE SUMMARY

Ferry services between Dover and Calais / Dunkerque, and the Channel Tunnel's Freight Shuttle services between Folkestone and Calais, are the country's most significant arteries for the movement of freight carried in accompanied road trailers. In 2010 total trailer volumes through Dover amounted to 2.068 million units with a further 1.089 million trailers moving through the Tunnel. Every week there are over 250 ferry sailings from Dover and over 500 Freight Shuttle departures from Folkestone, with corresponding returns, making maximum use of the UK's shortest crossing to the Continent.

Together these two routes carry 75% of all the accompanied trailers carrying freight between the UK and the Continent, Scandinavia and Ireland (see **Table 2.1**). For the UK's short sea unit load RoRo traffic as a whole (including trade cars), Dover and the Channel Tunnel handle a 33% share and in terms of Short Sea carrying capacity (including LoLo services) the two routes supply 35% of the total market capacity (ref. PRB Associates *UK Short Sea Freight RoRo and LoLo Capacity Analysis and Report 2010*).

Import trade volume through Dover and the Channel Tunnel amounted to just over 22 million tonnes in 2010, mostly moving in accompanied trailers but with some conventional traffic (fresh produce) being imported in general cargo / reefer vessels through Dover. These two routes account for 7% of all UK inbound traffic coming through the country's major ports (including the Channel Tunnel).

In addition to 351,000 tonnes of food imports entering the country through Dover from non-EU countries, as identified from HMRC data, there is an estimated 5.48 million tonnes of food import from EU countries coming through the two routes (see **Annex 1, Table 6.6**). It is estimated that 26% of the UK's total food import from EU sources, move through the corridor.

The importance of the routes for UK food supply is unquestionable as they satisfy the time critical requirements of the supply chain via frequent and fast crossings over the short Channel routes.

The Dover ferries and the Channel Tunnel Freight Shuttle services offer alternative transport modes for accompanied trailers and this, to some extent, provides each with a 'back-up' option if disruption occurs at the other. There is evidence of this happening when there have been strikes in Calais or when there was a fire in the Channel Tunnel in 2008. Major disruption has been averted by utilising spare capacity and by expanding capacity, where possible. For short term problems, such as weather delays, 'Operation Stack' diffuses the situation by holding back traffic that has no immediate alternative route, therefore easing the potential for congestion at Dover and the Channel Tunnel.

However, if disruption through one, or the other route (or both) occurs over an extended period, solutions are not easily found. For the purpose built Dover ferries and for the Freight Shuttle trains there are effectively no alternative options. The trains cannot use another tunnel and the ferries require the purpose-designed port infrastructure at Dover and Calais that is not a feature at other ports, to facilitate rapid discharge and loading operations.

There may be some temporary solutions available at other ports for the 'Dover' vessels, utilising makeshift ramps and there are single dual purpose ramps in Ramsgate and Portsmouth but these options will not resolve the problem. Effectively, if the Dover ferries cannot accommodate the Channel Tunnel traffic and vice versa (ignoring the major problem arising if both routes are closed together) the trailer traffic has to find alternative routes and other ferry services linking the UK and the Continent and such capacity is not easily available for the accompanied trailer mode. In any case other ferry services do not provide a service to match the needs of the supply chain (see **Tables 6.1** and **6.2**).

However, given the current levels of traffic (in 2010, before SeaFrance closure), evidence of spare capacity on the ferries (again before SeaFrance closure) and freight shuttles and the potential to expand capacity by intensifying existing schedules (see Section 5), indications are that one route could absorb the traffic from the other if one or the other suffered longer term disruption.

Although there would be immediate organisational problems and higher levels of utilisation will inevitably lead to less efficiency in operations, indications are that one route could absorb the other's traffic by utilising apparent spare capacity and by increasing capacity through more intense use of existing ferries and freight shuttles. (This analysis requires refreshing with up-to-date traffic volumes,

with estimates for higher volumes in more buoyant economic times, and revised capacity estimates reflecting current service patterns and accompanied / unaccompanied service mix).

Table 1.1: Route capacity, utilisation, flexibility and transferability			
	Dover	Freight Shuttle	Combined
Capacity ¹	3.320	1.494	4.814
Traffic volume ²	2.068	1.089	3.157
Average utilisation	62%	73%	66%
Under utilised capacity	1.252	0.405	1.657
Closure and transfer	+1.089	+2.068	
Revised utilisation	95%	211%	
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Est. maximum capacity ³	4.000	3.407	7.407
Potential spare capacity	1.932	2,318	4,250
Closure and transfer	+1.089	+2.068	
Revised utilisation	79%	93%	

Notes: All unit numbers in millions, to 3 decimal places

1: Estimated capacity at January 2011 from PRB Associates *UK Short Sea Freight RoRo and LoLo Capacity Analysis and Report*

2: Trailer volumes from DfT *Maritime Statistics 2010*

3: See Section 6.2 for explanation

The availability of spare 24 / 7 capacity, is one thing but the demands of the supply chain determine that there are peaks and troughs in the arrival of trailers at the ferry and Channel Tunnel terminals. Operation Stack does take care of the immediate congestion problems and spread the traffic over the 24-hour day to match capacity provision. Supply chain demands will not tolerate vehicles being delayed in queues on the M20, even for a few hours, especially with the cumulative impact of delay further affecting planned collections and deliveries.

Alternative routes will have to be found, if the capacity is available elsewhere, but the real demand profile of multiple inbound supply chains will need to be established in order to confirm whether movements through Operation Stack are sustainable and whether the transition is manageable.

If the (Dover/Tunnel) 'back-up' scenario fails there is spare capacity on other routes (see **Table 6.2**), but it is not capacity suitable for driver accompanied trailers. The dual closure of Dover (or Calais) and the Tunnel would require radical reorganisation such as the prioritising of freight over passengers on ferry services and foodstuffs in particular and maybe relaxing rules on the restricted numbers of passengers / drivers that can be carried on freight only and Ropax ferry services.

If it is regarded that the UK supply is over-reliant on the Dover Corridor, resilience could be built into the system by requiring new and existing river and harbour RoRo berths to have dual 'male' and 'female' ramp and access facilities, although twin-decked ramps and access lanes such as in Dover and Calais, at all facilities, would be infeasible. This would at least allow Dover type ferries access to other ports for rapid discharge and loading operations even though voyage times would be extended.

Also, perhaps development of Ramsgate or Newhaven as alternatives would be wiser than development of the Western Docks in Dover, which would in fact only add to the flow concentration and reliance on a single port.

However, building spare 'Dover' type capacity for the sake of food security will not satisfy the objectives of commercial port operators. So trying to spread the UK's trailer-based freight traffic over more of the existing routes could be a better option. Some efforts to spread traffic across other routes have been made at an EU and government level, supported by grant incentives, in an attempt to reduce the amount of lorry miles and carbon emissions by transferring freight to longer ferry routes (e.g. Motorways of the Sea, Marine Motorways, etc.).

As yet, the impact of these incentives has been minimal, primarily because longer and less frequent ferry services cannot satisfy the demands of 'just-in-time / minimum stock level' supply chain strategies. Also, scale economies at the ports and significant cost savings are not forthcoming. Maybe a further 'Security of Supply' incentive would lead to a change in food supply chain priorities.

As yet it is not clear what impact the introduction of low sulphur fuel legislation, due to be introduced in 2016, will have on the balance between short-distance and long-distance ferry service connections, but it is inevitable that ferry rates will have to increase.

High speed catamaran services such as Stena Line's Harwich / Hook of Holland service proved to be attractive alternatives to the short Channel crossings at one time but this service has now been closed due to the high fuel consumption and cost of this type of vessel. The market requires innovation in this area to produce high speed engines and propulsion systems for vessels that are also fuel-efficient.

The most recent case of major disruption in the system arose with the Tunnel fire in 2008 when a freight unit ignited in transit. Channel Tunnel authorities have now built 'sprinkler' systems in four sections of the tunnel which are designed to extinguish any fires as early as possible. Further resilience was built into the system after (Eurostar) trains suffered difficulties in the tunnel after snow, built up underneath the trains, melted while transiting the tunnel, causing electrical problems.

Disruption, other than when caused by industrial action and strikes, has been rare on the Channel ferry services, except for occasional bad weather. The greatest exposure to disruption otherwise would be a ship sinking in the harbour, or at the harbour entrance, in Dover or Calais, as the *Herald of Free Enterprise* did in Zeebrugge over twenty years ago. Providing some security in this regard are Dover's eastern and western harbour entrances, with the eastern entrance used most of the time by the ferry services, although Calais has only a single harbour entrance.

2. INTRODUCTION & ACKNOWLEDGEMENTS

Ferry services between Dover and Calais / Dunkerque and the Channel Tunnel's Freight Shuttle services between Folkestone and Calais are the country's most significant arteries for the movement of freight carried in accompanied road trailers. In 2010 total trailer volumes through Dover amounted to 2.068 million units, with a further 1.089 million trailers moving through the Tunnel (2010 volumes were still depressed by the Tunnel closure after the 2008 fire – 1.45 million units carried in 2007).

Together these two routes carry 75% of all the accompanied trailers carrying freight between the UK and the Continent, Scandinavia and Ireland. However, they account for a very small proportion of unaccompanied trailer traffic and do not carry any of the other conventional RoRo traffics, such as trade vehicles (3.137m) and 'shipborne port to port trailers' (0.719m).

The sheer volume of freight carried on the fast, frequent, and efficient Channel Corridor services (approx. 39m tonnes) make them a critical UK supply route and one that is impossible to replicate elsewhere for the UK's connection with the Continent of Europe.

Other key routes for accompanied trailer traffic are on the Irish Sea from Holyhead to Dublin, and from Cairnryan to Larne and Belfast. For the Continental market, only Portsmouth (0.154m units); Ramsgate (0.131m units); and Harwich (0.104m units) handle any significant numbers of accompanied trailers. The numbers carried on services through these ports equate to a significant proportion of the available capacity, capacity that is otherwise utilised for unaccompanied trailers.

Unit type	Dover	Channel Tunnel	UK Major Port and Tunnel total	% via Channel routes
Accompanied trailers	2,023	1,089	4,131	75%
Unaccompanied trailers	45		1,718	3%
Shipborne port to port trailers			719	0%
Import motor vehicles			3,137	0%
Total	2,068	1,089	9,705	33%

Source: Department for Transport *Maritime Statistics 2010*.

The importance of the Channel ferry and tunnel routes is also evident for passenger traffic. Of the 7.16 million passenger cars and coaches that travelled between the UK and the Continent, Scandinavia and Ireland in 2010, nearly 70% used the Channel routes.

The purpose of this Case Study is to delve deeper behind the statistics and through consultation with the Dover Harbour Board, the Channel Tunnel, ferry operators, government agencies, logistics service suppliers and food importers, obtain a better understanding of the route's importance to food supply chains and the impact on those supply chains if some disruption occurs. The analysis and assessment in Section 5 attempts to qualify and quantify the impact of disruption at Dover, or in the Channel Tunnel, or both, in terms of the extent, speed and duration of transmission of port disruption into interruption of food imports arriving in the UK as RoRo traffic.

The Case Study will help to determine the extent to which particular features of domestic and international transport infrastructure and food supply chains, on the Channel and elsewhere in the UK, are likely to ameliorate or exacerbate the impact of UK port disruption on the supply of food imports into the UK.

It will also help to determine the extent to which UK food (import) security is contingent upon the resilience of overseas port infrastructure, particularly at Calais and Dunkerque and it will explore the behaviour, over the short to medium run (up to six months), of individual port operators, shipping companies and land-based logistics and food supply agents in the event of port disruption.

Key challenges within this Case Study are to estimate the amount of food being imported in trailers from EU country sources, either on the Channel ferry services or through the Tunnel and to establish the 'uniqueness' of the routes in terms of the mode of transport used (accompanied trailers), the port infrastructure in place, and the specific vessel configurations designed for the route.

In addition, while it is impossible to translate the Freight Shuttle services to any other route it was not clear from earlier studies how transferable the Dover ferries are, from the Dover / Calais route to any other route serving the UK. Neither was there an assessment of the respective ferry and Tunnel capacities and the capacity available on other routes to absorb the transfer of traffic from the short Channel routes.

In the following sections there is first an overview of the Short Sea shipping sector for unit load traffic (trailers and containers) of which Dover and the Channel Tunnel form such an important part. This is followed by sections containing detailed port, shipping service, and hinterland descriptions and an insight into port trade and traffic (with reference to **Annex 1** on UK food and drink import data). In Section 5 the 'uniqueness' of the routes is examined in more detail to assess the resilience of food supply chains and the possibilities for transferring freight traffic to other routes, be it as trailers or full ships.

The Annex report is rounded off with a general food supply resilience assessment for this supply route, based upon feedback from food importers; both retail and wholesale (See **Annexes 2, 7 and 8**). In the final section, 'Messages and Conclusions' the issues and concerns are presented and some solutions proposed, along with any recommendations for further work that may be required to fill identified knowledge gaps.

3. SECTOR OVERVIEW

Ferry services from Dover and the Eurotunnel Freight Shuttle service are central to the UK's Short Sea freight RoRo ferry (and container shipping) service sector, as characterised by accompanied and unaccompanied trailers being driven on and off ferries; and containers being lifted in and out of small to medium size container vessels (as distinct from the much larger vessels operating in the deep sea container market served by Felixstowe and Southampton; and the smaller container vessels that provide regional 'feeder' services to link the deep sea 'hub' ports, such as Rotterdam with smaller, 'feeder' ports, such as Hull and Immingham in the UK).

Early in 2011 the UK Short Sea Freight RoRo and LoLo market (including Channel Tunnel services) employed enough capacity to move 13.9 million trailer and forty foot equivalent container units, over a 12 month period, between the UK mainland and Ireland, the Continent of Europe, and Scandinavia into the Baltic. Capacity employed on the Channel sector alone, between the UK and France, Spain, and Portugal, amounted to 5.57 million units (40% of the total market).

While the size and design of typical short sea container vessels is relatively standard there are a number of different variations to roll-on-roll-off (RoRo) ferries and operations. RoRo ferry services range from being for freight only, with accommodation for just 12 passengers (drivers), to being high capacity passenger ferries with an allocation of some space for driver accompanied freight vehicles. In the 'mid-market' there are 'ROPAX' ferries that are primarily for freight and a full complement of drivers (200 to 300), with some space for passengers and cars, as demand dictates.

Image 3.1: Eastern Channel and Southern North Sea



The ferry pictured in **Image 3.2** is a typical passenger ferry (PAX) with dual passenger and freight accommodation, while the picture in **Image 3.3** shows a typical freight only (RoRo) ferry. The picture in **Image 3.4** shows conventional RoRo ferry operations at the Humber Sea Terminal in Killingholme.

In addition to specialising in passenger (PAX) and ROPAX services the ferries operating from Dover are also distinct in their design. Ships operating between Dover and Calais / Dunkerque do not have integrated doors that are hinged in order to provide ramps (bridges) onto the quay to allow vehicles to drive on and off. The 'Dover' ferries' vehicle access via bow and stern doors is facilitated by ramps (bridges) being lowered onto the ship's decks (2-tier access and ramps to main deck and upper deck simultaneously) from purpose built shore-side infrastructure that can also be hydraulically adjusted to match the tide levels.

The vessels and the port infrastructures are very much purpose-built for the trade to enable rapid discharge and loading operations and a very quick turnaround time for the ship in port.

Sector	Unit capacity (millions)	% share
Near Continent	4.54	33%
Channel	5.57	40%
Irish Sea	2.85	20%
Scandinavia	0.67	5%
Baltic	0.23	2%
Total	13.86	100%

Source: PRB Associates *Short Sea Freight RoRo and LoLo Capacity Analysis and Report, 2010*

Note: Channel sector includes Channel Tunnel capacity

In addition to the Channel sector's dominant share of capacity employed, it also dominates in terms of the frequency of sailings on what is just a 26-mile sea crossing. There are over 250 ferry sailings every week between Dover and Calais / Dunkerque and an equal number of return journeys. It is the frequency of sailings and Freight Shuttle departures that determines the high level of capacity provision, compared to other markets. Asset (ships and freight shuttles) utilisation is high and the frequency of departures is a magnet for traffic that requires a 'turn-up-and-go' service, rather than a sailing every 24 hours. The short crossing provides the economic answer for ferry and Shuttle operators and the logistical answer for the service-oriented customers.

Image 3.2: Typical Dover type ferry with doors but no hinged doors / ramps



Port	Weekly sailings/departures	% share
Dover	365	23%
Channel Tunnel (Freight Shuttle)	535	34%
Rest	675	43%
UK total	1,575	100%

Source: PRB Associates *UK Short Sea Freight RoRo and LoLo Capacity Analysis and Report, 2010*

In January 2011 the UK Short Sea freight RoRo and LoLo market was served by 44 different operators and these operators provided a total of 141 service routes. The maritime operators employed 207 vessels between them, making a total of 1,040 round trips every week while Channel Tunnel services provided an average of 535 departures in each direction every week.

41 UK mainland ports serve the UK Short Sea Freight RoRo and LoLo sector and within those 41 ports there are a total of 151 RoRo berths and 109 dedicated container cranes. Dover on its own has eight RoRo berths in operation.

Image 3.3: Typical freight only RoRo ferry with integral hinged door / ramp



Image 3.4: RoRo operations at the Humber Sea Terminal, Killingholme



The Channel Tunnel provides a high capacity alternative to Channel ferry services. Regardless of the original motives and economic justifications the original fear was that the opening of the Tunnel would lead to the closure of Dover and its ferry links.

In fact the reverse is true, although profitability is difficult on both routes, and the Tunnel opening has led to an even greater concentration of traffic through the Channel corridor.

One route offers a completely different mode of transport to the other and a different range of disruption issues. They have therefore become complementary, with one route taking up the slack when the other is experiencing problems, such as in the aftermath of the Channel Tunnel fire and when strikes in France have disrupted Channel ferry services.

4. PORT DESCRIPTION

4.1 Port / Tunnel infrastructure

The Port of Dover offers a wide range of facilities including 24-hour access, no locks or tidal restrictions and a minimum quay water depth of 8.5 metres.

In addition to eight high-capacity RoRo berths located in the Eastern Docks, there is also a single 220m berth and two further 200m berths for general cargo vessels located at the eastern extreme of the Eastern Docks, adjacent to RoRo berth No.1. These general cargo berths are supported by 13,000 sq. m. of ambient and temperature-controlled storage and they attract considerable volumes of bulk reefer and containerised imports of fresh produce, including significant trade in bananas.

Dover has a total of eight RoRo ferry berths, 7 of which have 2-tier ramps for simultaneous access to two decks. The eighth berth (No.1 berth) has restricted access but it is the only dual purpose (male and female) berth in the port (see below for 'male / female' explanation). Norfolk Line used this berth when it first started its Dunkerque service using conventional ferries, with ramps, taken from North Sea operations. All of the other 7 berths are of the 'male' variety with inbuilt ramps that can be lowered onto the deck of incoming vessels that are themselves purpose designed for the Dover / Calais route (see **Image 4.1**).

Image 4.1: Typical short sea container handling operations



The analysis in Section 5 provides an indication of the comparative resilience of the route, based upon current capacity utilisation and notional, short term, capacity expansions.

The P&O Ferries and DFDS Seaways vessels berth to the stern in Dover and at the bow in Calais so that freight and passenger vehicles do truly drive on and off. Access to the freight and car decks is through the bow and stern doors and unlike 'conventional' RoRo ferries they have no inbuilt ramps to lower onto the shore ramp or quay. The vessels rely on the shore ramps at Dover and Calais and would therefore be unable to berth and make the 'bridge' between vessel and shore without a long delay and mechanical assistance at any other port.

If Dover, or Calais (or Dunkerque) was put out of action for any reason the vessels currently on the route could not transfer directly to another port and in any case they could not operate the rapid turnaround, short crossing type service that enables them to carry so much freight over a short period of time. (There is said to be a single 'male' ramp in Portsmouth and one ramp in Ramsgate is dual purpose with the ramp unfolding and folding underneath the bridge deck).

During a normal day there will be around 50 vessel arrivals in Dover (this was the case before SeaFrance ceased operations), at least two per hour and each of the seven standard berths will be

used at least 7 times per day. With fully driver-accompanied services being provided, the aim is to discharge and load each ferry within 45 minutes, providing rapid access into and out of the port (Customs permitting) so that large areas on the berths for parking prior to loading and after discharge are not required.

Dover handled nearly 20,000 ferry arrivals in 2010, equivalent to nearly 30% of all UK ferry arrivals. It also handled 163 dry cargo vessels, most of which will have been carrying fresh produce into the ports general cargo handling facilities.

Eurotunnel Freight operates a fleet of 15 freight shuttles each comprising 30 wagon sets and the platform infrastructure is in place in Folkestone and in France to accommodate continuous arrivals and departures. The capacity constraint on Freight Shuttle services is the number of shuttles with the current overall train path utilisation through the tunnel said to be only 53%.

With all 15 freight shuttles in operation Eurotunnel could operate a continuous schedule of 6 departures in one direction and 7 in the other direction every hour. However, normal operations average just 3 departures and 4 in the other direction every hour, roughly half of the potential.

Without any detailed knowledge of trailer contents the Channel Tunnel and Channel Ferry operators can only estimate the amount of food being carried. Channel Tunnel representatives indicated that roughly one third of all import loads will be food produce either in frozen, chilled or ambient condition. One third of import trailers would currently equate to 200,000 trailers and if the average payload is a conservative 10 tonnes the total estimated amount of food commodity import through the Channel Tunnel would be 2 million tonnes. (See Section 5 for a more detailed evaluation of trade and traffic).

Image 4.2: Berth layout at Eastern Docks, Dover



To accommodate future RoRo trade expansion the Dover Harbour Board (currently a Trust Port) is considering schemes to attract investment in order to finance the development of three additional RoRo berths (10, 11 and 12), with back-up marshalling areas, in the Western Docks. While this development will undoubtedly add to capacity it does not necessarily build in resilience.

4.2 Services calling at the port(s)

In terms of the capacity provided, ferry services calling into Dover in 2010 (including the now discontinued SeaFrance services) contributed capacity for the movement of approximately 3.3 million trailer units while Channel Tunnel Freight Shuttle services contributed capacity for the movement of 1.5 million trailer units. Together these two routes account for 35% of the UK's short sea freight RoRo and LoLo capacity. Freight capacity utilisation in 2010 was approximately 60% on Dover's ferry services and 75% on the Freight Shuttle services.

Above and below the Dover Straits, ferry services and train services provide the link between the UK and France. For the ferries and the Freight Shuttle services the link is a short one intended to provide regular and rapid crossings in order to minimise any disruption to journey times. It is the reason why so much freight traffic is drawn to the route, along with the relatively low freight rates compared to longer ferry crossings. For ferry companies it provides high asset utilisation and for the road trailer operators it optimises their own equipment utilisation.

At the beginning of 2011 P&O Ferries employed 6 ferries on the route; DFDS Seaways employed 3; and SeaFrance 4. Since then P&O has introduced two new high-capacity passenger / freight ferries each capable of carrying 180 accompanied trailers, in addition to 200 passenger cars and 2,000 passengers. These new ferries, with a 6.50 metre draft and a 31.43 metre beam can only use three of the Dover berths (7, 8 and 9) due to their size and the berths and the vessels have had to be temporarily modified in order to accommodate the other vessels still calling at the port.

In addition to the ferries and Freight Shuttles there are through freight trains that carry bulk traffic, trade cars and containers. The container-carrying through train services amounted to just 14 movements in each direction in a week, twelve months ago and developing these services has proved difficult, although Eurotunnel has itself now invested in two operators in an attempt to increase traffic volumes. While it is not easy to introduce through train services at short notice, they could be an answer to capacity issues if port disruption arises and in any event the development of through train services will reduce the amount of vehicles on the roads, as long as the mode meets the supply chain requirements.

Several operators, including Eddie Stobart, has been experimenting with train services between Spain and the UK, via the Tunnel for the transport of fresh produce, utilising temperature controlled containers and unit tracking and monitoring systems.

4.3 Port hinterland

Free and rapid access to Dover and Calais ferry terminals is an essential ingredient in satisfying freight carrier demands, as it is for Channel Tunnel services. Access to Dover, passing the Channel Tunnel terminal along the route from London, is via the M20, with just a short stretch of the journey along the promenade in Dover. When the road is clear there is no problem, blockage and disruption on the M20, however, could cause severe disruption to freight using the Channel Ferry services. The only alternative route is via the A2 leaving Dover in a northerly direction up a steep incline, ultimately connecting with the M2 heading towards London.

The port of Dover was once fully rail-connected and studies have been undertaken to assess the reinstatement of the direct connection, from engineering and economic perspectives. However, on such a road-dominated route the demand for rail connections to and from the port are hard to justify under present conditions.

5. PORT TRADE & TRAFFIC

5.1 Overall trade and traffic mix

Import traffic through Dover, the Channel Tunnel and adjacent ports in 2010 amounted to c.25 million tonnes (excluding through train traffic of approximately 0.6 million tonnes), comprising dry bulks, liquid bulks, general cargo and most significantly, unit load traffic. Export volume, in comparison, was just under 19 million tonnes (assuming Freight Shuttle traffic volume is evenly balanced).

Dover and the Channel Tunnel handle 7% of all UK inbound tonnage (9% of all foreign import tonnage) coming through the country's major ports and the vast majority of freight coming through these South Coast ports is carried in road trailers (95%).

Aside from the significant amounts of unit load traffic passing through Portsmouth, Ramsgate, and Newhaven (which are overshadowed by the traffic volumes through Dover and the Channel Tunnel) there are some identifiable food commodities being imported in general cargo vessels through Dover and Portsmouth. In both cases the trade is primarily in fresh produce (fruit and vegetables) from a range of sources, with bananas being a significant flow through both ports.

Port	Dry bulk	Liquid bulk	General	Unit load	Total
Ramsgate	10			1,041	1,051
Dover			272	14,111	14,383
Channel Tunnel				7,100	7,100
Newhaven	8			263	271
Shoreham	162	4	222		388
Portsmouth			532	1,526	2,058
Total	180	4	1,026	24,041	25,251
UK Major Ports Total ³	72,382	129,878	12,634	96,624	311,518

Source: Department for Transport, *Maritime Statistics 2010*

Note 1: Unit load includes trade cars. Total export volume 18,828k tonnes

Note 2: Channel Tunnel 50% of total freight shuttle throughput, through train traffic (0.6m tonnes) not included

Note 3: UK Major Ports foreign and domestic traffic

Port	Containers	Trailers RoRo	Trade cars	Total
Ramsgate		86		86
Dover		1,017		1,017
Channel Tunnel		545		545
Newhaven		18		18
Shoreham				0
Portsmouth	16	87		103
Total	16	1,753	0	1,769
UK Total	2,304	2,763	1,995	7,062

Source: Department for Transport, *Maritime Statistics 2010*

60% of all trailers (accompanied and unaccompanied) entering the UK pass through Dover, the Channel Tunnel, or those ports in the immediate vicinity of Dover, demonstrating the importance of this corridor for road transport. Given the gross weight of traffic and the numbers of unit loads the average payload per unit through the ports from Ramsgate to Portsmouth is 13.6 tonnes.

Without any detailed insight into the contents of the trailers passing through Dover, the Channel Tunnel, or adjacent ports it is impossible to confirm how much food commodity traffic is coming through the ports. As a maximum it is nearly 25m tonnes but the actual figure is much lower, given the range of goods and commodities imported. (Total volume of UK food commodity imports in 2010 from EU and non-EU sources, was 34m tonnes according to Defra's analysis of HMRC / DfT data feed).

5.2 EU and non-EU food imports

Using a combination of trade data obtained from HMRC via Defra statisticians and the DfT's *Maritime Statistics* it is possible to begin to profile the amount of food being imported through Dover and the Channel Tunnel. Not surprisingly there is very little non-EU traffic moving on the Channel ferries and through the Channel Tunnel (apart from trailers from Turkey). However there is a total of 351,000 tonnes of food entering Dover from non-EU sources, mostly identified as bananas arriving in (palletised) bulk on reefer vessels.

The importance of Dover and the Channel Tunnel for the UK food supply chain is in the traffic coming from EU origins. Approximately 21 million tonnes of freight was imported from EU countries in 2010 through either Dover or the Channel Tunnel.

The best estimate of how much of this was food traffic comes from analysis carried out by the Border Agency, using the insight and intelligence they require in carrying out their duties. It has been estimated that 27% of all trailers entering the UK through Dover are carrying food. At an average load of 13 tonnes per trailer, this would indicate that 3.57 million tonnes of food is imported through Dover. A similar calculation for the Channel Tunnel provides an estimate of food imports of 1.91 million tonnes. Together, therefore, these two routes are estimated to be handling 5.48 million tonnes of food imports from EU countries, 26% of the UK's total food import from EU sources.

Commodity	Non-EU	EU	Total
Frozen and chilled meat (#0201, 0202, 0203, 0204, 0206, 0207)	0.084	5,481.000 (Estimated food via RoRo through Dover and Channel Tunnel)	
Fresh and frozen fish (#0302, 0303, 0304)	2.008		
Citrus fruit, fresh or dried (#0805)	7.960		
Palm oil (#1511, 1513)	0.000		
Sugar (#1701, 1702, 1703)	0.015		
Other commodities	341.244		
Total food import	351.310		
<i>Total foreign import, EU estimated</i>	<i>693.782</i>	<i>21,389.218</i>	<i>22,083.000</i>

Source: Defra bespoke analysis of data feed from HMRC for non EU traffic and DfT *Maritime Statistics* coupled with Border Agency analysis for EU imports and estimated food element

The results of a traffic count carried out at the Channel Tunnel in Folkestone support the Border Agency estimate because out of 2,498 import trailers counted over a 24 hour period, 801 vehicles were refrigerated trailers and 74 were road tankers (34% in total), all probably carrying foodstuff. In addition, some other standard 'dry' trailers also coming through could have been carrying food product at ambient temperatures.

Port	2008		2009		2010	
	EU	Non-EU	EU	Non-EU	EU	Non-EU
Ramsgate		1,113		125	179,000	343
Dover		292,872		300,196	3,570,000	351,311
Channel Tunnel					1,911,000	
Newhaven		0		0	49,000	0
Shoreham		0		0		0
Portsmouth		497,454		625,651	271,000	590,974
Total		791,439		925,972	5,980,000	942,628

Source: Defra bespoke analysis of data feed from HMRC for non-EU imports and DfT / Border Agency estimates for EU food import estimate in 2010

Table 5.5: Frozen and chilled meat imports (#0201, 0202, 0203, 0204, 0206, 0207)			
Port of Clearance	Non-EU	EU	Total
Dover / Channel Tunnel	0.084	963.818 (Mostly through Dover / Channel Tunnel in trailers)	
Felixstowe / Southampton	83.568		
Thames / Medway	78.052		
Humber ports	1.211		
Other UK ports and airports	4.299		
Total	167.214		
<i>Check:</i>	<i>167.214</i>	<i>963.818</i>	<i>1,131.032</i>

Source: Defra bespoke analysis of data feed from HMRC for non EU traffic and DfT *Maritime Statistics*

The importance of Dover and the Channel Tunnel for the security of the UK food supply is not in question. In the next section of this report the resilience of the supply in the face of potential port disruption is assessed in more detail.

The majority of non-EU food commodity imports cleared through Dover and the Channel Tunnel are bananas, other fruits, and some vegetables, shipped in bulk. In addition Turkey is also a significant source of trailer-based food import traffic.

It is highly likely, although difficult to verify, that a significant proportion of the UK's imports of frozen and chilled meat from EU country sources (964,000 tonnes), enter the UK via Dover ferries and the Channel Tunnel shuttle services. Imports of fresh and frozen fish; and citrus fruit (and whole range of fresh produce) will also enter the country in trailers through Dover and the Channel Tunnel (see also **Annexes 7 and 8**).

The ports, ferry companies and freight shuttle operators do not receive sufficient detail of the types of food being carried across the Channel in trailers. To obtain a better picture of the different types of food being imported on the route further sample analysis and evidence gathering would have to be carried out with the trailer operators themselves, who are in a better position to identify the types of food being collected and carried for their customers.

6. PORT FLEXIBILITY

6.1 Issues and concerns / potential disruption scenarios

Whether there is short, medium or long term disruption to ferry operations, through Dover, or to Freight Shuttle operations through the Tunnel there will be an immediate requirement for the traffic that is constantly arriving at Dover, Calais and the Eurotunnel terminals (over 4,000 trailers per day in each direction) to be diverted.

For short term disruption, 'Operation Stack', amounting to parking trailers on the M20 motorway, is a means of taking the pressure away from the ports for those operators that cannot easily transfer from the ferries to the Tunnel and vice versa (i.e. those operators without dual accounts).

The first pressure valve is therefore to be able to divert traffic from the ferries to the Tunnel or vice versa. In order to assess the feasibility it is necessary to understand the capacity available; current utilisation levels; and any flexibility in the provision of additional capacity on the routes either with ferry operations, or Freight Shuttle operations.

In addition to possible diversion of traffic from Dover ferries to the Tunnel or vice versa, there is also the option to transfer to other ferry routes. The feasibility of this option will also be assessed by taking account of the estimated available capacity on other routes; and the ability to handle accompanied traffic on these alternative routes.

There will be restrictions on the number of accompanied trailers that can be carried on other freight RoRo routes and therefore a switch to unaccompanied movements will have to be considered at an early stage, followed in time by an evaluation of a switch to the container mode and the use of RoRo ferries specially designed to accommodate containers, LoLo shipping services across the North Sea, or even through freight train services in the Channel Tunnel.

6.2 Traffic diversion

The current estimated utilisation of Dover ferry and freight shuttle services is presented in **Table 6.1** below. Both the ferry and Tunnel capacities are based on actual service schedules in January 2011 and the actual traffic data would suggest that freight capacity utilisation of the ferries is 62% and on the freight shuttles it is 73%.

This immediately implies that both the ferries and Eurotunnel have spare capacity that could be utilised and with current (2010/2011) capacity provisions the ferry services could absorb all of the traffic moving through the tunnel (1,089,051 units). However, the same could not be said in reverse, if the ferry services were put out of action.

Consider also that ferry capacity has since been reduced by the withdrawal of the SeaFrance service, although now partially compensated by a new DFDS Seaways / LD Lines joint service on the Dover / Calais route.

Route	Current estimated capacity (trailer units)	Current traffic volume (2010)	Average utilisation %	Potential capacity (based upon capacity provision in 2011)
Dover ferries	3,320,480	2,068,000	62%	4,000,000
Freight Shuttle	1,493,881	1,089,051	73%	3,407,040
Total	4,814,361	3,157,051	66%	7,407,040

Source: DfT *Maritime Statistics* and PRB Associates *UK Short Sea Freight RoRo and LoLo Capacity Report*

Ferry operations, as observed in January 2011, are relatively intense with each of the 13 ferries on the route making four round trips per day, on average. This could, in theory, be increased to five round trips per day, adding 20% to route capacity, but such scenarios will need to be verified with the ferry operators. In any case the demise of the SeaFrance service and the gradual migration of the vessels operating on the route to other owners and other routes, only serves to diminish the scope for expansion.

More work is required with the ferry operators on ferry capacity deployment and utilisation and the current potential to develop fleet capacity, either with suitable available ferries or by adapting other RoRo ferries to meet the criteria required at Dover and Calais (i.e. open access, through watertight doors to bow and stern decks).

Image 6.1: Shore-side ramp lowered onto open deck of the *Spirit of Britain* in Dover (Dover type vessel)



While there is some scope to increase capacity through Dover (through extra sailings, particularly at night); and the Tunnel (increasing the number of shuttle departures to a current maximum of 6/7 departures per hour – 6 in one direction and 7 in the other direction each hour – could double current capacity); the impact of closure on either of these routes can be considerable, as was the case after the fire in one of the two Channel Tunnels in 2008.

To some extent one corridor provides a pressure valve for the other, as was the case after the Channel Tunnel fire when the Dover ferries carried much of the Tunnel traffic overflow through increased vessel utilisation, providing additional sailings and even bringing in extra vessels. If the same thing happened today, during a trough in trade volumes, the ferry companies could probably again pick up the slack, particularly while SeaFrance ferries continue to be redundant, but available.

The following analysis is intended to provide an indication of the impact of closure at the Port of Dover on the trailer traffic currently passing through the port. In effect, over 2 million trailers will need to find another route into and out of the UK.

Ignoring the fact that the mostly driver-accompanied traffic will need to convert to mostly unaccompanied movements, it would require utilisation of all estimated spare ferry capacity on existing Continental services and the Channel Tunnel, ranging from services into Newcastle round to services into Plymouth, from a range of other Continental ports.

There will be the potential for ferry services to add to capacity on existing routes to accommodate the additional cargo, providing spare tonnage is available and/or it is possible to intensify existing ferry schedules. Indeed, if the Channel Tunnel Freight Shuttle services are ramped up to full service capacity of 6 / 7 departures per hour on a 24-hour basis, the Tunnel alone could accommodate much of the Dover traffic.

Table 6.2: Indicative spread of trailer traffic if Dover closed						
Port	Available ferry capacity Jan 2011	Actual unit volume 2010	Approx. capacity utilisation	Total spare capacity		Closure of Dover and traffic spread
Tyne	40,748	22,000	54%	18,748		18,748
Teesport	194,316	128,000	66%	66,316		66,316
Hull	280,555	208,000	74%	72,555		72,555
Killingholme	539,736	377,815	70%	161,921		161,921
Immingham	413,995	289,797	70%	124,199		124,199
Felixstowe	308,775	180,000	58%	128,775		128,775
Ipswich	45,448	33,000	73%	12,448		12,448
Harwich	741,242	243,000	33%	498,242		498,242
Tilbury	194,466	136,126	70%	58,340		58,340
Purfleet	509,704	356,793	70%	152,911		152,911
Dagenham	104,172	72,920	70%	31,252		31,252
Ramsgate	235,698	160,000	68%	75,698		75,698
Dover	3,320,480	2,068,000	62%	1,252,480		-2,068,000
Channel Tunnel	1,493,881	1,089,051	73%	404,830		404,830
Newhaven	69,432	38,000	55%	31,432		31,432
Portsmouth	242,794	240,000	99%	2,794		2,794
Poole	99,840	37,000	37%	62,840		62,840
Plymouth	57,356	9,000	16%	48,356		48,356
	8,892,638	5,688,502	64%	3,204,136		-116,344

Source: PRB Associates *UK Short Sea Freight RoRo and LoLo Capacity Analysis and Report*

There are a wide range of other routes and services and alternative UK ports but the increasing distances and longer crossing times combine to make it harder to match the capacity provision supplied on cross channel routes and as a consequence trailer operators get much less utilisation of their trailers.

It has proved difficult to establish and nurture longer ferry routes across the North Sea and Western Channel, even with public sector support provided to stimulate the transfer of freight from the roads to sea and rail modes. The 26-mile crossing from Dover to Calais and the ability to maximise asset (vessel) utilisation and revenue generation through high frequency services makes it difficult to compete against.

The estimated spare capacity serving Harwich is likely to be over-stated due to the fact that the calculation was based upon recorded traffic in 2010 from the DfT and a capacity evaluation at the beginning of 2011, just after appreciable additional vessel capacity had been introduced by Stena Line Freight.

There are already 18 RoRo ferries operating on 9 services between ports in the Humber (Hull, Killingholme and Immingham) and the near Continent (mainly Rotterdam and Zeebrugge). These ferries work on a 48-hour round trip basis with 2 ferries working on each route providing daily services from each side of the North Sea.

Vessels on these services have been built to accommodate more and more freight but it would still require 30 more ferries of a similar size to bring route capacity up to the Dover to Calais and Dunkerque capacity. Even then there would not be enough berth space to accommodate the additional ferries, unless vessel turnaround times can be reduced dramatically. (Longer ferry routes

carrying mostly unaccompanied trailers require more time in port to discharge and load the freight using ‘tugmaster’ units operated by the stevedores to tow trailers on and off the ships).

One solution introduced to enhance the speed of crossing and therefore assist the supply chain process has been the introduction of high speed catamaran services with freight capacity. However, the high cost of fuel on these fuel hungry services has led to the closure of such services, like Stena’s Harwich / Hook of Holland service.

Table 6.3: RoRo berth infrastructure and infrastructure utilisation				
Port	RoRo Berths	Berth restrictions (Length / Draft)	Ferry calls per week	Average calls per berth per week
Tyne	5	185 / 7.5	7	1
Teesport	4	200 / 8.0	9	2
Hull	12	196 / 10.4	17	1
Killingholme	6	247 / 9.3	19	3
Immingham	11	198 / 10.4	34	3
Felixstowe	2	250 / 9.8	16	8
Ipswich	2	150 / 7.0	5	3
Harwich	6	300 / 9.5	32	5
Tilbury	7	250 / 10.5	15	2
Purfleet	2	200 / 7.5	26	13
Dagenham	1	241 / 8.0	13	13
Dartford	2	236 / 10.1	-	-
Sheerness	7	230 / 9.0	1	-
Ramsgate	3	160 / 6.5	39	13
Dover	8	200 / 7.8	365	46
Newhaven	2	145 / 6.0	14	7
Portsmouth	5	200 / 7.0	39	8
Southampton	5		-	-
Poole	2	7.0	8	4
Plymouth	1	200 / 8.5	12	12

6.3 Vessel diversion

If Dover is put out of action so, effectively is Calais, and vice versa. The Dover ferries with their ‘female’ access configurations complemented by purpose-designed berths, with inbuilt ramps to lower onto ships decks, in Dover, Calais, and Dunkerque are not transferable to other routes, unless major conversion work can be carried out to install hinged ramps/doors on the vessels.

There is a dual type ramp in Ramsgate and one other said to be located in Portsmouth, but it is not just the shortage of infrastructure it is the added voyage time that reduces the scope to transfer traffic to other routes using the existing Dover ferries.

More work is required to identify the full range of suitable berths in the UK and on the Continent (that can accommodate Dover-type ferries) and further research into the viability of dual purpose ramps is required so that some back-up contingency can be built into future developments.

Other innovative ship and port design, or container and trailer design and handling operation at other UK ports, might also help to dilute the importance of Dover and the Channel Tunnel for the movement of unit load traffic.

The major barrier to change is the demand from the supply chain in connecting the UK mainland with the Continent and Ireland, for rapid and frequent service connections providing the shortest possible delivery lead time, allowing the maintenance of minimum stock levels.

A review of the perceived imperatives in the supply chain, married to a commitment to spread the supply routes and transport modes, to enhance resilience, may be an answer.

Image 6.2: RoRo vessel ramps / doors lowered onto the berth in port



7. FOOD SUPPLY RESILIENCE ASSESSMENT

This Case Study assesses the disruption scenarios, the resilience and the flexibility among ports and shipping services to handle the transfer of traffic flows. The implications for specific food commodity flows and supply chains in the event of port disruption are illustrated in the four food commodity Case Studies:

- Frozen meat and fish (**Annex 7**)
- Citrus fruit (**Annex 8**)
- Sugar (**Annex 9**)
- Palm oil (**Annex 10**)

The business objective of maintaining low stock levels, especially for short shelf-life products, based on 'Just-in-Time' supply chain strategies, relies upon the Dover / Tunnel routes. To break such a cycle and to stimulate the use of longer ferry routes and through rail services there has to be a full review of the supply chain process and, perhaps, an adjustment in the response to consumer demand.

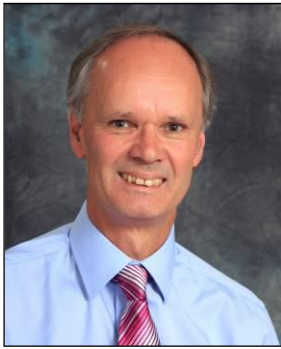
8. MESSAGES AND FINDINGS

The key messages and conclusions and suggestions for further work arising from this Case Study concentrating on the Port of Dover and the Channel Tunnel are summarised in bullet point format below:

- High frequency, short crossing times provided by Dover/Calais, Dover/Dunkerque and Channel Tunnel services are **crucial to UK food supply chains**, especially for fresh produce, both in terms of overall capacity and service provided. Because of the short distance, maximum ferry capacity can be supplied with the minimum number of vessels (highly expensive capital items)
- It is difficult to counter the **logistical and economic arguments** that other, longer routes would require many more ferries in service to maintain a similar level of capacity. Ferries are not available and Dover remains critical (maybe expand Ramsgate?). Developing longer ferry routes is only a part of the answer, even if mega ferries were deployed and there was significant mode change to unaccompanied trailer traffic
- The **greatest source of disruption for ferry operators** is the threat of industrial action in France (Calais) and occasional (to date) severe weather conditions
- If **Dover's berths** were out of action there are no viable alternatives at other UK ports to handle the discharge and loading of **Dover-type vessels**. Seven specialised ('male') RoRo ramps and one dual purpose ramp (No.1) are available and the P&O, DFDS Seaways, and (now redundant) SeaFrance vessels are designed with 'female' load / discharge arrangements, at bow and stern, specifically for these types of berth so as to enhance vessel turnaround speed.
- **If a single ramp is put out of action at Dover** it is likely to cause delays due to the disruption it would cause to load preparation arrangements adjacent to the specific berths used by each of P&O and DFDS Seaways (and SeaFrance previously)
- **Peaks in demand**, over the day, week, and season, for ferry and freight shuttle services prevent optimum utilisation of services and capacity, although in times of stress the traffic will move (or be directed) to the under-utilised periods
- Any **new vessels** for the route have to be purpose-built (there are no ready-made replacements in the market), or will need major conversion work. Also **new ferry operator entry** into the market on Dover is very difficult due to the specialised nature of the ferries required and the high frequency of service demanded
- **Dover's Trust Port status** means investment scale and options are restricted and there have been moves towards privatisation
- **Channel Tunnel Freight Shuttle** capacity is constrained by the number of freight shuttle sets in operation (15) and not by Tunnel capacity. Through train capacity is available and could be used more for container traffic
- **Channel Tunnel** has installed four 'Safe Stations' within the tunnel(s) where they can deal directly with fire problems. Cross-over points within the tunnels provide flexibility but fire and train breakdowns remain the chief disruption concerns
- **Further work** is required to assess the availability of suitable berthing capacity on the Continent (Calais – 5; Boulogne – 1; Dunkerque – 2; Oostende – 2; Zeebrugge – 1). Even if berths are available, additional sailing times render the routes uneconomic. Further assessment is also required to fully understand the scope for handling current Dover volumes through the Channel Tunnel and other routes
- **Consolidation of loads for the UK market** is increasingly taking place on the Continent (Calais; Dunkerque; Zeebrugge). Transport operator Daily Fresh, for instance, picks up consolidated loads for the UK market in Dunkerque. Such trends could make UK food supply chains less resilient.

- **EC legislation on fuels** due to come into force in 2015 is going to force ferry operators to use very low sulphur content (0.1%) fuels, leading to much higher costs and a need to improve service utilisation and freight rate returns. It is not clear whether this legislation will favour the Channel Ferry routes over longer routes, or not, but the Tunnel will be gaining an increasing environmental advantage and a lever to increase prices
- **UK government intervention** could be necessary to build resilience into UK ports infrastructure when private port owners and operators are naturally unwilling to build in surplus capacity – public money is used to build road and rail transport resilience but it is not available to ports.

ABOUT THE AUTHORS



Peter Baker, the founder and owner of PRB Associates, specialises in operational, financial and market analysis in the ports and shipping sectors; with working experience in the ports sector and in RoRo ferry operations.

In addition to a range of project commissions in the UK and internationally, Peter has researched and produced the '*UK Short Sea Freight RoRo and LoLo Capacity Analysis and Report*' every year since 2000 and for the first time in 2009 produced an Irish equivalent. The report and database information provide a detailed analysis and assessment of the capacity provision and spread in the market, with comprehensive route, service, vessel and port information contained in detailed appendices.

PRB Associates Limited specialises in providing shipping and transport consultancy and analysis services for private and public sector organisations. Founded in 1998, PRB Associates has successfully completed commissions for freight generators, freight transport service providers (shipping lines and road transport operators), port operators and various public sector organisations. Assignments have ranged from service analyses, feasibility studies, financial modelling and economic impact studies, to market research and appraisal and national transport strategy formulation.



Andrew Morgan, the founder of Global 78, has extensive international business and logistics experience gained in projects across many industrial sectors, including food supply projects in Europe, Brazil and India. These advisory and implementation projects have ranged in scope from agri-business, through manufacturing and processing, to wholesale and retail distribution in final consumer markets.

A Chartered Member of the Chartered Institute of Logistics and Transport (UK), Andrew is the author of '*Making the Brazil Connection – managing risk in the international food supply chain*' and also co-author of the UKIBC Report '*India Agri-Food Supply Chains: Overview and Opportunities*'.

Global 78 Limited is focused on helping commercial clients discover new perspectives for success in local and international markets and for delivery of real bottom-line improvements. It also undertakes research for public sector policy-making. Food supply chains are complex. Innovation, resilience and sustainability are all vital elements for successful policy, strategy, and operations. The Global 78 team therefore provides clients with quality research, specialist advice, and support for implementation.

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