AECOM

Iarnród Éireann

8 Reinstatement & Closure of Rail Lines

8.1 Introduction

The terms of reference required that the potential for the reinstatement of disused lines be investigated. Subsequently, the consultants were asked to develop a methodology for appraisal that could be used on an ongoing basis to assess both reinstatement of lines and closure of existing services.

Rather than engage in substantial modelling of demand for such lines, it was considered that from a strategic viewpoint, the emphasis should focus on whether individual reinstatement of closure decisions merited further investigation. Thus, the analysis should be regarded as a pre-feasibility appraisal.

8.2 Methodology

8.2.1 Overall Approach

As these are proposals for capital investment or divestment, they should be evaluated within the context of the Department's Common Appraisal Framework (CAF). However, the application of the CAF methodology assumes that projects have reached the feasibility stage and that an appraisal is needed to assess the options that have been identified. The CAF does not provide guidance on how to decide whether there is an a priori case to subject particular proposals to feasibility study. This paper proposes a screening methodology that is aimed at establishing whether there is a prima facie case for particular proposals to proceed to a feasibility study. It then goes on to apply the methodology to some proposals that have arisen during the context of the consultation exercise. A feature of the methodology is that it could also be used to establish a prima facie case for rail closures. The overall approach to developing such a screening appraisal was to develop a simplified approach that is in keeping with the spirit of the CAF. This was done in the first instance for the reinstatement of disused lines.

The CAF embodies both a cost-benefit analysis and a multicriteria analysis approach to appraisals. The criteria employed are:

- Economy;
- Safety;
- Environment;
- Accessibility and Social Inclusion; and
- Integration.

The Economy Criterion contains a cost-benefit element aimed at establishing users and non-user benefits in monetary terms, while the multi-criteria analysis considers a range of other impacts in both quantitative and qualitative terms. Implementation of a cost benefit approach requires significant modelling of demand and estimation of costs. For the purposes of a pre-feasibility screening appraisal, neither demand estimation nor project cost information will be available, so that an alternative approach is required. The approach adopted here was to develop a number of quantitative and qualitative (as opposed to monetary) indicators that could be used to appraise proposals.

8.2.2 Development of Indicators

One of the features of the CAF appraisal approach is that the scale of the benefits, whether they be user, non-user or other benefits, is based on the predicted use of the transport system that is being appraised. This is true of the Economy and Safety benefits and is partially true of Environment, Integration and Accessibility benefits.

Thus, in the case of railway investments, predicted patronage is a strong indicator of benefits. In advance of a feasibility study, estimates of patronage will not be available. However, it is possible to gauge the overall market for the proposed rail lines, by estimating the population in the rail catchment. This can be done by identifying the stations that would be in place and measuring the population in the catchment from DED level Census of Population data. In undertaking this analysis, the catchment was calculated as the station town or village population, or if there was no significant settlement, it was based on one third of the population of the DED in which the station was situated.

The demand measured in this way is a proxy for user and non-user benefits and these ideally should be set against the capital and operating costs. However, as the latter may not be available, the length of the proposed rail line could be used as a proxy. Thus, the first indicator proposed is:

- Aggregate station catchment population / rail line kilometres.

This indicator reflects patronage potential relative to a proxy for capital and operating costs. However, patronage will also be dependant on the level of competition from road based modes. Ultimately, the level of competition is determined by the relative journey times for road and rail. Relative journey times are related to the relative journey lengths by road and rail and the road and rail infrastructure design speed.

Perusal of a number of proposals for reinstatement of lines indicated that relative rail and road lengths tended not to differ much. This is because transport infrastructure developments, whether they be road or rail often follow the line of least resistance topographically. As a result, route distance was not considered as a good proxy for competition effects. However, road design speed is an important indicator of competition from road modes. As road design speed is related to road type, an indicator developed around the latter was developed.

- Competing road type.

Four levels of competition were identified as follows:

- Motorway/Dual Carriageway;
- Other National Primary;
- National Secondary; and
- Regional or local roads

Thus, on this indicator, a proposed rail line that has a competing Motorway/Dual Carriageway would score low marks, as the level of service on that road would be high.

The first two indicators reflect the capacity of the railway to win patronage relative to the costs of the line. Road safety benefits will be directly related to rail patronage, as will environmental

emissions. Other environmental aspects, such as visual intrusion are route specific and could not be assessed at this preliminary stage. As a consequence, safety and environmental benefits are assumed to be proxied by the above two indicators.

Integration is a relevant consideration even at pre-feasibility stage for three reasons:

- While catchment populations are an accurate proxy for additional rail patronage in respect of branch lines, they do not reflect the patronage potential of new lines that link up rail networks. This is because in the latter case, new links offer potential for rail travel between stations that are not on the new line;
- New rail links may offer reduced journey times between stations on existing lines; and
- Where National Spatial Strategy hubs and Gateways are connected to the rail system, greater integration benefits arise.

For this reason, an integration indictor is proposed as follows:

- Degree of integration of rail infrastructure.

This has a number of hierarchical dimensions as follow:

- No linking of existing rail routes and no Gateway or Hub connected e.g. pure branch line attaching small towns and villages;
- Creates a link that shortens rail journey times between existing rail stations but no Gateways or Hubs connected;
- Linking of existing rail routes resulting in better connection of existing Gateway or Hubs on the rail system;
- No linking of existing rail routes but a Gateway or Hub is attached to the rail system; and
- Linking of existing rail routes resulting internal integration of a Gateway or Hub.

A branch line e.g. Middleton to Youghal would have little impact on this criterion, as it does not link two separate parts of the rail network.

Rail services would tend to have a substantial benefit in terms of providing access for socially deprived households in circumstances where there is no alternative bus service or where the services provided are poor. The quality of bus services is a function of frequency and journey times. Long distance bus service levels vary by day of the week, with lower frequencies usually observed at weekends. Where services are operated on a daily basis and with high frequency, the quality of the service is generally regarded as high. With this in mind, the quality of bus was measured by the frequency of daily services Monday-Friday operating through the largest town/village on the rail route. The following dimensions of service are proposed:

- Daily service Monday to Friday with 0 to 9 services per day: maximum of 100 points;
- Daily service Monday to Friday with 10 to 14 services per day: maximum of 75 points;
- Daily service Monday to Friday with 15 to 19 services per day: maximum of 50 points; and

- Daily service Monday to Friday with 20 to 50 plus services per day: maximum of 25 points.

This classification means that a service that operates hourly each way between the hours of 8am and 7pm would be regarded as falling into the highest level of service category. This classification does not take account of the in vehicle journey times by bus. However, given that journey times are related to the quality of the road infrastructure and that the latter is captured on another criterion, it was felt that there was no need to further complicate this criterion.

8.2.3 Scoring and Weighting of Indicators

The above process has produced four indicators as follows:

- Aggregate station catchment population / rail line kilometres;
- Degree of integration of rail infrastructure;
- Quality of competing bus services; and
- Competing road type.

With regard to scoring of these indicators, there was a need to establish a means of scoring within a range of 0 to 100. As the first indicator is numeric, this required translating numeric values into the 0 to 100 scale. In order to do this, the equivalent characteristics for the Manulla Junction-Westport line were calculated. This line section was chosen as representing a section that, if subject to a cost-benefit, would be likely to provide a reasonable return to its development.

With regard to competing road type the following scores were adopted:

- Motorway/Dual Carriageway 0 points
- Other National Primary 33 points
- National Secondary 66 points
- Regional or local roads 100 points

In the event that the road network varied such that some of the route was motorway and the rest national secondary, then the points were weighted according to the representative length of road.

Integration was scored as follows:

- No linking of existing rail routes and no Gateway or Hub connected e.g. pure branch line attaching small towns and villages: 20 points;
- Creates a link that shortens rail journey times between existing rail stations but no Gateways or Hubs connected: 40 points;
- Linking of existing rail routes resulting in better connection of existing Gateway or Hubs on the rail system: 60 points;
- No linking of existing rail routes but a Gateway or Hub is attached to the rail system: 80 points; and
- Linking of existing rail routes resulting internal integration of a Gateway or Hub: 100 points.

The quality of bus services was scored as follows:

- Daily service Monday to Friday with 0 to 9 services per day: maximum of 100 points;
- Daily service Monday to Friday with 10 to 14 services per day: maximum of 75 points;
- Daily service Monday to Friday with 15 to 19 services per day: maximum of 50 points; and
- Daily service Monday to Friday with 20 to 50 plus services per day: maximum of 25 points.

These scores represent the maximum points that can be achieved by bus services falling into each category. Within each category, actual points to be awarded can be below these levels.

The weighting scheme applied was as follows:

- Aggregate station catchment population / rail line kilometres: 35 points;
- Degree of integration of rail infrastructure: 30 points;
- Quality of competing bus services: 15 points; and
- Competing road type: 20 points.

This weighting scheme reflects the fact that the first indicator is reflective of a large range of benefits covering Economy, Safety and Environment as well as the costs of construction and maintenance.

8.3 Appraisal of Rail Lines

8.3.1 Appraisal of Proposed New Rail Lines

A number of new rail lines have been suggested. These include the following:

- An extension of the Midleton Line to Youghal;
- An extension of the Northern Ireland Rail system into the Republic via a link between Derry and Letterkenny;
- The second phase of the Western Rail Corridor between Athenry and Claremorris, which is envisaged to be implemented in two sections: Athenry-Tuam and Tuam-Claremorris;
- A new link from Charleville via Patrickswell to Limerick;
- Reinstatement of the Mullingar-Athlone Line; and
- Re-opening of the Drogheda-Navan Line to passenger traffic.

There is also pressure from groups in Donegal and other Border counties for the introduction of railways in Donegal. While these are not specific, we have evaluated the introduction of a rail link from Derry to Lifford and Strabane.

Table 8.1 provides an overview of the evaluation. Taking Midleton-Youghal as an example, this proposed route scores poorly (48 points) on the Population per Route Km score as the only significant settlement attached to the rail system by the investment is Youghal itself. On Integration, its score is poor (20 points), as it is a branch line

and does not link parts of the network. Moreover, it does not contain a Gateway or Hub. With regard to road competition, it again scores poorly (33 points), as there is a National Primary Route in competition with the line. It also scores poorly on the quality of alternative bus services, as there are relatively good bus links. The overall score of 33 out of 100 for this route means that it is a poor candidate for reopening. Other potential lines to score less than 50 points are Charleville-Limerick, Tuam-Claremorris, Mullingar-Athlone, Derry-Strabane and Drogheda- Navan. In the case of Drogheda-Navan, the analysis assumes that Clonsilla-Navan will be constructed. Athenry –Tuam and Derry-Letterkenny perform somewhat better, but nevertheless do not achieve high scores.

8.4 Appraisal of Lightly Used Services

Lightly trafficked lines are usually considered for service closure. A full evaluation of a proposal for service closure would be undertaken from a marginal viewpoint, through comparison of marginal costs and benefits. This is different to appraisal of a proposed line, as full capital costs would not normally be considered. However, the indicators developed above are still relevant to such decisions e.g. population per route kilometre is relevant as the benefits lost from service discontinuation will be related to population and the cost of maintaining the route. Integration benefits lost are likewise related to the type of line it is and its role vis-à-vis Gateways and Hubs.

Table 8.1: Multicriteria Appraisal of Proposed Rail Lines (scores out of 100)

Rail Line	Population per Route km	Integration	Road Competition	Bus Quality	Total
Midleton-Youghal	48	20	33	26	33
Derry-Letterkenny	71	80	33	20	59
Derry-Lifford- Strabane	97	20	33	0	47
Athenry –Tuam	39	80	100	20	61
Tuam – Claremorris	2	60	33	76	37
Mullingar – Athlone	9	100	22	51	45
Charleville – Limerick	19	60	16.5	25	32
Drogheda - Navan	17	40	66	51	39

Source: Goodbody Economic Consultants

The quality of the alternative road system limits the potential of the services to achieve economic viability. However, the quality of existing alternative bus services is not considered a good indicator of access for socially deprived households. This is because alternative additional bus services are usually put in place, when closure of rail services occurs. As a result, this criterion was not used in this sketch appraisal of service closures. The NTA has devised a methodology for estimating social impacts in the context of full appraisal of service closures.[35]

This analysis was undertaken for the following lightly used services:

- Rosslare Europort – Waterford;
- Limerick – Ballybrophy;
- Limerick Junction- Waterford; and
- Manulla-Ballina

These are lines that could potentially be considered for closure. Rosslare Europort-Waterford is included to provide a comparison of a line on which services have recently been discontinued. Again, Table 8.2 provides data on the characteristics of the lines, while Table 8.3 sets out the indicators and scores. It should be noted that these scores are not comparable with those for new services outlined above. This is because fewer criteria were used. The lightly trafficked line of Manulla-Westport is used as a benchmark.

Note that the exercise below which focuses on population ignores the wider value of the Manulla to Ballina spur in supporting ongoing freight operations.

Table 8.2: Characteristics of Lightly Trafficked Rail Lines

Rail Line	Route Kilometres	Number of Stations	Catchment Population
Rosslare EP– Waterford	57	4	1,059
Limerick – Ballybrophy	92	5	14,609
Limerick-Waterford	124	4	30,576
Manulla –Ballina	33	2	11,467
Manulla-Westport	25	2	17,366

[35] See: Social Impact Methodology. NTA, 2010.

Table 8.3: Multicriteria Appraisal of Service Retention (scores out of 100)

Rail Line	Population per Route km	Integration	Road Competition	Total
Rosslare EP– Waterford	3	60	33	30
Limerick – Ballybrophy	23	40	0	24
Limerick- Junction -Waterford	36	60	33	44
Manulla-Ballina	49	80	33	56
Manulla-Westport	100	80	33	77

8.5. Overview

A methodology for the sketch multi-criteria appraisal of proposed new lines and service closure on lightly trafficked existing lines has been developed. The purpose of the appraisal is to determine whether proposed new lines merit fuller assessment through a feasibility study and to identify possible candidates for service closure.

With regard to proposals for new lines, the following were analysed:

- An extension of the Midleton Line to Youghal;
- An extension of the Northern Ireland Rail system into the Republic via a link between Derry and Letterkenny;
- The second phase of the Western Rail Corridor between Athenry and Claremorris, which is envisaged to be implemented in two sections: Athenry-Tuam and Tuam-Claremorris;
- A new link from Charleville via Patrickswell to Limerick;
- Reinstatement of the Mullingar-Athlone Line; and
- Re-opening of the Drogheda-Navan Line to passenger traffic.

Of these, the Athenry-Tuam line, while not receiving a convincing score offers some potential for reinstatement and should be subject to further review in light of the patronage experience of Phase 1 of the Western Rail Corridor. Currently, this is well short of levels forecast in the Business Case. Mullingar-Athlone and Charleville–Limerick are subject to further analysis in Section 9 below, as they offer network improvements that may not be fully captured by the screening methodology.

With regard to service closures, the recent closure of the Waterford-Rosslare Europort line is supported. Another candidate for consideration for closure is Ballybrophy-Limerick. Based on this appraisal, while performing poorly, the Limerick Junction-Waterford and Manulla-Ballina services are not as strong candidates for closure as Ballybrophy Limerick.


Departure / Imeacht
Time Destination Plat.
12:00 MALLOW 5
Calling At
On Time
Time Destination Plat.
12:00 COBH 2
Calling At
Little Island
Glounthaune,Fota
Carrigaloe
Rushbrooke
On Time
Time Destination Plat.
12:30 DUBLIN 4
Calling At
Mallow,Portlaoise
On Time
Snacks/Drinks
11:46
iarnród éireann
General Information
Please Do Not Smoke
in the Station
This is a no
smoking area
Time From Plat.
11:11 MALLOW 5
Calling At
On Time
Time
11:50
Calling
Prebooked
Ticket Collection
irishrail.ie
Prebooked
Ticket Collection
irishrail.ie
Cork County Council - MIDAS Project
its faster
cheaper
cleaner!
Ticket Collection
Bailiú Ticéad
Ticket Sales
Díolachán Ticéad
Ticket Sales
Díolachán Ticéad

9 Development of Investment Options

9.1 Introduction

The development of a strategy must have regard to the strategic priorities for the ICN. Section 3 established these priorities and it is worth reiterating them here:

- The need to build on the infrastructure and rolling stock investments already made to ensure that they make the maximum contribution possible to economic development;
- Within this context, to provide service frequencies and service improvements that will prove attractive to users in general and business users and car available passengers in particular;
- Other things being equal, to concentrate future investments and service improvements on linkages between the major agglomerations. This suggests that the radial routes connecting Dublin to Cork, Belfast, Galway, Limerick and Waterford should be the focus of future rail development;
- To support National Spatial Strategy objectives by improvement of the key non-radial rail links between Cork, Limerick and Galway where transport volumes are of sufficient density; and
- To improve rail links and services to the major airports that act as access points for tourists.

In order to build a strategy, it is necessary to first identify where deficiencies currently reside. This was elaborated in Section 6. A second requirement is to identify measures that could make good these deficiencies and subject them to some preliminary screening. As part of this screening it is necessary to estimate the extent to which measures will attract patronage. This screening is implemented in the rest of this Section. The fact that a measure accords with strategic priorities is a necessary but not sufficient reason for their inclusion in a strategy. This is especially true at present when Exchequer funds are limited and value for money must be obtained. Section 10 will subject the screened measures to cost-benefit analysis as a means of determining priorities and phasing of investments.

9.2 Forms of Investment

Whilst the range of potential investments is quite broad, a number of basic categories can be defined. A number of these categories are outlined below.

Journey Time

Journey time remains a significant determinant of rail patronage. Users will make mode choice decisions of the basis of travel time, quite likely valuing it over and above other features such as frequency. In Ireland, on all but a few routes, journey time by road tends to be significantly faster. It is generally observed that on inter-urban corridors, when competition with rail is strong, and the share of rail is lower than would otherwise be expected, elasticities of demand in response to changes in service quality will be higher. This suggests that quite significant passenger responses can result from improvements in journey time, where journey times are currently uncompetitive.

This suggests that the approach to rail investment should focus as a minimum at retaining some form of competitiveness with other travel modes, as this will achieve the highest returns on the investment.

Such should obviously be a consideration in the implementation of investment in roads, or indeed in the provision of additional buses along InterCity rail routes, where the perceived or quantified benefit of such measures should allow for the resulting need for additional investment in the rail network.

Fares

Fares are a relatively important determinant in the level of demand for rail. Cost is generally cited as a reason for travelling by competing modes, although the recent introduction of low fares, the increases in fuel cost and the introduction of road tolling have led to a rebalancing of the monetary cost of travel by road and rail. This has been partly offset by the introduction of low cost bus services on a number of InterCity routes which offer further alternatives to rail.

The management of fares is a relatively complicated topic, and is covered in detail in Section 12.

Frequency

In urban systems, the frequency is accounted for in the generalised cost of rail travel by assuming that a user will be required to wait half the average headway for a train. In other words, a frequency of 6 trains per hour will lead to an average waiting time of 5 minutes. For longer distance trains where headways are measured in hours, it is not reasonable to expect that a person will wait for long periods at a railway station. Instead, that user will plan other events around the time of the train arrival.

For such services, headways are more appropriately measured as Service Interval Penalties, which describe the disutility of longer headways between trains. Table 9.1 below outlines service interval penalties in minutes for all users, and is taken from the Non-London Inter-Urban data of the PDFH.

Table 9.1 Average Service Interval Penalties

Service Interval (mins)	Equivalent Time Penalty (mins)
30	23
60	31
90	39
120	47

The table suggests that increasing a train frequency to 60 minutes (hourly) from 120 minutes (bi-hourly) leads to an effective saving in time (or disutility) of 16 minutes.

The introduction of clockface timetables also generates benefit through simplification of timetables. There is evidence that for longer distance trips, hourly clockface timetabling is worth in the region of 5 minutes to travellers.

Interchange

The requirement for interchange in public transport trips is universally accepted as having a significant impact on demand. Efforts to achieve 'seamless' interchange are common in transport systems, and strive to address the quite notable impacts that uncoordinated interchange can have on demand.

For journeys of up to 200km by rail, interchange can be perceived as an effective time penalty of up to 55 minutes. This is an upper limit, and is reduced to account for regular rail users, guaranteed connections and good waiting environments.

Typically, it is not unreasonable to assume an effective penalty of between 20 minutes and 30 minutes at intercity interchanges (eg Limerick Junction). In other words, passengers would be prepared to take a train that would have a journey time of 20 minutes longer solely in order to avoid an interchange.

Reliability and Punctuality

Although difficult to measure, reliability and punctuality remain a prominent feature of self-reporting by rail service providers. Guidance suggests that every minute of lateness should be multiplied by 3 to estimate the effect on user disutility. On this basis, a train arriving 10 minutes late is equivalent to an additional journey time of 30 minutes – this is quite a significant penalty. This has consequential effects on trip planning, where rail users will make an allowance for lateness, thereby incorporating this effect into all journeys – not just those which are late.

It can therefore be concluded that achieving a reliable service is more important than reducing journey time, and hence there is a practice of allowing extra time in rail schedules to ensure timely arrival at destinations, at the expense of a faster timetabled journey time.

Rolling Stock Quality

The principal factors associated with rail demand are accepted as fare and journey time (including the various penalties discussed above). Rolling stock is more associated with a set of basic requirements of passengers, particularly those on InterCity services.

These requirements include:

- Cleanliness;
- Provision of information;
- Security; and
- A comfortable environment.

These needs are assessed through the use of multipliers wce the value of time (effectively generating some utility associated with the trip). The level of change associated with each item is typically between 1 per cent and 5 per cent, with the highest value attributed to security. As such, once an acceptable level of rolling stock is provided (i.e. one which provides a minimal level of all these features) the subsequent demand effects of improvements can be quite small.

Marketing

Other factors which influence demand include the provision of other supporting facilities, either on-board or at stations. Services such as café's, shops, business lounges, waiting rooms, branding of services and ticketing services all generate small levels of passenger demand.

Electrification

Whilst the above investments are often targeted at achieving patronage increases, other interventions are driven by the drive for greater operating efficiencies. Electrification can significantly reduce operating and maintenance costs, whilst providing a more reliable operation, and in cases can reduce journey times on routes with high stopping requirements.

9.3 Preliminary Screening

The baseline assessment identified a number of areas where the existing network and services struggled to support such a vision and hence where options for future investment should be considered.

Investment options are presented as those which seek to enhance existing infrastructure or services, and those which target future growth through new market opportunities.

Investment in Existing Infrastructure or Services

The Preliminary Screening is presented on a route by route basis through the existing network, summarizing existing and future deficiencies and proposing measures which support the objectives of the strategy.

Route 1:	Dublin – Cork	
Typical Journey Time:	2:45	
Rolling Stock Quality:	Excellent	
Frequency:	High	
Demand:	High	
Summary	The Dublin- Cork Route remains the central spine of the railway network, with hourly services throughout the day on high quality rolling stock and with a competitive journey time. The route generates a high level of demand between Dublin and Cork City, and captures a high proportion of demand from other modes with an estimated 50% of demand between each city catered for by rail. The route, however, suffers from a large number of speed restrictions which impacts on journey time. Trains on this route operate in excess of 3.5 million train km per annum, making this the most cost intensive of all InterCity routes currently operated.	
Proposals	1.1	Reduce Journey Times to at most 2:30hrs on all services.
	1.2	Consistent stopping patterns (limited stopping at commuter stations within the Greater Dublin Area)
	1.3	Electrification of corridor
	1.4	Run services via DART Underground to Dublin City station (St Stephens Green), and terminus in Dublin Airport via spur from Clongriffin
Comments	With the exception of the proposal to reduce the journey time to at most 2:30hrs, proposals on this corridor are longer term measures, which account for the relatively high performance of this corridor in comparison to other routes. Future measures are therefore focused on reduction on operation and maintenance costs (through electrification), and the maximisation of the value of Dart Underground through increasing access to the city centre from the InterCity route network.	

Route 2:	Dublin – Galway	
Typical Journey Time:	2:45	
Rolling Stock Quality:	High	
Frequency:	Moderate	
Demand:	Low	
Summary	The Dublin-Galway route serves a number of significant population centres between the two cities which support passenger demand on this corridor. Nevertheless, the volume of passenger movement between Dublin and Galway City Centres is low, and is below what should be expected on the basis of the catchment population along the route. Journey times are excessive in comparison with other modes, and there is fierce competition from bus operators. The large number of stops leads to a high level of delay, as does the requirement for passing loops on the single track section between Portarlington and Galway	
Proposals	2.1	Reduce Journey Times to at most 2:00hrs on all services through reducing the number of stops and targeted renewal of track.
	2.2	Consistent stopping patterns (limited stopping at commuter stations within the Greater Dublin Area)
	2.3	Double-tracking from Portarlington to Athlone, and increasing frequency to hourly service
	2.4	Reinstatement of double track from Athlone to Mullingar, with double tracking from Mullingar to Maynooth to cater for hourly services between Galway and Connolly station (alternative to Heuston)
	2.5	Electrification of corridor
	2.6	Run services via DART Underground to Dublin City station (St Stephens Green), and terminus in Dublin Airport via spur from Clongriffin. Note that this is not compatible with option 2.4.
Comments	A high level of short, medium and long term investment is therefore being considered on this route, with the objective of restoring the journey time to a level that is competitive with other modes. The electrification is proposed as a measure to reduce operating and maintenance costs, in addition to reducing the delay associated with multiple stopping requirements. The proposals to utilise DART Underground for both Galway and Cork services would lead to InterCity Services every 30 minutes via DART Underground serving Dublin Airport.	

Route 3:	Dublin – Belfast	
Typical Journey Time:	2:15	
Rolling Stock Quality:	Excellent, but ageing	
Frequency:	Moderate	
Demand:	Low	
Summary	Investment on the Dublin-Belfast route in the mid 1990's saw a significant increase in passenger demand on that corridor. Nevertheless, passenger volumes have declined considerably in recent years, and the route now carries only a small proportion of the potential demand. Although the service offers a good journey time, it is generally restricted by the requirement to fit into commuter timetables in the Greater Dublin and Belfast areas, which can lead to delays. Significant improvement to this corridor will be challenging without major investment to trackwork north of the border.	
Proposals	3.1	Reduce Journey Times to 2:00 on all services through targeted investment.
	3.2	Increase train frequency to hourly clockface timetables
	3.3	Relocation of Belfast Terminus to Victoria Street
	3.4	Electrification of corridor
Comments	Investment options presented here are most likely to form elements of an overall strategy for this corridor which would be delivered as a joint project between Iarnród Éireann and Northern Ireland Railways. The Dublin to Dundalk section of the route operates at quite high speeds with quite limited stopping, and the greatest scope for journey time reductions is likely to exist north of the border. Electrification is proposed in anticipation of the eventual progression to an hourly service in order to reduce operating costs. It should be noted that the Vision 2030 envisages that additional tracks will be added in the Connolly-Balbriggan section.	

Route 4:	Dublin – Limerick	
Typical Journey Time:	2:05 (connecting) or 2:20 (Direct)	
Rolling Stock Quality:	High	
Frequency:	High	
Demand:	Moderate	
Summary	Limerick is provided with the highest number of connections from Dublin compared with any other regional destination. Connections are provided at Limerick Junction to all Dublin – Cork services, with further direct, albeit stopping, services provided from Dublin Heuston. The journey time via Limerick Junction is also good. As a result, demand is relatively strong, and the route performs relatively close to its full potential. Nevertheless, the interchange requirement remains a barrier to travel on this route. The interchange also poses additional delay to Dublin – Cork Services.	
Proposals	4.1	Introduce bi-hourly direct services from Dublin. Facilitate connections from Dublin – Cork Trains only every 2 hours. Journey time at most 2 hours
	4.2	Upgrade Limerick Junction station as a strategic interchange to facilitate improved transfer to/from Limerick services.
	4.3	Electrification of corridor
Comments	The focus of the investment is therefore on a reduction in the reliance on interchange for access to Limerick, and the creation of at most 2 hour journey time. This allows removal of the requirement for Dublin-Cork services to stop at Limerick Junction for every second train. Connections from Cork to Limerick would be reduced to bi-hourly. The electrification of the corridor is a long term proposal which is justified by the electrification of the Dublin – Cork corridor.	

Route 5:	Dublin – Waterford	
Typical Journey Time:	2:30	
Rolling Stock Quality:	High	
Frequency:	Moderate	
Demand:	Low	
Summary	Although subject to recent increases in service frequency, the Dublin to Waterford corridor continues to suffer from a number of barriers including the relatively high journey time in comparison to road, the isolation of the mainline rail station in Waterford from the City Centre, and the limited population catchment along the corridor. Journey times are hampered by the arrangement in Kilkenny, and by permanent speed restrictions through difficult terrain, and this all contributes to the route falling significantly short of its full potential demand.	
Proposals	5.1	Reduce Journey Times to at most 2:00 on all services through targeted investment.
	5.2	Improve pedestrian/cycle connections into Waterford City Centre from a relocated Railway Statio
Comments	It is acknowledged that the reduction in the journey time to at most 2:00 will be challenging, and ultimately such a target may not be achievable at moderate cost. Nevertheless, the improvement in the accessibility to the City Centre may generate substantial benefits in itself, equivalent to major investment in journey time reduction. No improvement in frequency is suggested at this stage.	

Route 6:	Dublin – Westport/Ballina	
Typical Journey Time:	3:30	
Rolling Stock Quality:	High	
Frequency:	Low	
Demand:	Moderate	
Summary	The Westport and Ballina service is one of the longer routes from Dublin, and carries relatively strong when compared to the catchment population – mainly as a result of the tourism potential on the line. Even so, the high proportion of concessionary travelers on this route has been noted, which make up a significant proportion of leisure travelers. The demand at Castlebar is particularly strong, and confirms the important role of rail in service the Castlebar-Ballina linked hub. The journey time is reasonable in comparison to road journey times, and would become more competitive with any improvements to line speed between Dublin and Athlone as discussed earlier. The main deficiency on this route is the low frequency which restricts availability of services, and the requirement to interchange for Ballina services.	
Proposals	6.1	Increase frequency to 5 trains/day.
	6.2	Introduce train splitting at Manulla Junction for connections to Ballina
	6.3	Increase frequency to 8 trains/day.
	6.4	Upgrade Athlone station as a strategic interchange to facilitate transfer to/from Westport/Galway services.
Comments	Increasing the Westport/Ballina service to 8 trains/day will allow some stations to be omitted from the Dublin-Galway route to achieve the reduced time on that corridor (most likely Clara and Portarlingon and potentially Tullamore). As a result, it is likely that the journey time can be retained at 3:30, although the introduction of train splitting at Manulla Junction is likely to lead to substantial improvements in demand to/from Ballina.	

Route 7:	Dublin – Sligo	
Typical Journey Time:	3:05	
Rolling Stock Quality:	High	
Frequency:	Moderate	
Demand:	Moderate	
Summary	Patronage on the Sligo route responded well to improvements to frequency and rolling stock quality in recent years. Nevertheless, the route is heavily biased by patronage from the commuter areas within the Greater Dublin Area, and demand to/from areas northwest of Longford is somewhat weaker. The route enjoys a moderate train frequency (8 trains/day) for a limited population, using high quality rolling stock and at a journey time that is comparable to that by road. The route also terminates in Connolly Station which boasts good access to the City Centre.	
Proposals	7.1	Double track from Maynooth to Mullingar (as part of proposal 2.4 on the Dublin – Galway Route.
Comments	No increase in frequency is proposed, and hence increases in capacity would only become necessary as a result of growth for other routes (e.g. Galway services via Mullingar).	

Route 8:	Dublin – Wexford/Rosslare EP	
Typical Journey Time:	2:30 (Dublin to Wexford)	
Rolling Stock Quality:	High	
Frequency:	Low	
Demand:	Low	
Summary	The Wexford service is relatively isolated from the core InterCity railway network. The high commuting demand arising from coastal towns in Wicklow and North Wexford dominates the route, often at the expense of intercity demand. Rolling stock is variable and the InterCity experience can be extremely low, particularly for peak time departures from Dublin. The journey time to Wexford City is not unreasonable, but demand is restrained by limited service frequency and the variable rolling stock quality. Overcrowding is also prevalent on peak services to and from the Capital.	
Proposals	8.1	Upgrade all services to inter-city branding with seat reservations, advance purchases and catering.
	8.2	Increase frequency to 8 trains/day.
Comments	Whilst journey time improvements are difficult on this corridor, it is noted that the existing journey time from Wexford to Dublin is not unreasonable, and access to the city is good from Pearse Station and Connolly Station. Fitting services into DART schedules is a challenge. The focus on investment is therefore to achieve a reasonable service frequency on consistently high quality rolling stock which will stimulate demand from quite a strong population catchment along this corridor.	

Route 9:	Dublin – Tralee	
Typical Journey Time:	4:00	
Rolling Stock Quality:	High	
Frequency:	Moderate	
Demand:	Moderate	
Summary	Excluding the Dublin to Cork route, the Tralee routes generate quite strong levels of demand in comparison to the population catchment. As with the Westport/Ballina route, this is due to the high volume of tourism, although a significant level of that demand comprises concession travelers which comprise in the region of 30% on parts of the Mallow – Tralee corridor. The long travel times by road from Dublin to Killarney and Tralee supports the use of the railway, and patronage is resilient despite the need for an interchange at Mallow for the majority of services.	
Proposals	9.1	Upgrade Mallow station as a strategic interchange to facilitate transfer to/from Tralee services.
Comments	Given the current frequency, rolling stock quality and topography between Mallow and Tralee, there is limited scope for further enhancement of this service. Improvement to the interchange conditions at Mallow will benefit a significant number of passengers on this route.	

Route 10:	Waterford – Limerick Junction	
Typical Journey Time:	1:40	
Rolling Stock Quality:	Low	
Frequency:	Low	
Demand:	Low	
Summary	The Waterford to Limerick Junction remains a relatively low quality route, with a limited number of services each day which do not respond to typical commuting peaks, and operate with low quality rolling stock. Reservations are not possible, and the route is generally excluded from ticket promotions. These factors all act to reduce demand on the corridor. Gravity modelling suggests a potential demand from Clonmel, Carrick on Suir and Tipperary Town into Waterford.	
Proposals	10.1	Upgrade to 5 services/day to connect with InterCity trains at Limerick Junction/Waterford.
	10.2	Continue route as InterCity route to Limerick City, also operating as Limerick junction to Limerick shuttle.
Comments	Although there is limited potential demand between Waterford and Limerick, the provision of the connection into Limerick is achievable at limited cost given that it will simply replace a number of the Limerick shuttles from Limerick junction – whilst providing new connectivity from Clonmel and Tipperary to Limerick City. The increase to 5 services per day is seen as a minimum frequency to retain this route on the InterCity network – the current service is not seen as viable as a long-term solution for this route. However, a decision to operate such a level of service in the long term must take account of the need for up to €20m in improvements to level crossings and signalling.	

Route 11:	Galway – Limerick	
Typical Journey Time:	2:00	
Rolling Stock Quality:	Low	
Frequency:	Moderate	
Demand:	Low	
Summary	The Western Rail corridor opened to business during 2010, and provides direct InterCity connections between Galway and Limerick. Nevertheless, whilst commuting demand from its catchment into Galway and Limerick is strong, the level of intercity travel is very low, and central sections of the line remain lightly trafficked. Nevertheless, it does not offer consistency within the InterCity network, having no capability for seat reservations, promotional tickets and catering.	
Proposals	11.1	Upgrade all services to inter-city branding with seat reservations, advance purchases and catering.
	11.2	Increase frequency to 8 trains/day.
Comments	The key proposal for this route is therefore to introduce consistency with other InterCity services. The increase in service frequency is proposed as a measure to stimulate more intercity demand.	

Route 12:	Cork – Limerick - Galway	
Typical Journey Time:	4:00	
Rolling Stock Quality:	Variable, Generally Low	
Frequency:	Low	
Demand:	Low	
Summary	Travel on the route from Cork to Limerick requires interchange at Limerick junction with potentially long dwell times in the station, with another change in Limerick required for onward travel to Galway.	
Proposals	12.1	Introduce 5 direct services per day from Cork – Limerick – Galway as an extension of the Western Rail Corridor.
	12.2	Reinstate rail link from Charleville to Limerick for direct services, avoiding Limerick Junction.
Comments	Such a route would facilitate connection of all the regional cities along the southwest and west coast along a single axis, effectively providing direct through services along a corridor which currently requires two connections.	

Route 13:	Ballybrophy Spur	
Typical Journey Time:	2:00 Ballybrophy - Limerick	
Rolling Stock Quality:	Generally Low	
Frequency:	Low	
Demand:	Low	
Summary	A branch route with quite limited daily services, and which serves a very small population catchment. The route is currently structured to carry commuting demand between Nenagh and Limerick, along a route which competes very poorly with the parallel and recently upgraded N7. There is limited potential for strategic connectivity on this corridor, as all traffic from Dublin to Limerick now routes via the higher quality limerick Junction route. Analysis of demand data shows a very limited demand for movement to and from Limerick City on this route, with the main demand comprising trips connecting to the InterCity network at Ballybrophy and travelling on to Roscrea and Nenagh. Investments here will examine the potential for upgrading this route to a minimum acceptable standard for retention of services, in addition to curtailment of services at Nenagh.	
Proposals	13.1	Introduce 5 direct services per day from Ballybrophy to Limerick.
	13.2	Operate 5 services/day from Ballybrophy to Nenagh only.
	13.3	Serve Roscrea and Nenagh by train-splitting at Ballybrophy from Dublin-Limerick services.
Comments	The investments therefore seek to generate demand along the Nenagh to Limerick corridor through an increase in the level of service offered.	

New Market Opportunities

A number of further investment opportunities have been developed which seek to broaden the offer of the railway network into those areas where services are currently limited, or not provided. A number of proposals are outlined below:

Measure 14.1: Dublin Parkway InterCity Station

Heuston Station serves a significant catchment in the Dublin Metropolitan Area, and for those areas on the fringe of this catchment, access to the city centre for InterCity services can represent a significant impedance to travel by rail. This can be overcome through the development of a 'Parkway' station at the edge of the built-up area which offers improved strategic accessibility to the rail network for such users.

The rail network in Dublin benefits from the relatively strong corridor leading from Heuston, which serves routes to the west and south, and with in excess of 35 InterCity trains per day using the corridor.

It is proposed that a new station facility be developed at Fonthill Road which will offer improved accessibility to the InterCity railway network during peak periods during the day. The station would serve InterCity services throughout the day, in addition to providing an opportunity to interchange between commuter and InterCity services. The station would require a Park & Ride facility of up to 1,000 spaces with good access from the M50 and the main radial routes, supported by strong guidance and marketing to maximise utilisation of the facility.

Figure 9.1: Dublin Parkway Station

The measure would significant improve access to InterCity services for a large population located in the western parts of the city, including Lucan, Clondalkin, Blanchardstown and Tallaght. In the longer term, improved access will be available via Metro West, which will provide onward connectivity to Dublin Airport.

Measure 14.2: Dublin Airport Shuttle Service

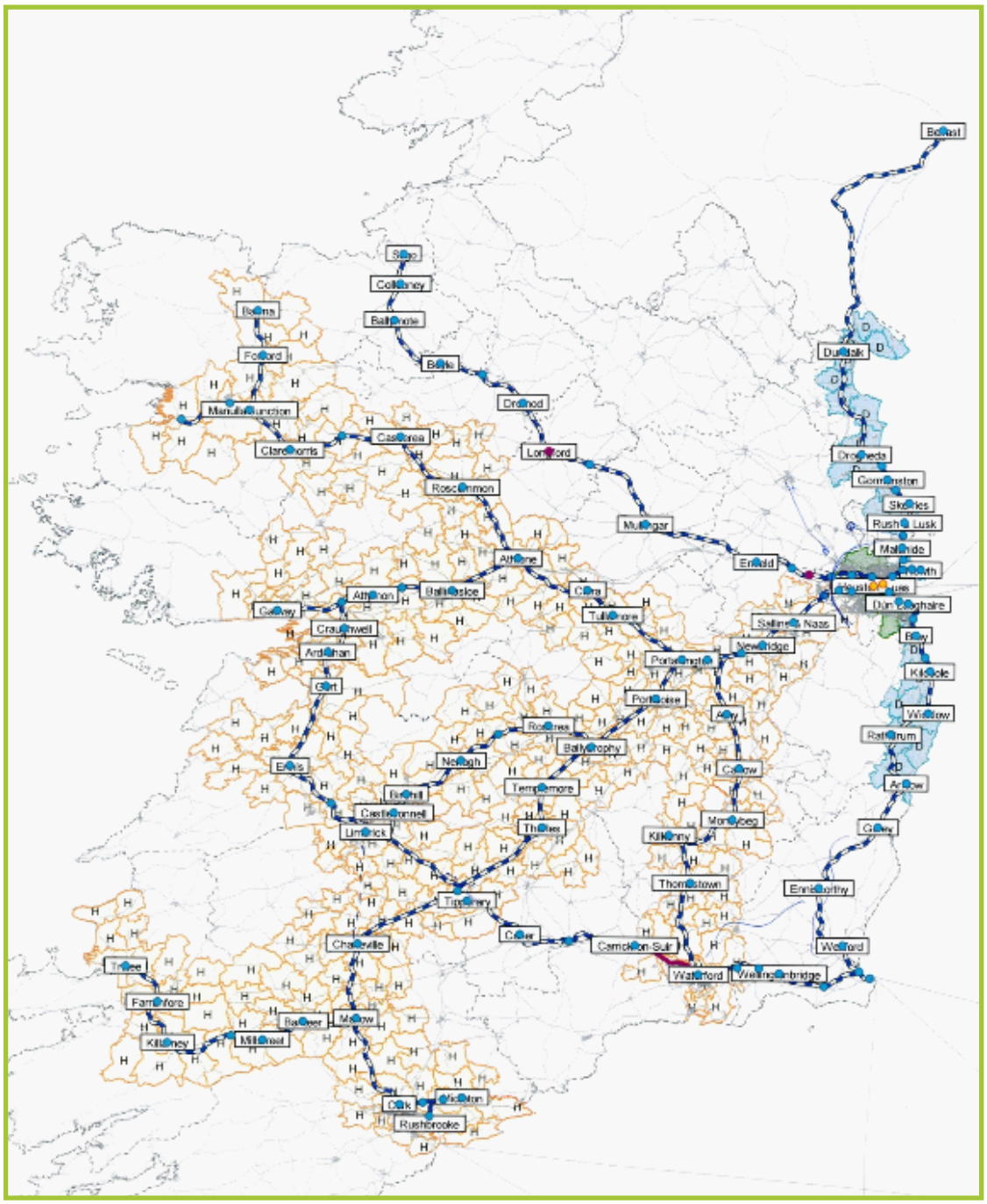
As an extension to the above proposal, it is also possible to develop a scheduled connection from InterCity services to Dublin Airport via the Dublin Parkway station at Fonthill Road. Off peak journey time would be approximately 20 minutes, and would offer significant savings to those travelling onward to the airport. The service could:

- Be available via through-ticketing from rail stations located throughout the country;
- Be timed to meet InterCity services from Cork, Galway and Limerick, all of which will be supported by hourly services from Dublin;
- Be supported by a dedicated bus terminus at Dublin Airport and supporting ticket/ information desk; and
- Be operated by a fleet of high quality vehicles offering similar levels of comport and service to the InterCity rolling stock.

Note that the suspension of Metro West supports the need for an orbital service providing strategic connectivity into Dublin Airport.

Figure 9.2 below shows the potential catchment for the Dublin airport service at Dublin parkway, with catchment zones (shown in yellow and labeled 'H') defined as those zones which currently generate commuting demand by rail as reported in POWCAR.

Figure 9.2: Catchment for Airport Bus Connection



Analysis suggests that such a service could attract significant demand from relevant InterCity services, such that a service frequency of 2 buses per hour could be supported to time with InterCity trains throughout the day. The service would replace the existing Airlink services currently operated from Heuston Station to Dublin Airport.

Measure 14.3: Railway Connection to Dublin Airport

The value of a heavy rail connection to Dublin Airport has been discussed under the individual measures suggested for investment in existing corridors. In that context, the airport connection has been presented as an alternative InterCity terminus which would achieve the following:

- It would allow through-running of InterCity trains from Cork, Galway and Limerick to Dublin Airport, with additional stops at St Stephens Green and/or Pearse station;
- It would replace the bus connection from Dublin Parkway station described above; and
- It would provide a direct strategic connection to Dublin Airport for InterCity trains from regional cities, reducing the reliance on regional air services and further supporting the case for investment in line speed on key corridors.

It is recognised that the through-running of InterCity trains will require electrification of InterCity routes into Heuston and the completion of Dart Underground. In the medium term, however, the existing Wexford/Rosslare Europort and southern commuter services could be scheduled to terminate in Dublin Airport, thereby reducing pressure on platform capacity in Connolly Station.

The DART Spur from Clongriffin to the Airport is a viable solution both in advance of, and following the delivery of Dart Underground. Prior to Dart Underground, the airport station would be served by DART services which will avail of the new capacity on the northern line resulting from Dart Underground signaling, which is being progressed in advance of the main tunneling. This resignalled northern line will ultimately be able to accommodate up to 16 DART services and four outer commuter / InterCity services. An analysis of passenger demand suggests that DART would provide access to the airport for those areas who would have limited accessibility to Metro North (i.e. areas along the existing DART corridor between Howth/Malahide and Greystones).

If DART Underground were to be delivered, the pattern of demand would alter substantially. Demand from the southeastern coastal DART corridor would access the airport via an interchange to Metro North at Drumcondra, whilst passengers from the western commuter corridor would interchange at St Stephens Green, or alternatively would remain on DART where that service continued to the airport. In such a situation, DART would cater primarily for those catchments located along the northeastern corridor (Clontarf Road to Clongriffin) for whom airport access is currently poor. Instead, the airport would become a major InterCity hub for services to the south, west and southwest, offering through-running from the regional cities to Ireland's largest airport.

The through-running of InterCity trains to Dublin Airport will obviously place increased pressure on line capacity between Connolly and Clongriffin, and which would be increased with any initiative to increase frequencies on the Belfast route. It should be noted that the Greater Dublin Area Draft Transport Strategy 2011-2030 published by

the National Transport Authority envisages that additional tracks will be added in the Connolly-Balbriggan section. In the shorter term, the city centre Resignalling project will greatly improve train capacity through the city.

9.4 Scheme Costs

Scheme costs have been derived based on unit rates established from recent delivery of railway infrastructure. Construction and land costs are constantly changing, and the rates used cannot be relied upon to provide a robust indication of project cost for each measure. They do, however, provide a useful benchmark for appraisal such that individual measures can be deemed worthy of inclusion or otherwise in the final strategy.

All costs involving land purchase are based on construction through agricultural land. In addition, the costs associated with linespeed enhancements are on the basis that improvements can be undertaken within the existing land take (signaling and track enhancement) and no new alignments are necessary. This will obviously require further investigation. Relevant unit rates are outlined in Table 9.2.

Table 9.2: Scheme Costs – Unit Rates

Item	Unit	Rate
Construction of single track railway, 120kph	km	€3.5m
Construction of double track railway, 120kph	km	€5.5m
Upgrade single track (120kph or less) to single 160kph	km	€1.5m
Upgrade double track (120kph or less) to double 160kph	km	€2.5m
Upgrade single track (120kph or less) to double 160kph	km	€3.5m
Electrification of single track	km	€0.4m
Electrification of double track	km	€0.5m
Station enhancement	no.	€5m
Rolling Stock set (6 cars)	no.	€20m
Train Operating Cost (DMU)	train km	€6
Train Operating Cost (EMU)	train km	€5

9.5 Demand Modelling

The Passenger Demand Forecasting Handbook (PDFH) sets out elasticities to be used in order to estimate the impact of journey time savings on InterCity rail routes. Whilst such an approach will provide some basis for forecasting patronage responses, it is constrained by the following shortcomings:

- It is not appropriate to use these elasticities where journey times are currently uncompetitive with other modes, as elasticities will be higher in those cases; and
- It does not account for the overall length of a trip, which can influence the elasticity. This results from rail journey time being a higher overall proportion of generalised cost for longer trips (as opposed to access time and egress time).

A logit mode share model has therefore been developed which seeks to replicate these effects. The model draws on experience from other studies on the various parameter values to be used, and adopts a number of simplifications to enable robust and transparent assessment of major interventions. Logit Models are based on a calculation of Utility. Utility is a measure of generalised cost (expressed as a negative utility) of a trip, and includes:

- Access and egress time, with appropriate weighting;
- Journey time, again with appropriate weighting;
- Fares, tolls and other costs expressed in a common base year; and
- Reliability allowances (users allow greater travel time).

The following principles have been used to construct the mode choice models:

- An In-Vehicle Time factor has been applied to account for the relative disutility of different modes. IVT factors of 1.0 have been applied to bus and car, with a reduced value of 0.8 applied to rail. This factor suggests that users perceive rail journey time as 0.8 times that of car or bus journey time, as a result of the more pleasant and productive environment provided;
- Access and egress time has been factored by 1.5 to represent the hassle of travelling to an from bus/rail stations. This is applied to bus and rail modes only;
- Costs per km have been defined for public transport (fares) and cars (fuel) as 12c/km for rail, 7c/km for bus and 10c/km for cars. These values are established based on the analysis of a random selection of public transport fares/ distances, and a fuel cost of €1.30/litre for cars;
- A fares discount factor of 15 per cent has been applied to rail fares to account for the number of passengers travelling on discount or concession tickets. This has been established form aggregate information on fares and passenger kilometres;
- Travel by car attracts a further reliability factor of 20 per cent. In other words, drivers will add 20 per cent to their travel time to account for travel time variability;
- Car Availability is assumed for 90 per cent of the population. Those without car availability will choose between bus and rail only;

- An average car occupancy of 1.5 is assumed based on national parameters. This occupancy defines the perceived cost of travel by car, which is deemed to be shared between all occupants;
- The logit modelling assumes an impedance value of 5. This is consistent with practice in mode choice modelling, and has been validated through previous studies for Iarnród Éireann;
- Service penalties have been referenced from the PDFH. They equate to 47 mins for a bi-hourly service, or 31 mins for an hourly service. An hourly clockface service is set at 26 mins;
- A CPI factor of 0.85 is used to deflate fares and tolls from 2010 to 2002 values;
- A global value of time per person of €10 is assumed in 2002 values; and
- For intercity trips, an access and egress time of 15 minutes at each end is assumed to form part of the generalised cost calculation.

Although the main function of the logit model is to assess incremental changes to demand as a result of service changes, it has been used to assess likely demand by mode for the Galway, Cork and Tralee services. Results are outlined below in Table 9.3.

Table 9.3 Mode Choice for Key Corridors

Mode	Galway	Cork	Tralee
Rail	0.18	0.42	0.40
Bus	0.23	0.12	0.18
Car	0.59	0.46	0.42
Total	1.00	1.00	1.00

The results confirm the findings of the baseline, namely that Galway patronage is significantly eroded by other modes, whilst demand remains relatively strong on the Cork and Tralee corridors.

The demand modelling of the various investment options will use logit modelling in the case of journey time, reliability and service frequency enhancements. The assessment will use the Passenger Demand Forecasting Handbook to identify those parameters which feed into the demand modelling, mainly through the conversion of subjective passenger preferences into generalized time equivalents for use in the logit models.

All modelling is supported at a higher level by the National Rail model, which provides a matrix of movements through a particular location where an improvement (journey time saving, interchange improvements, more frequent services) is proposed. All demand forecasting effects are then applied to these localised demand totals. Where interventions are full-route, the benefits are disaggregated into smaller units which apply at different points along the route – and then demand response calculated individually at each such location.

9.6 Results of Assessment

An assessment has been made of the order of cost of each investment option and the demand effects that it is expected to generate. This assessment follows the structure of the presentation of measures earlier in this section of the report, and outlines a summary of the findings of the assessment. Each measure is then defined as:

- Retained, where the results suggest that it should be carried forward to more detailed appraisal;
- Conditional, where a variation on the proposal is taken forward for more detailed consideration; or
- Rejected, where the measure does not generate any significant response.

All demand forecasts are expressed in average passengers per weekday. More importantly, however, demand forecasts represent those attracted from other modes, and do not include for induced demand that will result from the increased accessibility.

Measure	Cost	Patronage	Comment	Status
Route 1: Dublin - Cork				
1.1	€50m	+900 passengers/ day	Cost is order of magnitude estimate for localised works	Retained
1.2	None	No impact	Assumes that commuter services and new direct Limerick services will capture demand at lost stations	Retained
1.3	€240m capital cost €3m operating cost saving per annum	+250 passengers/ day due to further journey time reduction	No cost assumed for rolling stock, which will be assumed to be life expired. Ignores cost savings to commuter services.	Retained
1.4	€1m operating cost increase per annum	+450 passengers/ day due to increase in city centre access. +250 airport passengers/day	Based on 30% public transport mode share for airport trips. Excludes cost for rail connection to airport	Retained
Route 2: Dublin - Galway				
2.1	€90m	+800 passengers/ day	Cost is order of magnitude estimate for localised works	Retained

Measure	Cost	Patronage	Comment	Status
2.2	None	No impact	Assumes that commuter services and new Westport services will capture demand at lost stations	Retained
2.3	€210m capital cost €80m rolling stock cost €6m operating cost per annum	+900 passengers/ day	Will still require 1 passing loop at Woodlawn for operation of hourly service	Retained
2.4	€350m capital cost €80m rolling stock cost €6m operating cost per annum	+900 passengers/ day	Significantly more expensive than option 2.3, and will lead to reliability problems east of Maynooth	Rejected
2.5	€112m capital cost €2m operating cost saving per annum	+900 passengers/ day due to further journey time reduction	No cost assumed for rolling stock, which will be assumed to be life expired. Assumes Portarlington – Heuston already electrified.	Retained
2.6	€1m operating cost increase per annum	+600 passengers/ day due to increase in city centre access +250 airport passengers/day	Based on 30% public transport mode share for airport trips. Excludes cost for rail connection to airport	Retained
Route 3: Dublin - Belfast				
3.1	€45m	+200 passengers/ day	Cost is order of magnitude estimate for localised works. Growth is occurring from very low base	Retained
3.2	€80m rolling stock cost €6m operating cost per annum	+500 passengers/ day	Assumes use of DMU Railcars	Retained

Measure	Cost	Patronage	Comment	Status
3.3	unknown	+150 passengers/ day	Will arise as a result of greater access to City Centre. Accounts for cross-border intercity trips only.	Retained
3.4	€100m capital cost €2m operating cost saving per annum	+400 passengers/ day due to further journey time reduction	No cost assumed for rolling stock, which will be assumed to be life expired. Ignores cost savings to commuter services.	Retained
Route 4: Dublin - Limerick				
4.1	€20m Cost for trackwork improvements €80m rolling stock cost €4.5m per annum operating cost	+350 passengers/ day	Cost is order of magnitude estimate for localised works. Note that some costs and some of the increase in demand would arise as a result of proposals for Cork route.	Retained
4.2	€20m allowance suggested to improve platforms and reduce time delay to trains	+100 passengers/ day	Likely to include new platform on southbound track at Limerick junction	Retained
4.3	€25m capital cost €0.5m operating cost reduction per annum	Accounted for on Cork services	No cost assumed for rolling stock, which will be assumed to be life expired.	Retained
Route 5: Dublin - Waterford				
5.1	€75m Cost for trackwork improvements	+300 passengers/ day	Cost is order of magnitude estimate for localised works.	Retained
5.2	€2m allowance suggested to improve pedestrian route, crossings and information	+50 passengers/day	Assumes 5 minute reduction in perceived disutility as a result of improved access	Retained

Measure	Cost	Patronage	Comment	Status
Route 6: Dublin – Westport/Ballina				
6.1	€20m rolling stock cost €1.2m per annum operating cost	+100 passengers/ day	May be achieved at reduced cost through train splitting in Athlone	Retained
6.2	€80m rolling stock cost €2.4m per annum operating cost	+100 passengers/ day	Will require 6 car sets to be run from Dublin Heuston, although see measure 6.4 which will allow shuttle services from Athlone	Conditional
6.3	€40m rolling stock cost €2.4m per annum operating cost	+100 passengers/ day	This is in addition to the increase resulting from measure 6.1	Retained
6.4	Suggest allowance of €5m	Will vary depending on service option defined	Will vary depending on service option defined	Retained
Route 7: Dublin – Sligo				
7.1	€175m	+100 passengers/ day	Could lead to increase in commuter services, but expenditure likely unjustified on the basis of intercity demand	Rejected
Route 8: Dublin – Wexford/Rosslare EP				
8.1	€20m rolling stock cost	+150 passengers/ day	No change in operating costs as existing services are replaced	Retained
8.2	€20m rolling stock cost €2m per annum operating cost	+150 passengers/ day	3 car DMU sets assumed – demand increase applied to trips south of Arklow only	Retained
Route 9: Dublin – Tralee and Cork-Tralee				
9.1	Suggest allowance of €10m	+150 passengers/ day	Connection onto Tralee services available every 2-hours from Dublin – Cork Services	Retained

Measure	Cost	Patronage	Comment	Status
Route 10: Waterford – Limerick Junction				
10.1	€20m rolling stock cost €3m per annum operating cost	+100 passengers/ day	Demand starting from extremely low base, and not fully determinable without additional study. Gravity modelling suggests strong potential demand on this corridor, particularly between Waterford and Clonmel/Carrick on Suir. Stronger demand response expected if combined with timetable changes	Retained
10.2	No additional cost – operational proposal only	+100 passengers/ day	Increase results from additional demand between Waterford and Limerick – assumes that InterCity style service is available with promotional fares and seat reservations.	Retained
Route 11: Galway - Limerick				
11.1	€40m rolling stock cost	+50 passengers/day	Demand increase assumes limited impact on Ennis to Limerick trains which are relatively short journey times.	Retained
11.2	€40m rolling stock cost €1.2m per annum operating cost	+50 passengers/day	Assumes use of higher quality rolling stock on this route.	Rejected
Route 12: Cork – Limerick - Galway				
12.1	€60m rolling stock cost €3m per annum operating cost	+50 passengers/day	Very low base demand between city centres observed by road or rail.	Rejected
12.2	€140m capital cost	+100 passengers/ day	Very low base demand between city centres observed by road or rail.	Rejected

Measure	Cost	Patronage	Comment	Status
Route 13: Ballybrophy Spur				
13.1	€5m rolling stock cost €0.6m per annum operating cost	+80 passengers/day	Assumes all services connect to InterCity services at Ballybrophy	Retained
13.2	No net cost – reallocation of trains only, although some cost reductions due to lower use of line from Nenagh – Limerick.	+50 passengers/day	All trains will continue to connect at Ballybrophy, with 5 trains/day. Will warrant some improvements in interchange conditions at Ballybrophy.	Retained
13.3	€40m rolling stock cost €1.6m per annum operating cost	+80 passengers/day	High cost increase due to requirement to run trains through from Dublin	Rejected
14.:Other Proposals				
14.1	€20m capital cost Estimate €1m revenue per annum from car parking at €5 per day assuming 800 spaces	Further study required	May be opportunity to develop as PPP to reduce investment required	Retained
14.2	€5m capital cost €750k operating cost per annum for 3 buses Estimate €1m revenue per annum	Further study required	May be opportunity to develop as PPP to reduce investment required	Retained
14.3	€300m	Further study required	Intended to function mainly as an InterCity terminus	Retained

9.7 Overview

The Preliminary Screening has therefore led to the rejection of a small number of measures. In general, the assessment has indicated that even significant investment on lightly used routes is not likely to lead to substantial increases in demand. On the other hand, there are clear deficiencies on the core network which can be addressed through quite moderate spending.

The analysis has demonstrated repeatedly that there is very limited demand for movement between the regional cities. Travel by rail between Cork, Limerick and Galway is extremely low, as is demand between Waterford and Limerick. Analysis of the National Traffic Model[36] confirms that such is generally the case for road travel, where the volume of City Centre to City Centre movements are relatively low, other than for:

- Trips between the Regional Cities and Dublin City; and
- Trips between Regional Cities and large towns within their catchment.

This dictates against substantial investment in providing connections between the regional cities, other than in those areas where the catchments of connected cities partially overlap, and InterCity connections allow both catchments to be connected with their relative city centres on a single service. Whilst this is the case with Galway-Limerick and to a lesser extent Limerick – Waterford, it is certainly not the case with Cork – Limerick.

The establishment of an intercity journey time of 2:00 or better on the Galway, Limerick, Waterford and Belfast routes will establish rail as a strong option for such connections, and will bring a high level of consistency and legibility to the network – although demand forecasts have been calculated based on transfer from other modes, the induced demand that will result will lead to a likely increase on these forecasts, particularly on those routes which continue to under perform (Galway and Belfast).

One significant finding is the role of the Ballybrophy branch line, which appears to provide very limited passenger demand into Limerick City. Instead, this line acts as a feeder service from Nenagh and Roscrea onto InterCity services at Ballybrophy, and the analysis suggests that this may become a viable future role for that railway.

In the longer term, electrification would appear to bring with it a number of benefits. In addition to the reduction in operating cost, which is a central theme to electrification, the ability to route services via DART Underground will represent a significant improvement in the level of accessibility provided by the InterCity rail network, resulting in city centre to city centre journey times that will be far superior to those attainable by road. With such a proposal, the rail connection to Dublin Airport presents a unique opportunity to develop as an InterCity rail terminus, with InterCity trains to Cork or Galway every 30 minutes.

The measures retained through the analysis presented here will be subject to more detailed appraisal which will consider the full range of costs and benefits, leading to the final recommendation for inclusion or otherwise on the final strategy.

[36] National Traffic Model, National Roads Authority, 2006

10 Appraisal of Options

10.1 Introduction

This Section of the Report sets out the result of appraisals of the investment options available to Iarnród Éireann. Section 9 of this report described a range of potential investments that have been identified for further consideration, and outlined the results of demand modelling carried out on these investments. These demand modelling results were used to carry out a preliminary appraisal of the potential investments. A number of the potential investments were rejected on the basis of this preliminary appraisal. The remaining potential investments have been the subject of individual appraisals that identified and valued the costs and benefits of each candidate investment.

The remainder of this Section:

- Describes the cost/benefit framework and parameters used to carry out these appraisals;
- Describes the benefits and costs included in the appraisals and the approach taken to valuing these benefits and costs;
- Provides details of the method devised to identify and place a value on the "Wider Economic Benefits" of potential rail investments for this Review;
- Summarises the results of the appraisals; and
- Concludes on a recommended set of investments for Iarnród Éireann and a proposed timeframe for making in these recommended investments.

10.2 Cost Benefit Framework

The potential investments identified were appraised using a cost benefit approach. These cost benefit calculations followed the guidelines for this type of appraisal issued by the Department of Finance[37] and the Department of Transport[38]. In each case the relevant, incremental, costs and benefits of the investment over a thirty year planning period were identified and quantified. Money values were placed on non-monetary costs and benefits using standard parameters. The present value of these monetary values was calculated using a standard discount rate. These present values were used to calculate the net present value and the benefit cost ratio of each investment. Where possible an Internal Rate of Return for each investment was calculated.

The key parameters and assumptions used were as follows:

- Investments were appraised over a thirty year planning horizon. Where an investment would have a useful value greater than thirty years, a residual value for the asset in question at the end of year thirty was calculated by deprecating its cost over its useful life. This residual value was then included in the cost benefit calculation as a reduction in the cost of the investment;
- The money values of costs and benefits arising in the future were discounted to a present value using a discount rate of 4 per cent;
- Time savings for travellers were valued based on a set of values of time in 2009 prepared by Goodbody Economic Consultants. A weighted average value of working, commuting and

[37] Department of Finance, "Guidelines for the appraisal and management of capital expenditure proposals in the public sector" February 2005. Available at www.finance.gov.ie
[38] Department of Transport, "Guidelines on a common appraisal framework for transport projects and programmes" June 2009. Available at www.transport.ie

leisure time of €13.90 was used as an opening value for travel time. This baseline value was increased over the thirty year appraisal period to reflect expected long term increases in productivity and real incomes. It was assumed that productivity and incomes, and hence the monetary value of time to individuals would grow by 2.5 per cent per annum between 2012 and 2020 and by 2 per cent per annum thereafter;

- The benefit of reductions in emissions was calculated using baseline values for average physical emissions by cars and buses and the environmental cost of these emissions calculated by Goodbody Economic Consultants using 2009 data. The value of emissions avoided in future years was adjusted to reflect:
    - Expected changes in physical emissions by cars and buses; and
    - Expected changes in the money value of the damage done by these emissions.
- A baseline value for the benefit of avoiding road accidents was calculated using:
    - 2009 values for the cost of individual road accidents calculated by Goodbody; and,
    - Accident rates per vehicle kilometre from the Road Safety Authority.
- The value of avoiding accidents in future years was adjusted to reflect expected changes in the economic cost of accidents as a result of changing incomes; and
- Passenger numbers were assumed to grow over time in line with the passenger growth rates calculated as part of this study[39].

10.3 Approach to Valuing Costs & Benefits

The cost benefit calculations prepared for the potential investments included monetary values for each of the following costs and benefits:

- Capital Costs;
- Operating Costs;
- Time savings and other improvements in service for existing passengers on the rail service in question;
- Time savings and other improvements in service for additional passengers on the rail service in question;
- The reduction in congestion on roads as a result of diverting travellers from road to rail;
- Additional fare revenue for Iarnród Éireann;
- The reduction on emissions from cars and buses as a result of diverting travellers to rail; and
- The reduction in road accidents as a result of diverting travellers to rail.

The approach taken to forecasting and valuing these costs and benefits is described in more detail in the sub-sections that follow.

[39] See Section 7 and "Technical Paper 10: Developing Growth Factors for Mainline Rail" September 2010.

In addition, Goodbody Economic Consultants carried out an exercise to identify and measure the wider economic benefits that might arise from investments in the Iarnród Éireann network. In particular, a methodology was developed to estimate the agglomeration benefits arising from investments in the Iarnród Éireann network outside the Greater Dublin Area. The nature of so called "wider economic benefits", the methodology devised for this study and the results obtained are summarised in section 10.4 below. The values obtained for the wider economic benefits of the candidate rail investments identified in Section 9, were included in the cost benefit assessments of these investments,

10.3.1 Capital Costs

The capital spending required for each of the projects appraised has been estimated at factor costs, using current prices. These are preliminary estimates and subject to review. New rolling stock has been assumed to have a useful life of 30 years. Investments in stations or in track infrastructure have been assumed to have a useful life of sixty years. These long lasting investments have been assigned a residual value at the end of thirty years equal to half of their initial cost for the purposes of the cost benefit calculations.

10.3.2 Operating Costs

The additional operating costs that would arise as a result of capital spending required for each of the projects appraised has been estimated using a standard cost per train kilometre.

10.3.3 Time Savings and Other Service Improvements for Existing Passengers

Each of the potential investments identified in Section 9 would improve the service offered to train travellers. Improvements include:

- Reducing journey times by increasing train speeds;
- Reducing waiting times and providing a more convenient service to passengers by increasing the frequency of services; and
- Improving the experience of travellers by providing better facilities on trains or at stations and providing direct services rather than requiring passengers to change train.

The value of each of these improvements for rail travellers can be expressed as an amount of journey time. These improvements either directly reduce passengers' journey times, or the improvement in the travel experience can be considered to be equivalent to a certain reduction in journey time. These time savings for each of the potential investments were calculated to allow the effect of each investment on passenger number to be modelled, as described in Section 9.

In order to calculate a money value for the improvement in service for existing train passengers arising from each potential investment:

- The total time saved by all existing passengers in the base year was calculated based on the time saving per passenger and the number of passengers on the relevant section of the rail network before the investment is made;

- Future values of the time saving for these passengers over the thirty year appraisal figure were calculated based on forecast levels of passenger growth on the rail network;

- The time saving in each year were valued based on the relevant value of time for each year, i.e. using the baseline value of time of €13.90 in 2009 inflated for increases in the real value of time between 2009 and the year in question; and

- The values for the time savings for existing passengers in each of the thirty years of the appraisal period were discounted to a present value using a 4 per cent discount rate.

10.3.4 Time Savings and Other Service Improvements for New Passengers

The modelling exercise described in Section 9 forecasted the number of additional passengers that would use the rail services affected if the potential investments were made. These additional passengers also benefit from the investment. Some of the time saving compared to the situation without the investments would be necessary to attract these new passengers from the mode of transport that they previously used. Because of this, the standard approach in cost benefit analysis is to apply the "rule of one half" when valuing the benefits enjoyed by new passengers on a transport mode. Half of the time saving, or other benefit of the investment for travellers, is assumed to accrue to these new passengers as a net benefit.

The time saving accruing to new traveller in each of the thirty years of the appraisal period was calculated and valued in the same way as the time savings for existing travellers. The values obtained were then divided by two to apply the rule of one half. The present value of this scaled back stream of benefits was then calculated using the standard 4 per cent discount rate.

10.3.5 Reduction in Road Congestion

Investments in rail infrastructure that attract new passengers to trains away from the roads will reduce road congestion. Additional passengers on mainline rail routes would previously have used national primary routes and, in many cases, the congested road network of the Greater Dublin Area to complete their journeys. Goodbody Economic Consultants devised a parameter to value this benefit of the potential rail investments. This exercise involved:

- Calculating an average value for the vehicle kilometres avoided on national three lane roads, national two lane roads and urban roads when a traveller switches to InterCity rail, This calculation was based on typical origins and destinations of rail travellers;

- Identifying current levels of traffic on national two lane and three lance roads from NRA traffic count data. Deriving average speeds on these roads based on these traffic volumes;

- Forecasting future levels of traffic on national two lane and three lane roads based on current traffic levels and expected growth factors;

- Estimating future average speeds on national routes based on these traffic forecasts, and identifying the improvements in average speed and reductions in total journey times on roads that would be produced if some road travellers transfer to rail;

- Valuing these future time savings for road users using future values for time; and

- Calculating a value for the time savings for road users on urban roads. This was done by using the NTA Dublin Traffic Model to estimate the effect of removing vehicles from the congested road network in the Greater Dublin Area.

The result of this exercise was a parameter for the present value of the reduction in congestion enjoyed by remaining road users when some road users switch to using rail. Goodbody Economic Consultants estimated that the present value of the benefit to remaining road users of 1,000 additional rail travellers each year over a thirty year appraisal period is approximately €230,000.

10.3.6 Additional Fare Revenue for Iarnród Éireann

The national traffic model prepared for this report captured details of the average fare revenue per passenger earned by Iarnród Éireann on each part of its network. Iarnród Éireann's additional fare revenue in the base year as a result of each potential investment was calculated based on the forecast increase in passengers and this fare value. Additional revenue in future years over the thirty year appraisal period was estimated using this base year figure and expected growth in passenger numbers across the whole network. As with other benefits, a present value of this stream of benefits was calculated using a 4 per cent discount rate.

10.3.7 Reductions in Emissions

When travellers switch from road to rail, this reduces the amount of traffic on the roads, and so reduces the harmful emissions of greenhouse and other gases from road traffic. The value of this benefit in the base year was estimated by:

- Estimating how many of the new rail passengers previously travelled by bus, and how many previously travelled by car based on the mode shares on the route in question in the national traffic model prepared for this study;

- Calculating the number of bus kilometres and car kilometres avoided as a result of these passengers changing mode, based on average occupancy levels for cars and buses;

- Placing a money value on the emissions avoided as a result of this reduction in the number of bus and car kilometres driven, using the parameters described in Section 10.2;

- Calculating the value of this benefit in each of the thirty year of the evaluation period using the base year value adjusted for expected growth in travel, and changes in the quantity of emissions and cost of emissions from cars and buses; and

- Discounting these estimates to a single present value using a discount rate of 4 per cent.

10.3.8 Reductions in Accidents

Rail is a significantly safer mode of transport than road. To the extent that the potential investments lead to people travelling by rail rather than by road, they will lead to a reduction in road accidents. This is obviously a social benefit. This social benefit has been estimated and valued in money terms for these cost benefit appraisals. The number of vehicle kilometres avoided as a result of travellers switching to rail from either cars or buses was calculated to value the reduction in vehicle emissions as a result of the potential investments. Using the parameters described in Section 10.2 these value for the reduction in road vehicle kilometres as a result of rail investments can be used to estimate, and place a value on, the number of road accidents that would be a avoided as a result of investing in the rail network.

10.4 Wider Economic Benefits

As part of this Study the consultants identified the wider economic benefits that could arise from investments in the inter city rail network. A methodology was devised the estimate the value of these benefits for the potential investment projects that had been identified. The results of this exercise were included in the cost benefit appraisals of these potential investments.

10.4.1 What are "Wider Economic Benefits"

The potential benefits of rail investments described in Section 10.3 all arise directly from the provision of improved transport services. There are well established methods to identify and value these benefits for a given investment proposal. Transport investments have a wider significance for the economy than simply providing improved, safer or more efficient travel. The existence of these "Wider Economic Benefits" has long been recognised in transport appraisal, and methods to measure and value these benefits are now being developed.

The latest work on the identification and valuation of wider economic benefits comes from both the UK and Ireland. The UK Department for Transport has commissioned two pilot exercises to measure the wider economic benefits of transport investments: a review of the Crossrail project[40] and a modelling exercise on potential transport interventions in South and West Yorkshire[41]. Following these studies the UK Department for Transport has prepared draft guidance for the measurement of these wider economic benefits[42]. In Ireland this draft methodology has been used in the preparation of a business case for DART Underground[43].

The Wider Economic Benefits that are recognised and measured using these emerging techniques are described below:

- Pure agglomeration benefits. It is well established that firms in agglomerations (typically cities, where firms are close to many other firms and to a deep pool of labour) perform better than firms that are relatively isolated. Transport investments reduce travel times, and so reduce the effective distances between firms, and between firms and labour markets. Transport investments can, therefore, increase these agglomeration effects. A transport investment that reduces travel times in a city agglomeration, such as DART Underground, increases the effective size and density of the agglomeration and will improve its economic performance. The business case for DART Underground estimated the value of

[40] Referred to in Department for Transport "Transport, Wider Economic benefits, and Impacts on GDP" Discussion Paper July 2005
[41] Feldman et al "Transport investments, the wider welfare benefits and the GDP effects of transport schemes" available from DfT and from corresponding author "David Simmonds Consultancy"
[42] "The Wider Impacts Sub-Objective" TAG Unit 3.5.14 DRAFT FOR CONSULTATION. September 2009. Department for Transport. www.dft.gov.uk/webtag/
[43] "Iarnród Eireann DART Underground Business Case". March 2010. Colin Buchanan

this effect for the Greater Dublin Area, using the methodology currently being proposed for consideration by the UK Department for Transport. Similar effects may arise from rail investments outside the GDA:

- Improvements in the InterCity network linking Dublin and the other major cities could have an agglomeration effect on the country as a whole;

- Investments that create high quality links between cities could link these cities together to form effective agglomerations. For example if travel between each of Cork, Limerick and Galway became sufficiently quick and convenient agglomeration effects could arise for firms in each of these cities.

Section 10.4.2 below describes the method used for this study to estimate the potential agglomeration benefits of the investment options identified in Section 9.

- Move to more productive jobs. Improving transport links can encourage people to travel further to work, and so allow them to take higher paid, more productive jobs, so increasing economic output. The exchequer benefit of this represents a net gain to the economy as a whole. This type of effect is most likely to arise where a transport investment improves commuting services in and out of a large city. The investments being considered to the InterCity Network will not lead to this type of economic benefit.

- Labour force participation. Making commuting easier and cheaper can encourage people into the labour force. This increases overall economic output and the exchequer benefits will represent a net social benefit. Again this type of effect will arise where there is a significant improvement in commuting services into a large city. This effect will not be particularly significant for the investments being considered as part of this review.

- Imperfect Competition. Improvements in transport reduce the effective distance between firms and so increase the size of geographic markets. A consumer looking for a good or service might consider all potential suppliers within a given journey time. The area defined by this journey time defines the geographic market for the good or service in question. Firms providing this good or service will only face effective competition from firms in the same geographic market as them. Where there are few firms in a geographic market competition may be "imperfect". In this situation prices will be higher and output lower than if there was a fully competitive market. If a transport investment increases the size of a geographic market (i.e. consumers can now look further afield when sourcing the good or service in question) the number of firms, and hence the intensity of competition, in the market will increase. This should reduce prices and increase output. This effect is unlikely to arise unless a completely new transport link is being created. Simply reducing travel time, or adding a rail link between two points that were previously only connected by road would not have a noticeable effect on competition. This effect will not arise from the investments being considered as part of this study.

10.4.2 Measuring Wider Economic Benefits

The UK Department of Transport has developed a methodology to measure agglomeration benefits. This is the type of wider economic benefit which is most relevant to the appraisal of potential investments in InterCity rail. The methodology is complex and involves a great deal of data, analysed by small geographic area, on:

- Employment by industry sector;
- Output by industry sector;
- The generalised cost of travel within and between areas; and
- Trip origins, destinations and purposes.

In broad outline the increase in GDP is calculated using the approach outlined in Figure 10.1 below:

Figure 10.1: Agglomeration impacts of a transport investment.

Source: UK Webtag / Goodbody Economic Consultants

This approach to measuring the agglomeration benefits of a transport investment is set out in the UK Department of Transport's "Webtag" website. It is based on measuring the effective density of the area in question before and after the investment, and applying an elasticity measure to the change in density to calculate the proportionate increase in economic output as a result of the transport investment. The full calculation is extremely detailed and reflects precise details about economic activity and travel in the area in question. The full formula suggested by Webtag is set out in Figure 10.2 at the end of this Section. For the purposes of this study data would not be available in sufficient detail to apply the full Webtag methodology.

A method was devised to estimate the agglomeration benefits of the investments being considered as part of this study. This method was based on applying a number of simplifying assumptions to the detailed Webtag methodology:

- The eight cities connected by the InterCity network (Dublin, Belfast, Wexford, Waterford, Cork, Limerick, Galway and Sligo) were treated as a single area, the density of which would be increased by investments in the InterCity rail network;
- The current effective density of this area was measured using travel times. Figures for the total number of daily trips within and between each of the eight cities, analysed by mode, were obtained from the transport model developed for this study. Total travel times were estimated based on these trip numbers, average road speeds and Iarnród Éireann timetable data. The effective density of the combined eight city area was calculated based on this total travel time and the total number of people in employment in the eight city area;

- The current economic output of the eight city area was estimated based on the number of people in employment in each city and the Gross Value Added per person in the relevant regions;
- The elasticity of productivity with respect to effective density was assumed to be the same as that identified in the UK Webtag draft guidance. This is the same approach as was taken in the DART Underground business case;
- The change in effective density as a result of each investment under consideration was calculated by changing the rail journey times to reflect the effect of the investment used to calculate total travel times and recalculating the effective density of the eight city areal; and
- The change in economic output as a result of the agglomeration effect of each investment was calculated by multiplying the current output of the area by the proportionate increase in density by the elasticity of productivity with respect to changes in density.

10.4.3 Results Obtained

The process described above was repeated for each of the investments under consideration. In each case the estimated agglomeration effect from the investment was positive and of the same order of magnitude as the more conventional transport related benefits of the investment. The results obtained for the proposed investments on the Dublin-Cork service show the greatest agglomeration benefits and are reproduced in Table 10.1 below.

Table 10.1 Present Values of Benefits from Proposed Investments: Dublin-Cork

Benefit Type	Reduce Journey Time to 2 Hours (€m)	Electrification (€m)	Link to Airport via DART Underground (€m)
Time Savings – Existing Passengers	188	101	105
Time Savings - New Passengers	7	2	2
Decongestion of Roads	29	15	15
Fare Revenue Iarnród Éireann	71	36	37
Reduction in Emissions	1	1	1
Reduction in Accidents	2	1	1
Agglomeration Benefits	208	105	130
Total Benefits	506	261	291

10.5 Results of Cost Benefit Appraisals

Each of the potential investments in the rail network described in Section 9 was the subject of a cost benefit appraisal carried out as described in sub sections 10.2 to 10.4 above. The main conclusions from these appraisals are summarised in the Tables below. These results include agglomeration benefits in the assessment of these investment projects.

Route 1: Dublin - Cork						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
1.1 & 1.2	Reduce journey time to no more than 2½ hours and introduce consistent stopping patterns	42	506	464	12	79
1.3	Electrification of the corridor	508	261	(247)	na	na
1.4	Direct service to city centre and Dublin Airport via DART Underground	16	291	275	18	na

Comment

Measure 1.1 is a clear early priority. Journey times could be reduced to no more than 2½ hours following limited civil works. This line carries a large number of passengers, all of whom would benefit from this time saving. The reduction in journey time would also attract extra passengers and fare revenue for Iarnród Éireann. These benefits would easily justify this investment.

The attractiveness of Measure 1.3 Electrification depends on the timing of the investment. If this investment were to take place in the near future when the current fleet of DMUs are all still within their useful life, the relevant costs of electrification would include the full cost of new EMUs. As the results above show, the benefits of electrification are not enough to justify this cost. However if this measure were postponed until the current fleet was being replaced, the relevant capital cost of electrification would be limited to the cost of the civil works needed to the line. The present value of the cost of electrification in this situation would be only €148m. This would make electrification an viable investment, with a net present value of €113m, a benefit cost ratio of 2 and an internal rate of return of 6 per cent.

Measure 1.4 Direct Service to Dublin Airport via DART Underground can only be carried out when the measure 1.3 Electrification has already taken place, and when a spur to the airport from Clongriffin has been constructed. This measure will be a useful addition to services when these other investments have taken place.

Route 2: Dublin - Galway						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
2.1 & 2.2	Reduce journey time to at most 2 hours and introduce consistent stopping patterns	76	274	197	4	16
2.3	Double tracking from Portarlington to Athlone and hourly service	287	166	(121)	na	na
2.5	Electrification of the corridor	265	128	(137)	na	na
2.6	Direct service to city centre and Dublin Airport via DART Underground	16	124	108	8	na

Comment

Similarly to Dublin-Cork, Measure 2.1 is a clear early priority. Journey times could be reduced to at most 2 hours following limited civil works. This line carries a large number of passengers, all of whom would benefit from this time saving. The reduction in journey time would also attract extra passengers and fare revenue for Iarnród Éireann. These benefits would easily justify this investment.

Completing measure 2.3 to introduce an hourly service on this route would require a significant capital investment to introduce double tracking between Portarlington and Athlone, to address reliability issues. Demand for travel on this corridor is not yet high enough to justify this level of investment. However long term growth in passenger numbers and increases in the value of these passengers' time will make this investment more attractive in the future. If in the interim an hourly service can be introduced without impacting on existing stopping service patterns, then such a service would be justified.

Similarly to the Cork corridor, Measure 2.5 Electrification cannot be justified if the relevant costs include the cost of replacing DMUs that are still within their useful life. However if electrification is postponed until the DMU fleet is being replaced anyway then electrification leads to net cost savings of €15m.This measure becomes an investment with a net present value of at least €143m (exact value will depend on the actual timing of the investment) and an IRR of 12 per cent.

Measure 2.6 Direct Service to Dublin Airport via DART Underground can only be carried out when the measure 2.5 Electrification has already taken place, and when a spur to the airport from Clongriffin has been constructed. This measure will be a useful addition to services when these other investments have taken place.

Route 3: Dublin - Belfast						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
3.1	Reduce journey time to 2 hours through targeted investment	38	104	66	2.7	10
3.2	Hourly clock face timetable	110	217	108	2.0	na
3.3	Relocation of Belfast Terminus to Victoria Street	na	51	na	na	na
3.4	Electrification of Corridor	228	83	(145)	0.4	na

Comment

Measure 3.1 is a clear early priority. If journey times can be reduced to 2 hours with a limited set of investments this level of spending will be easily justified by the time savings for existing and new passengers and the extra fare revenue for Iarnród Éireann. An hourly clockface timetable could also be introduced at a relatively low cost using rolling stock that is already available to Iarnród Éireann. This would produce significant net benefits for Iarnród Éireann and travellers.

The current level of travel between Dublin and Belfast by all modes is not high enough to justify electrifying the line. Even if the current DMU fleet was being replaced anyway, the relevant cost of electrification would still be €48m, meaning that electrification would only produce a net present value of €35m. In general the volume of journeys by all modes between Dublin and Belfast is not as high as the size and relative position of the two cities would normally produce. This makes it difficult for further investments in the rail line to generate a return.

Route 4: Dublin - Limerick						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
4.1	Alternate direct and indirect services, 2 hour journey time	82	253	171	3.1	na
4.2	Upgrade Limerick Junction station	17	77	60	4.6	18
4.3	Electrification of corridor	na	na	na	na	na
Comment						
These upgrades to the Limerick corridor generate high levels of net benefits. This is consistent with the high levels of passenger traffic already using the service. These investments should be carried out in conjunction with the equivalent investments in the Dublin Cork service.						

Route 5: Dublin - Waterford						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
5.1	Reduce journey times to 2 hours	63	135	72	2.1	8
5.2	Improve pedestrian/cycle connections between Waterford city centre and station	6	23	17	4.1	42
Comment						
Assuming that the reduction in journey times can be achieved for the relatively modest investment in civil works mentioned in Section 9, then this investment can easily be justified by the benefits to passengers and the extra fare revenue for Iarnród Éireann. Similarly there is clear potential to realise significant net gains by improving access by passengers to Waterford train station.						

Route 6: Dublin – Westport//Ballina						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
6.1	Increase frequency to 5/day	22	54	32	2.5	na
6.2	Train splitting at Manulla for services to Ballina	44	42	(2)	1.0	11
6.3	Increase frequency to 8/day	44	68	14	1.3	na
6.4	Upgrade Athlone Station for interchange with Galway services	5	na	na	na	na
Comment						
There are enough current passengers on this route, and enough additional passengers could be attracted to rail on this route, to justify the limited investment needed to increase service frequencies to 5 a day. However further service improvements such as direct services to Ballina and a service frequency of 8 a day would require much larger capital investments. These cannot be justified at current levels of passenger demand. Investment in this service could be revisited later in the planning period. At this stage proposals to upgrade Athlone station and introduce interchanges with the Galway service could be considered. It is understood that Iarnród Éireann are considering altering the existing service pattern to allow for one direct service and 5 to 6 other services operating on a shuttle basis from Athlone. While this has not been subject to analysis it has the potential to yield benefits.						

Route 7: Dublin – Sligo						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
Comment						
No measures identified that required further appraisal						

Route 8: Dublin – Wexford/Rosslare EP						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
8.1	Upgrade services to InterCity branding	0	33	33	na	na
8.2	Increase frequency to 8/day	37	48	12	1.3	na
Comment						
This service could be upgraded to an InterCity level of service using rolling stock that is already available to Iarnród Éireann. This would have minimal extra cost and would produce benefits for travelers. Increasing frequencies to 8 per day would require an investment that cannot be justified at current levels of demand on this route.						

Route 9: Dublin – Tralee						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
9.1	Upgrade Mallow station to facilitate interchange	20	66	46	3.3	15
Comment						
A relatively modest investment would improve the experience of exiting passengers and attract additional passengers on these services. The resulting benefits would be well in excess of costs.						

Route 10: Waterford – Limerick Junction						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
Extra passengers as predicted by model (80-90 passengers/day)						
10.1	Upgrade to 5 services/day using InterCity rolling stock	55	8	(47)	0.1	na
10.2	Continue route from Limerick Junction to Limerick city	55	13	(42)	0.2	na
Assume 1,000 trips/day based on car trips on Waterford-Carrick-Tipperary-Clonmel						
10.1	Upgrade to 5 services/day using InterCity rolling stock	55	101	46	1.8	na
10.2	Continue route from Limerick Junction to Limerick city	55	101	46	2.0	na
Comment						
There are very few passengers currently on this route. If the response to these investments is proportionate to current use of the service the benefits will be extremely limited. There is significant road traffic along the corridor. Approximately 8,000 people a day travel between Waterford and each of Carrick on Suir, Tipperary and Clonmel. Although there is a potential market, it is considered that attracting a significant proportion of these users to rail will remain a challenge.						

Route 11: Galway – Limerick						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
11.1	Upgrade services to inter-city branding (rolling stock, seat reservations, advance purchase, catering)	0	18	18	na	na
Comment						
This service could be upgraded to inter-city branding using rolling stock already available to Iarnród Éireann. This would have minimal incremental cost for Iarnród Éireann and would produce certain benefits for travellers.						

Route 13: Ballybrophy Spur						
Measure	**Description**	**Present Value of Costs €m**	**Present Value of Benefits €m**	**NPV €m**	**Benefit/ Cost Ratio**	**IRR %**
13.1	Introduce 5 direct services per day from Ballybrophy to Limerick	16	22	6	1.4	9
13.2	Operate 8 services a day from Ballybrophy to Nenagh only	0	17	17	na	na
Comment						
A small investment in rolling stock would increase the service from Ballybrophy to Limerick to 5 a day. The model prepared for this study suggests that much of the use of the Ballybrophy spur does not involve travel to or from Limerick itself. Most of the use of the spur is to travel to or from Roscrea or Nenagh and points on the main line to Dublin. Whilst there may be a case for running services between Ballybrophy and Nenagh only, it is noted that this would still remain a branch line and would suffer from lack of direct connections to Dublin – the provision of which would incur a high level of additional cost.						

10.6 Conclusion: Phasing of Investments

The appraisal carried out has identified a range of investments that should be carried out as a priority by Iarnród Éireann over the period to 2030. These investments fall into three main groups:

- Relatively small investments to bring services on rail corridors where there is high passenger demand or high potential passenger demand up to their full potential. These investments would show a large return in both passenger benefits and fare revenue for Iarnród Éireann if they were carried out immediately. They are compatible with stated policy in relation to mainline rail priorities in that they are high value for money investments that have a low negative impact on subvention needs;
- As long term growth in rail travel continues a further set of investments will become worthwhile. These should be considered towards the end of the period from 2015-2020; and
- Major investments to electrify the major rail corridors and, potentially, to continue InterCity services into the city centre and to Dublin Airport using DART Underground. Investments in electrification will show high returns if they are made at a point where the rolling stock must be replaced anyway. Further benefits can be secured at this stage if DART Underground is in place and if the proposed rail spur from Clongriffin to Dublin Airport is completed. These investments should be considered for initiation in the period 2020-2025.

A list of priority investments and a proposed scheduling of these investments in set out in Table 10.2.

Table 10.2: Proposed Investment Schedule

Phase 1: "Consolidating the Gains through Quick Wins" 2010-2015	
Dublin - Cork	
1.1 & 1.2	Reduce journey time to 2 ½ hours or better and introduce consistent stopping patterns
Dublin - Galway	
2.1 & 2.2	Reduce journey time to 2 hours or better, introduce consistent stopping patterns and an hourly service using existing rolling stock
Dublin - Belfast	
3.1	Reduce journey time to 2 hours through targeted investment and introduce an hourly service using existing rolling stock
3.2	Hourly clock face timetable
Dublin - Waterford	
5.1	Reduce journey times to 2 hours or better
5.2	Improve pedestrian/cycle connections between Waterford city centre and station

Dublin – Westport/Ballina	
6.1	Increase frequency to 5/day
Dublin – Wexford/Rosslare EP	
8.1	Upgrade services to InterCity branding
Dublin - Tralee	
9.1	Upgrade Mallow station to facilitate interchange
Galway - Limerick	
11.1	Upgrade services to inter-city branding
Ballybrophy Spur	
13.2	Investigate a more targeted service pattern
Phase 2: Responding to Long Term Growth 2015-2020	
Dublin - Galway	
2.3	Double tracking from Portarlington to Athlone and Hourly service
Dublin - Limerick	
4.1	Alternate direct and indirect services, 2 hour journey time
4.2	Upgrade Limerick Junction station
Dublin – Westport/Ballina	
6.2	Train splitting at Manulla for services to Ballina
6.3	Increase frequency to 8/day
6.4	Upgrade Athlone Station for interchange with Galway services
Dublin – Wexford/Rosslare EP	
8.2	Increase frequency to 8/day
Phase 3: Electrification of the Core Rail Network 2020-2025	
Dublin - Cork	
1.3	Electrification of the corridor
1.4	Direct service to city centre and Dublin Airport via DART Underground
Dublin - Galway	
2.5	Electrification of the corridor
2.6	Direct service to city centre and Dublin Airport via DART Underground
Dublin - Limerick	
4.3	Electrification of the corridor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DART

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Iarnród Éireann

11 Rail Freight

AECOM

11.1 Introduction

This Section of the Report considers the future of rail freight. It begins with an overview of current policy in relation to rail freight. This is followed by an outline of trends in rail freight activity and market share. The impact of these trends on rail freight finances is then described. The future potential of rail freight on both a commercial and non-commercial basis is then considered.

11.2 Policy Background

The public service contract that is in place between Iarnród Éireann and the NTA sets out the service requirements and the various conditions of contract. These are largely based on the provision of specified passenger services and passenger capacity. There is no provision for the support of rail freight services.

During the course of the development of this Review, consultations with interested parties often elicited the view that the full potential for carriage of goods by rail was not exploited. While it was felt that there were some possibilities for increased used on rail freight on a commercial basis, the bulk of consultees envisaged greater use of rail freight on environmental and sustainability grounds. However, such a policy has not been fully endorsed by Government. For example, the Smarter Travel policy document stopped short of supporting such a viewpoint, contenting itself with proposing a Forum " to bring all interested parties together, including industrial development agencies and industry representative bodies, to explore in greater depth the issues relating to the movement of goods, including: the realistic potential for rail freight……." While the Renewed Programme for Government made a commitment to introduce an allowance (subsidy) per tonne for freight transported by rail in line with climate change objectives, this has not been acted on[44].

In the absence of specific supports for rail freight, Iarnród Éireann has sought to operate rail freight on a strictly commercial basis. This approach was endorsed by the previous Strategic Rail Review (2003) which recommended that the focus of the railway in the future should be as a predominantly passenger railway, only allowing for freight services that are commercially viable. When combined with developments in the market, this policy has resulted in a decline in rail freight volumes.

11.3 Trends in Rail Freight Volumes

11.3.1 Overall Rail Freight Trends and Market Share

Between 1980 and 2009, rail freight volumes have fallen from 637m to 97m tonne kilometres or by some 88 per cent. The period from 2005 to 2009 in particular has represented a period of marked decline in freight, as a result of the withdrawal from certain key markets by Iarnród Éireann. Today, rail freight carries less than 1 per cent of the total national inland freight movements[45]. See Table 11.1.

[44] Renewed Programme for Government. October 2009.

[45] If freight activity in Northern Ireland is taken into account, road is even more dominant. Iarnród Éireann is the sole operator of rail-based freight on the island of Ireland, its occasional cross-border movements on the infrastructure of Northern Ireland railways ceased in 2003.

Table 11.1: Road and Rail Freight in the Republic of Ireland, 1980-2008

Year	Rail	Road	Total	Modal share of Rail
	Tonne Kms (millions)	Tonne Kms (millions)	Tonne Kms (millions)	%
1980	637	5,011	5,648	12.7
1985	601	4,520	5,121	13.3
1990	589	5,130	5,719	11.5
1995	602	5,493	6,095	11.0
2000	491	12,263	12,754	4.0
2005	303	17,819	18,122	1.7
2008	103	17,289	17,392	0.6
2009	79	12,069	12,148	0.6
% Change 1980-2008	-88	141	115	-95

Sources: Iarnród Éireann & CSO Transport 2008 for road and rail data from 2000 – 2009. National Spatial Strategy - Report 17 Tables 2.1 and 2.2 for 1980 - 1995

11.3.2 Trends in Key Rail Freight Markets

Table 11.2 provides an overview of the developments in key rail freight markets that influenced the decline in aggregate rail freight demand.

Ale, Beer and Stout: The distribution of kegs of ale, beer and stout has long been a mainstay of the freight business. However, in 2005, the country's largest brewer – Diageo – announced the complete withdrawal of their kegs business from Iarnród Éireann. Some contracts with smaller operators continued for a short while thereafter, but this activity eventually ceased. The demand for keg-based beer in Ireland has been falling in recent years, although the absolute scale of the market remains large. Iarnród Éireann has retained 200 customised pallets that were placed on wagons for the distribution of kegs. They are therefore well placed to re-enter the market should such an opportunity arise.

Beet and Beet Pulp: Sugar beet and associated pulped products was also traditional a major rail freight traffic. However, the complete closure of the Carlow sugar beet plant in 2005, followed by the Mallow processing plant in 2006, meant that the last sugar beet loads were carried in that year. There is no prospect of this market re-emerging.

Cement: Iarnród Éireann has not been active in the transport of bagged cement for several years and the transport of bulk cement since 2009. Irish Cement continues to lease the Iarnród Éireann silos at Tullamore and Waterford, which are serviced by road. The silos are used for the distribution of cement in those regions.

Fertiliser: Fertiliser is no longer conveyed by rail, principally due to the closure of various IFI factories in 2002 and 2003. Most fertiliser used in Ireland is now imported in bags.

Petrol and Oil: The movement of petrol and oil on a commercial basis ceased in 2005. The major contract at that time was for the transport of

oil from Dublin Port to Sligo. New regulations required an upgrade of the Sligo facility if it was to remain compliant with environmental and safety requirements. The cost of upgrading was prohibitive and the operation ceased.

Mineral Ores: Mineral ores continue to be a mainstay of the rail freight business. Lead and zinc are carried by rail from Tara Mines in County Meath to a facility in north Dublin Port: both the mine and the port facility are rail-connected. The output at the mine varies from year to year, but it is estimated to have a remaining life of approximately 10 years. The carrying of ores by rail is a requirement of the mine's planning permission, and is likely to be secure for the lifetime of the mine.

Wood and Cork: In recent years, Iarnród Éireann has conveyed up to 120,000 tonnes of pulpwood per annum on behalf of Coillte from rail forwarding locations in the West of Ireland to the Coillte owned SmartPly Europe Plant in Belview Port (adjacent to Waterford city). Coillte has expressed interest in conveying wood by rail from locations such as Ennis and Farranfore, but the rates quoted for rail carriage have not to date been able to compete with the alternative road rates. The competitive situation might be improved if improved facilities were available at Belview[46].

General Freight: The final category of freight listed in Table 9.2 – general freight - is composed of all other items conveyed. It now consists almost entirely of LoLo containers and demountable tanks. The movement of container traffic on rail freight has been subject to a general decline in recent decades, but there has been a return to modest growth in more recent times.

Traditionally, all container traffic has involved movements in and out of ports. In July 2005, Iarnród Éireann took the decision that single containers would no longer be carried, and cancelled the sole remaining scheduled liner service from Waterford Port to Ballina. At that time container traffic accounted for 10 per cent of their business but 70 per cent of their financial losses[47]. Following a brief period of closure, a full train load liner service was reintroduced in April 2006 for DFDS from Waterford to Ballina, primarily catering for the Coca Cola plant near Ballina.

In 2009, the Irish freight forwarder, International Warehousing and Transport (IWT), launched a container service between Ballina and Dublin. The container facility in use by IWT in Dublin Port is now rail connected.

[46] At present, although the plant is located adjacent to the Belview Container Terminal, which is rail-linked, the wood is carried to the rail head in Waterford City, from here the wood is unloaded and shunted a distance of several kilometres to the plant. Subject to the agreement of Waterford Port, a conveyor system could be installed at Belview that would allow for the direct transfer of the wood from rail into the plant.

[47] Iarnród Éireann did state that they would be willing to continue to offer a service based on the client hiring a full train, and thus taking responsibility for filling the capacity.

Table 11.2: Principal Commodities conveyed by Rail in Ireland: 1995-2010

	1995 '000s of tonnes	2000 '000s of tonnes	2005 '000s of tonnes	2006 '000s of tonnes	2007 '000s of tonnes	2008 '000s of tonnes	2009 '000s of tonnes	2010 '000s of tonnes	Composition 2010	Change 1995-2010
Ale, Beer and Stout	209	350	406	109	0	0	0	0	0%	-100%
Beet and Beet Pulp	173	162	235	79	0	0	0	0	0%	-100%
Cement	679	550	268	224	139	108	33	0	0%	-100%
Fertiliser	192	96	0	0	0	0	0	0	0%	-100%
Mineral Ores	628	528	533	521	516	452	460	376	66%	-40%
Petrol and Oil	49	29	6	0	0	0	0	0	0%	-100%
Wood and Cork	59	161	116	121	118	90	53	55	10%	-7%
General Freight	1,249	992	372	36	52	67	87	137	24%	-98%
Total	3,238	2,868	1,936	1,090	825	717	632	568	100%	-82%

Source: Iarnród Éireann and CSO: Transport 2006, Statistical Yearbooks 2002 and 2008

11.3.3 Overview

The rapid decline in rail freight volumes has been due to both market place developments and a desire on the part of Iarnród Éireann to cease unprofitable operations. However, recent developments have indicated that opportunities continue to arise for the carriage of bulk materials and unit load traffics, where relatively long distances and port oriented traffics are involved.

11.4 Rail Freight Finances

Revenue in Iarnród Éireann's freight division declined from €50.3m in 2003 to €9.0m in 2009. In 2003. Iarnród Éireann's road freight revenue amounted to €32.4m (or 64 per cent) of the freight division's total revenue. Iarnród Éireann exited the road freight business in 2008 as it became unsustainable with the loss of contracts to the brewery industry. Therefore, most of the decline in the overall revenue of the freight division has been as a direct consequence of exiting the market for road-based haulage.

However, the bulk of traffics that were discontinued over this period were loss-making, so that operating losses before exceptional items fell from €15.30m to €0.97. In 2009, the freight division is expected to make a surplus of €0.8m.

Table 11.3 sets out separate accounts for Iarnród Éireann's rail freight activity[48]. By 2009, maintenance of ageing rolling stock accounted for 23 per cent of the cost base; while depreciation amounted to just 3 per cent of all costs. The depreciation figure is low as most assets have no remaining book value to be charged to the accounts. This is indicative of the lack of capital investment over the past decade.

In line with the significant reduction in freight carried, Iarnród Éireann's freight division has seen a corresponding decline in staff numbers in recent years In January 2003, there were 612 people working in and for the division. The equivalent 2010 figure was 74.

[48] For the financial years 2007 onwards, these accounts include financials for Navigator whose activities were previously classified with road activity.

Table 11.3: Financial Performance of rail-freight (excluding road based activity) 2003 to 2009

	Actual 03	Actual '04	Actual '05	Actual '06	Actual '07	Actual '08	Actual '09	Change 2003-2009
	€000	€000	€000	€000	€000	€000	€000	
Revenue	17,884	18,111	17,809	13,014	16,716	15,479	9,001	-50%
Expenditure	33,159	28,310	25,773	20,936	20,010	16,446	10,408	-69%
Operating Result	(15,276)	(10,199)	(7,964)	(7,922)	(3,294)	(967)	(1,407)	-91%
Exceptional Items	(3,275)	(3,421)	(1,290)	(3,258)	(1,011)	0	0	-100%
Net Result	(18,550)	(13,620)	(9,254)	(11,180)	(4,305)	(967)	(1,407)	-92%
Payroll as a % of pre-exceptional costs							26%	
Maintenance as a % of pre-exceptional costs							23%	
Depreciation as a % of pre-exceptional costs							3%	

11.5 Future Potential of Rail Freight in Ireland

11.5.1 Limitations to Rail Freight Potential

The future potential for rail freight in Ireland is limited for a number of reasons:

- Ireland is unique in that, as a relatively small land mass, few long distance land journeys are conducted for the haulage of freight. This isolates it from the primary driver of growth in European rail-freight: long distance, international haulage;
- Few parts of the island of Ireland are any significant distance from a sea port, so most transport activity to and from a given port is limited to its immediate regional hinterland;
- On a purely commercial basis, road is generally more competitive in terms of speed and flexibility over the short distances that typically characterise most Irish freight-journeys;
- The small scale of the Irish market means that in many instances the potential volumes of freight that could be conveyed are insufficient to justify large scale capital expenditure;
- Rail transport is best suited to the transport of bulky raw materials over relatively long distances. The structure of the Irish economy is such that there is less and less demand for this type of transport; and
- Furthermore, unlike other countries, there is no financial support mechanism in Ireland, such as a rail freight grant, to promote the use of rail freight on environmental and sustainability grounds.

11.5.2 Potential New Freight Traffic

Despite these limitations, opportunities to expand rail freight operations will undoubtedly arise from time to time. At the time of writing, a number of such opportunities are apparent as follows:

Bremore Port: The proposal to develop a new deep-water Port at Bremore, in Fingal County, was initiated in 2002 by the Drogheda Port Company (DPC). The proposed site is adjacent to the existing Belfast Dublin railway and the promoters of the venture have already announced their intention to integrate rail spurs into the berths.

Holyhead Port: The A55 road and the North Wales Coast Line (NWCL) railway run from Chester to Holyhead in Wales. These alignments, in conjunction with the connections from Holyhead to Dublin (and on to Cork and Belfast) form part or the European TEN-T network[49]. A study currently underway in Wales could result in an increase in the volume of intermodal traffic being transported by rail to Holyhead, for onward shipping to Dublin.

In 2010, a study was commissioned by Taith (the joint board of the six county authorities in north Wales) to prepare a fully integrated Rail Strategy. One option considered was the construction of a Holyhead Land-Bridge and Rail Terminal serving Ireland. (Between 1968 and 1989 a LoLo container service operated between Dublin and Holyhead). If the Taith project were to come to fruition it would provide a potential market for containers that were bound for beyond the Dublin region.

49 The TEN-T network denotes key arterial routes for the movement of passengers and freight in Europe.

A second proposal being examined for Taith, is for a rail connected facility based within or in the vicinity of Deeside Industrial Park in Shotton. The Park is located 125km east of Holyhead, near Chester, and it is therefore likely that most of the traffic that it would attract would be destined for long distance land haulage to and from other parts of Great Britain and Continental Europe. Although the centre could form part of an inter-modal link with Dublin via Holyhead, it might be difficult to attract sufficient quantities of containers to travel the relatively short distance by rail.

Rosslare Europort: Although a RoRo port, Rosslare Europort is rail connected, with passenger train services linking the east coast with the port. The port has in the past operated Maffi trailers to consign LoLo containers onto the RoRo ships using the port. The port is also considering the use of adjacent lands to construct a container terminal.

Pallas Green Mine: Ireland is Europe's leading producer of zinc, and accounts for half of Europe's zinc mining in a typical year. There are three large zinc mines in Ireland: Tara Mines, County Meath; the Galmoy Mine, County Kilkenny; and the Lisheen Mine, County Tipperary. Tara Mines is rail-connected. The other two mines which are not rail-connected are nearing the end of their life.

Exploratory digging has been undertaken for several years on the southern boundary of the Irish Midland orefield between Limerick and Tipperary. The results to date suggest that a large, economically viable deposit has been discovered within the Pallas Green licence area which lies adjacent to the Limerick to Limerick Junction rail alignment. It is considered likely that a mining operation larger than that at Tara Mines will come to fruition in the coming years at Pallas Green.

Bord Na Móna: Power Stations and other items
Bord Na Móna (BNM) has contracts to supply peat (known as Power Supply Agreements or PSAa) to three power stations[50].

As these PSAs expire in the coming years, their operators will seek to extend the life of the plants. However, a condition of these extensions is likely to oblige the operators to co-fuel the plant with carbon neutral fuels such as biomass or MBM. It is possible that some of this biomass will need to be imported, or sourced in other parts of Ireland, remote to the plants. Currently Edenderry Power Ltd. has received permission to co-fuel the plant with carbon neutral fuels and has already begun to burn 100,000 tons of non-peat fuel per annum. To date, the biomass has been imported through Belfast and road hauled using walking floor trailers. Although this system works well, there is potential for a rail-based solution. The EPL plant, outside the town of Edenderry, lies some 20 km away from the rail alignment. It is fed peat from an extensive private rail network of BnaM that crosses the IÉ Galway-Dublin line immediately north-west of Portarlington. It may be possible to design an intermodal solution to transfer biomass onto the BnaM network at this point.

The other two power plants are connected to local BnaM rail networks that do not cross the IÉ network at any point. Furthermore, their need to begin co-fuelling large amounts of carbon neutral fuels is not as imminent.

Other opportunities that may exist within BNM include:

- Coal: BnaM is one of the largest coal importers in the country and supplies 65 per cent of the market for residential coal supply. There may

[50] The three plants in question are: Edenderry Power Ltd (EPL): EPL is owned by BnaM and burns 1,000,000 tons per annum; West Offaly, Shannonbridge, which is owned by the ESB and burns 1,245,000 tonnes per annum; and Lough Ree, Lanesboro which is owned by the ESB and burns 800,000 tonnes per annum.

be possibilities to distribute from the ports with IÉ and to use their national network of yards;

- Horticultural Produce: Bord Na Móna manufacture peat products for export and national sale in Athy, Co. Kildare; and

- Waste: Bord Na Móna generates large amounts of waste. In other countries, such produce is often moved by rail.

Waste: The carriage of waste by rail is found in many countries including Great Britain and Italy. Rail freight has also shown itself to be highly successful in serving waste to energy plants in Switzerland and France. Rail is also used to deliver recycled or sorted waste from Waste Management Facilities.

At present, none of the 30m tonnes of waste generated annually in Ireland is currently being transported by rail, but with an increasing shift to recycling and energy conversion, it is likely that opportunities may arise. For example, an Indaver plant at Duleek, Co Meath has planning permission and a waste licence and is under construction. The plant which lies immediately adjacent to the rail line will treat 200,000 tonnes of waste annually. If in time it is licensed to take waste from beyond the immediate region, an obvious opportunity exists for carriage by rail.

These examples indicate that opportunities to expand rail freight activity will arise in the future. Availing of some of these opportunities is likely to require significant capital expenditure and or operating subsidies. It is possible that some of these expansions of rail freight activity would provide an economic rate of return, once external benefits such as congestion alleviation, reduced road damage, and environmental impact are taken into account.

11.6 Capacity of Iarnród Éireann to Take up New Business

11.6.1 Introduction

This section reviews the assets that remain in use, or at the disposal of Iarnród Éireann's freight division and thus their capacity to respond to new opportunities.

11.6.2 Rolling Stock

Iarnród Éireann's rail freight division is serviced by a dedicated fleet of wagons (each suited to the needs of a specific freight task) as well as locomotives that previously worked on passenger services. In 2002, there were 1,043 wagons in the fleet, most of which were over 20 years old. There are currently 408. Of these, 136 are in use. Most wagons and locomotives are nearing the end of their economic life. Thus, where new specialised wagons are required for new proposed contracts, the heavy depreciation associated with the proposal often renders potential contracts un-commercial.

A need for additional wagons capable of carrying unit load could arise if the service levels of container trains from Dublin were increased. A height restriction exists that prevents containers taller than 9'6" in height from being conveyed on conventional flat wagons between Kildare and Dublin. This restriction is currently overcome by using pocket wagons,[51] which comprise approximately 40 per cent of port containers, and are used exclusively for the Dublin Port service (see Table 11.4).

[51] IÉ has 24 pocket wagons suited for carrying the most modern, 45' long by 9'6" high containers.

At present, the Dublin to Ballina container service operates three times a week. Two different types of wagons are used: 12 X Pocket Wagons; and 15 X 47'6" & 3 X 42'9" Long Flat Wagons[52]. The service out of Dublin could be increased from three times a week to once per day without the need for additional rolling stock, however, a shortage of suitable rolling stock will arise if more than one daily service was to operate out of Dublin.

Of the 263 wagons currently not in use, 38 could return to use if carryings of cement and shale were to resume. The 215 surplus flat wagons in the reserve fleet are also capable of carrying 9'6 high and 40' containers, and could be modified if necessary for a variety of bulk carryings.

11.6.3 Infrastructure

Depots

The general decline in the volumes of freight carried by rail has brought about a rationalisation of rail freight depots. Iarnród Éireann currently operates freight yards at Ballina, Westport and Waterford. There are also a number of customer premises that remain connected at Tara Mines, Co. Meath; Castlemungret, Co. Limerick and Platin, Co. Louth. In recent decades, gantry facilities have been dismantled at some locations and certain freight yards have been redeveloped for car parking and other uses.

Table 11.4: Rolling Stock – Freight Division

Wagon Fleet	Quantity	Average Age
Tara Mines	27	33
62'9" Long Flat Wagons (currently used for Coillte Wood Pulp)	31	27
Pocket Wagons (suitable for 9'6" x 45ft load)	14	10
Flat Wagons: 47'6" Long (suitable for unit load)	59	31
Flat Wagons: 42'6" Long (suitable for unit load)	5	31
Subtotal: wagons in use	**136**	**28**
Flat Wagons: 42'9" Long	215	31
Flat Wagons: 62'9" Long	9	27
Shale	26	27
Bulk Cement	12	31
Pocket Wagons	10	10
Sub-total: wagons in reserve	**272**	**30**
Total Wagon Fleet	**408**	**29**
Freight Locomotives	8	31
Total IÉ Locomotive Fleet	38	24

Source: Iarnród Éireann

Despite the current low level of activity, most of the depots listed in Table 11.5 remain rail-connected, and all could be reactivated. The investment required to handle cargo varies from

[52] This second configuration does not cater for higher containers, but can carry 18 containers.

depot to depot. Some cargos could be handled at all depots with minimal investment. Unit load could also be carried at most depots with the use of a Reachstacker. The handling of bulk cement is limited at present to Waterford, Cork and Tullamore as these are the only locations with silos.

Table 11.5: Iarnród Éireann Depots

Location	Recent or current activity
Dundalk	Keg Distribution
Dublin Port	Unit Load, Bulk
Tullamore	Bulk Cement
Longford	Keg Distribution, Unit Load
Sligo	Pulpwood
Ballina	Pulpwood, Unit Load
Westport	Pulpwood
Galway	Keg Distribution
Limerick	Bulk Cement, Keg Distribution, Pulpwood, Unit Load
Tralee	Keg Distribution,
Cork	Bulk Cement, Keg Distribution, Unit Load
Waterford City	Bulk Cement, Keg Distribution, Pulpwood
Bellview, Waterford	Unit Load
Ennis	-
Clonmel	-
Mallow	-
Athlone	-
Mullingar	-

Source: Iarnród Éireann

Seaports

The number of ports that are rail-connected in Ireland has declined in the past two decades. The following situation now pertains at the principal Irish ports.

Dublin Port: Dublin Port is one of two ports in the Republic of Ireland that remains rail-connected. Trains can reach the port from the north west (via the upper and lower Maynooth lines); the west (via the Kildare line through the Phoenix Park tunnel to the Maynooth line); and from the north via the Northern line. The current track layout merges all of these lines at a major rail junction at Church Road, near the entrance to Dublin Port: a freight line runs from this junction on an east-west axis along the entire length of the north port. Spurs exist to most major terminals on the north quays, some of which remain in use. The Church Road junction lies on the immediate approach to the proposed station and tunnel entrance of the Dart Interconnector Project. The extent of access to the north port in future may be reduced, given the additional signalling and gradient considerations on the approach to the tunnel.

Waterford Port is rail-connected at the Bellview Terminal. In recent years, this has been the primary source of container traffic on the rail network. Furthermore, pulpwood is currently carried for Coillte to Bellview Port. Although the wood plant is located adjacent to the Belview Container Terminal, which is rail-linked, the pulpwood is carried by rail as far as the rail head in Waterford City, then carried by road a distance of several kilometres to the plant. Subject to the agreement of Waterford Port, a conveyor system could be installed at Belview that would allow for the direct transfer of the pulpwood from rail into the plant.

Port of Cork: The existing container facility at Tivoli was formerly connected by rail, but had fallen into disuse. It was disconnected as improvements were made to the Cork – Midleton line, to avoid the installation of expensive signalling infrastructure. Since then, the layout of the Tivoli container yard has been reconfigured and the Port Authority advises that the re-introduction of a rail siding would not be feasible. The terminal at Marino Point was previously rail connected for the transport of ammonia for use in the manufacture of fertiliser, but it is no longer in use and has been disconnected from the adjacent Cork-Cobh line. The Port of Cork does not currently own the site, but subject to purchase by a relevant body, it would be theoretically possible to construct a new rail link to the site on the port side of the railway line. The feasibility of Marino Point for rail freight is however being kept under review by the port authority.

Shannon-Foynes: Shannon-Foynes port is by far the busiest bulk port in the country. The reason for such focused activity in the Shannon estuary is the proximity of two key installations: Moneypoint Power Station and Aughinish Alumina. The vast majority of bulk product associated with these plants (coal, bauxite and alumina) is conveyed directly to the port. The rail link to the deepwater facility at Foynes in disused: a previous study estimated that it would cost in excess of €30m to re-open the line.

Northern Ireland: Ports in Northern Ireland have not catered for rail-freight activity for many years. The Port of Derry and Port of Larne formerly catered for freight with dedicated sidings, but these have fallen into disuse, and there are no LoLo sailings from these ports. Belfast Port also had extensive sidings at the western piers, but these now have alternative uses. Furthermore, the provision of a spur from the rail line (on the section between Belfast Central to Yorkgate) to serve the principal quays in Belfast Harbour would be difficult and very costly as the rail line is now separated from the port by the M2 motorway. These factors suggest that there is unlikely to be a feasible proposal for rail freight services to Northern Irish ports in the near future.

11.6.4 Overview

Iarnród Éireann's capacity to maintain existing traffics will be affected by the need to replace life-expired rolling stock. This may result in higher depreciation and other charges that my render some existing traffics un-commercial. With regard to new traffics, some may require investment in new infrastructure if they are to be obtained e.g. through new rail facilities at ports. It is also clear that some traffics could prove to be un-commercial in the sense of incurring operating losses. However, in contrast, it is possible that carriage of these traffics by rail could provide an economic if not financial rate of return. The problem is that there is no means at present by which traffics that are economic can be diverted too the rail system. The realisation of some opportunities for increasing the carriage of goods by rail in Ireland is likely to require public funding support.

11.7 The Case for Public Funding of Rail Freight

11.7.1 Benefits of Developing Rail Freight Services

Opportunities may arise to develop rail freight, and this may be seen as a desirable objective firstly because as the costs of climate change rise, the economic benefits of using rail freight will grow. For certain traffics, these benefits may then outweigh the costs of providing services, so that the use of the rail mode over road freight haulage should be favoured.

Public funding support for rail is typically justified on the basis of the lower external costs associated with carrying freight by rail when compared to road. A 2008 report[53] from the EU sought to provide guidance on quantifying the extent of the costs for both rail and road: the difference in the external costs between the modes provides a rational, economic basis for justifying a subvention to rail freight. Quantifying the external costs of a given freight activity is a complex task and varies widely depending on such factors as average loading, engine type, and environmental conditions. Box 11.1 quantifies the external costs of completing a hypothetical freight operation by road or by rail. A key assumption is that the journey conditions are in line with the average conditions in Europe. Furthermore, the costs of congestion have been excluded from the calculations: a factor that would significantly increase the external cost of road transport in many situations.

Box 11.1 shows the external costs associated with carrying 400,000 tonnes of ore per annum from a mine to a port facility over a distance of 80km. The external costs of transportation, over the 15 year life of the mine are €5.6m for rail and €8.6m for road. Thus, a subvention of €2.9m (in year 2000 prices) towards facilitating transport by rail could be economically justified.

Table 11.6: External Costs of transporting 400,000 tones by road vs. rail (Yr 2000 Prices and excluding congestion benefits)

	Road	Rail
Load Per Annum (Tonnes)	400,000	400,000
Distance (km)	80	80
% urban journey	20%	20%
% night-time journey	25%	25%
External Costs Per Annum	€ 633,440	€ 414,880
NPV over 15 year life of project	€ 8,608,656	€ 5,638,355
Difference	€ 2,970,302	

The above analysis demonstrates that external costs associated with the carriage of goods by rail can be substantial. This does not mean that the carriage of goods by rail is always economic. The merits of any particular proposal for carriage of goods by rail can be assessed only through a cost-benefit analysis that takes all costs and benefits into account.

A second reason for supporting the maintenance of rail freight activities is that the ongoing existence of a rail freight industry (and the associated expertise) might be seen as strategically important in the

[53] Handbook on estimation of external costs in the transport sector - Internalisation Measures and Policies for All external Cost of Transport (IMPACT) Delft, CE, 2008

event of an energy crisis or if certain opportunities (e.g. mining projects) emerged that would only be feasible with the use of rail. In this regard, rail freight operations in Iarnród Éireann are at a critical juncture in that the small size of the division may be unsustainable: The current small scale of operations in rail freight places it in a strategically perilous position. If further contracts are lost, and new business is not won, it may no longer be feasible to provide the physical and human resources needed to operate the division. Growth would secure the future of the division by giving it critical mass.

11.7.2 Support for Rail Freight Abroad

The nature of public funding support for rail freight varies across Europe. In some cases it is specifically categorised as a support mechanism for rail freight; while in other instances it results from general investment in infrastructure. A review of the public financing of rail services in 2004[54] found that the number of specific subsidies for rail freight amounted to less than 1 per cent of total public funding for railways. However, payments for infrastructure maintenance and operation, as well as capital expenditure, accounted for over 50 per cent of all funding.

The most comprehensive specific subsidy is perhaps that operated by the Department for Transport in the UK:

- The Freight Facilities Grant (FFG) helps offset the capital cost of providing rail and water freight handling facilities; and
- The Mode Shift Revenue Support (MSRS) scheme (formerly Rail Environmental Benefit Procurement) assists companies with the operating costs associated with running rail freight transport instead of road (where rail is more expensive than road).

The previous scheme operated by the Department - the Rail Environmental Benefit Procurement Scheme - had a budget of £60m for the years 2007 to 2010.

Another less ambitious grant scheme is that operated by the Government of the Walloon region in Belgium. Under the scheme, enterprises are encouraged to invest in projects that promote alternative transportation modes to road and pursue goals of environmental protection.

11.8 Conclusions & Recommendations

Between 1980 and 2009, rail freight volumes have fallen from 637m to 97m tonne kilometres or by some 88 per cent. As of 2009, rail freight carries less than 1 per cent of the total national inland freight movements.

The rapid decline in rail freight volumes has been due to both market place developments and a desire on the part of Iarnród Éireann to cease unprofitable operations.

Revenue in Iarnród Éireann's freight division declined from €50.3m in 2003 to €9.0m in 2009. In 2003. Iarnród Éireann's road freight revenue amounted to €32.4m (or 64 per cent) of the freight division's total revenue. Iarnród Éireann exited the road freight business in 2008 as it became unsustainable with the loss of contracts to the brewery industry. Therefore, most of the decline in the overall revenue of the freight division has been as a direct consequence of exiting the market for road-based haulage.

[54] Study of the Financing and Public contributions to Railways: A Final Report for European Commission, DG TREN Prepared by NERA, January 2004

However, the bulk of traffics that were discontinued over this period were loss-making, so that operating losses before exceptional items fell from €15.30m to €0.97. In 2009, the freight division is expected to make a surplus of €0.8m.

In line with the significant reduction in freight carried, Iarnród Éireann's freight division has seen a corresponding decline in staff numbers in recent years In January 2003, there were 612 people working in and for the division. The equivalent 2010 figure was 74.

Table A11.2 sets out separate accounts for Iarnród Éireann's rail freight activity[55]. By 2009, maintenance of ageing rolling stock accounted for 23 per cent of the cost base; while depreciation amounted to just 3 per cent of all costs. The depreciation figure is low as most assets have no remaining book value to be charged to the accounts. This is indicative of the lack of capital investment over the past decade.

However, recent developments have indicated that opportunities continue to arise for the carriage of bulk materials and unit load traffics, where relatively long distances and port oriented traffics are involved. Iarnród Éireann's capacity to maintain existing traffics or take on new traffic will be affected by the need to replace life-expired rolling stock. This may result in higher depreciation and other charges that may render some existing traffics un-commercial.

With regard to new traffics, some may require investment in new infrastructure if they are to be obtained e.g. through new rail facilities at ports. It is also clear that some traffics could prove to be un-commercial in the sense of incurring operating losses. However, in contrast, it is possible that carriage of these traffics by rail could provide an economic if not financial rate of return. As the costs of climate change rise, the economic benefits of using rail freight will grow. For certain traffics, these benefits may then outweigh the costs of providing services, so that the use of the rail mode over road freight haulage should be favoured.

A second reason for supporting the maintenance of rail freight activities is that the ongoing existence of a rail freight industry (and the associated expertise) might be seen as strategically important in the event of an energy crisis or if certain opportunities (e.g. mining projects) emerged that would only be feasible with the use of rail.

The problem is that there is no means at present by which traffics that are economic can be diverted too the rail system. The realisation of some opportunities for increasing the carriage of goods by rail in Ireland is likely to require public funding support. Such funding support is available to railway companies in other jurisdictions.

The previous Government commitment to introduce an allowance (subsidy) per tonne for freight transported by rail suffers from the drawback that it is not budget delimited. Given the current Exchequer position and the competition for scare resources, it is considered that such a policy is no longer justifiable. It is recommended that Government supplant this approach by a budget delimited grant facility that would be available to both enterprises and Iarnród Éireann to support projects where a clear economic return exists, as demonstrated by a cost-benefit analysis that encompasses environmental and other economic benefits.

[55] For the financial years 2007 onwards, these accounts include financials for Navigator whose activities were previously classified with road activity.

12 Rail Maintenance & Renewal Needs

12.1 Introduction

This Section of the Report sets out the requirements for maintenance and renewal expenditures in respect of both infrastructures and rolling stock for the period 2011-2030. In the recent past, much of the expenditure on infrastructure maintenance and renewal has been funded through the Railway Safety Programme. Progress under this Programme is first reviewed before future requirements are established.

12.2 The Railway Safety Programme

Following the Knockcroghery derailment of November 1997, the then Minister for Public Enterprise commissioned IRMS to carry out a strategic review of all aspects of the safety of Iarnród Éireann's railway system.[56] This reached a number of conclusions related largely to safety management systems. Also in 1998, Iarnród Éireann commissioned an independent safety review to be carried out by AD Little, which focused on risks related to railway infrastructure and associated maintenance.[57] The AD Little report noted that an exceptionally high level of derailments had occurred and concluded that much of the track was over age and worn beyond what would be normally acceptable on other European Railways. It recommended a rolling programme of 166 km of track renewals per annum to ensure that safety risks did not escalate.

Following the IRMS review, the Minister established a Railway Safety Task Force to prepare prioritised recommendations based on the review findings. The Task Force recommended a 15-year safety investment programme, and asked Iarnród Éireann to prepare a prioritised five-year safety programme based on the IRMS report. This resulted in the first phase of the Railway Safety Programme (1999-2003), which had a budget allocation of over €660m. Subsequently in 2002, the Programme was renewed for another five years from 2004 to 2008.

This second Programme phase had a budget allocation of over €510m and the bulk of the monies (86.9 per cent) were invested in infrastructural maintenance and renewal. Table 12.1 below gives a more detailed breakdown of this expenditure.

A substantial emphasis was placed on the improvement of safety management systems and the enhancement of a safety culture across the whole organisation, which received an investment of €66.9 million or 13.1 per cent of total expenditure under this second phase of the Railway Safety Programme.

[56] IRMS. A Review of Railway Safety in Ireland. 1998.
[57] A.D.Little. Independent Safety Review of Infrastructure. 1998.

Table 12.1: Breakdown of Expenditure under Phase 2 of the Railway Safety Programme (2004-2008)

Area of Investment	€ (millions)	%
Infrastructural Investment:		
Track renewal & maintenance	208.5	40.8
Signalling, Electrical, Telecomms & Electrification	35.7	7.0
Fencing	24.9	4.9
Structures (safety bridges)	88.6	17.4
Level crossings	64.9	12.7
Other works (cuttings etc.)	21.1	4.1
	443.7	86.9
Safety Management Investment:		
Safety Management Systems	66.9	13.1
Total	510.6	100.0

Source: Iarnród Éireann

12.3 Progress Under the Railway Safety Programme

Table 12.2 below sets out the various outputs under the Programme, as an indication of the progress made across each key area of expenditure. Much of this expenditure was focused on lines other than Dublin-Cork, Dublin-Belfast and the DART system, which had suffered from inadequate resources historically.

Table 12.2: Progress made under Phases 1 & 2 of the Railway Safety Programme (1999-2008)

Main Physical Indicators	Phase 1 (1999-2003)	Phase 2 (2004-2008)	Total
Track Renewal (miles)	400	134	534
Fencing (miles)	220	429	649
Safety Structures (number)	124	106	230
Level Crossings – High Risk	283	135	418
Level Crossings – Lower Risk	446	115	561

Source: Iarnród Éireann

As the table indicates, over the initial ten-year period between 1999 and 2008, this programme of investment has enabled Iarnród Éireann to:

- Renew in excess of 500 miles of track;
- Erect approximately 650 miles of new fencing;
- Replace and/or renew 230 bridges; and
- Close or upgrade almost 1,000 level crossings.

Other works that have been funded under the programme include ballast cleaning; the replacement of point ends; the renewal of glue joints; embankment stabilisation; and signalling works. Besides improving safety, this rehabilitation and renewal of the infrastructure has also facilitated improved journey times, additional services and passenger comfort throughout the network, by providing for a platform for further investment in the network and the rolling stock under Transport 21.

The monies invested in the safety management systems were used in a number of areas to do the following:

- Develop railway, company and departmental standards;
- Develop and implement an intensive staff training programme;
- Use focus groups for certain categories of workers to identify actions that might mitigate certain risks associated with their work;
- Create departmental safety teams; and
- Improve procurement and contractor control.

To measure the combined effects that these various outputs have had on safety, a collective Risk Factor was developed which combines figures for fatalities, major injuries, and minor injuries to give a numeric expression of risk. Over the first phase of the programme the risk factor was reduced from 7.8 in 1998 to 4.5 in 2003, or by 42.3 per cent. This risk model was enhanced for the second phase of the Railway Safety Programme to include a wider range of hazards that those arising solely from infrastructure and equipment failures. For example, it also allowed for staff error, public and passenger error, movement and non-movement accidents, and occupational safety concerns. The new system was used to develop a baseline collective Risk Factor of 13.7 for 2003, which was reduced over the course of the second phase to 8.8 in 2009, or by 35.8 per cent. This suggests an overall reduction in risk factors of 62.9 per cent over the ten year period as a whole.

12.4 Future Needs: Track Infrastructure & Structures

12.4.1 Track Infrastructure

It is clear that the Railway Safety Programme was intended to make good existing deficiencies in the rail network, so that the railway could be operated safely and at adequate line speeds. In this context, it may be noted that pace of track renewals fell short of that recommended by A.D.Little.

Moreover, as railway assets depreciate with use, safe operation of the railway requires continuing expenditure on track maintenance and renewal. This means that an adequate level of expenditure on maintenance and renewal is a prime requirement for continued rail operations, and deserves priority consideration for funding. In particular, an ongoing renewal programme is required, if maintenance expenditures are not to become excessive.

The investment in track relaying under the Railway Safety Programme has resulted in the renewal of all the main InterCity routes except for Dublin-Cork, Dublin-Belfast, and the DART system. Track renewal is ongoing on the Dublin-Cork line, with 50 miles renewed in the period 2009-2010. However, the average age of track infrastructure on this route is approximately 28 years, as compared with the design life span of 25 years. Significant renewal expenditure is required in the short to medium term. The life span of the Belfast route is similar and will be exceeded within the next ten years. The DART line is approaching 30 years old and is thus due for renewal, although there is less criticality here due to lower line speeds. While increased maintenance expenditures could extend the period to renewal for these routes, this would be at the expense of:

- An increase in rail breaks;
- An increase in temporary speed restrictions; and
- A decrease in line speeds.

Over the next twenty years, track renewals of some 485 miles will be required on the Dublin-Cork, Dublin-Belfast, and the DART system. As these lines support the core ICN services, failure to renew the system will adversely affect the competitive position of the ICN, at a time when the priority is to improve speeds to ensure that ICN services maintain and improve their competitive footing. However, track renewal is an ongoing process, so that significant expenditures will be required across the system. Total track maintenance and renewal costs are estimated at €2,088m over the twenty years from 2011 to 2030.

12.4.2 Structures and Level Crossings

Iarnród Éireann has some 5,500 bridge structures, which is the largest ownership of bridge assets in the State, exceeding that of the National Roads Authority, for example. There are a further 3,500 earth structures that need to be maintained and renewed. Bridge structures are critical to the integrity of the network, as failure results in a whole route being affected. Much of the bridge assets date back over one hundred years and the risk of failure is more difficult to assess than is the case for track infrastructure. Based on the age, type of construction and recent experience, it is estimated that an average expenditure of €12m per annum on bridge renewals is required. Multi-span bridges will require additional expenditure which is estimated at €1.25m per annum. A further €5m per annum is required for routine maintenance. This gives a total requirement of €438m over the twenty year period 2011-2030, when overheads are included.

Level crossings represent the single biggest rail safety risk. They also impact on journey times. Recent investment has seen a reduction in the number of level crossings from 2,000 to 1,100. Continued investment is required to manage the safety risk associated with these assets and to provide more competitive journey times. It is envisaged that expenditure on level crossing of €10m per annum for the next ten years will be required, with €5m thereafter, giving a total of €150m over the twenty years, rising to €180m when overheads are included.

Finally, Iarnród Éireann is responsible for the maintenance and renewal of some 1,900 facilities and buildings, including station buildings. The estimated expenditure requirement is estimated at €190m over twenty years.

12.4.3 Summary of Track Infrastructure and Structures Maintenance and Renewal Expenditure Needs

Table 12.3 summarises track infrastructure and structures maintenance and renewal expenditure needs for the period 2011-2030 inclusive. Aggregate expenditures needs are €2,896m in aggregate or approximately €145m per annum. The bulk of the expenditure relates to track maintenance and renewal.

It is important to note that, while Iarnród Éireann has benefitted from a consistent investment level under the Railway Safety Programme over the last number of years, this safety driven investment was provided to address the significant inherent deficiencies that existed throughout the infrastructure and that had developed as a result of previous years of under investment.

Table 12.3: Track Infrastructure and Structures Maintenance and Renewal Expenditures 2011-2030 (€m)

Expenditure Category	Aggregate Expenditure (€m)	Average Expenditure per Annum (€m)
Track	2,088	104.4
Structures	438	21.9
Level Crossings	180	9.0
Facilities	190	9.5
Total	2,896	144.8

While this investment has delivered significantly improved and safer infrastructure, the steady state position whereby infrastructural assets can be managed under an optimised maintenance and renewal regime, has not yet been achieved. For example, there are a number of temporary and permanent speed restrictions currently in place throughout the network as a result of various types of degraded conditions with infrastructure assets.

Therefore, the cost profile provided is based on the requirement to maintain the condition and provision of infrastructure at current or existing levels. It does not assume a future steady state with regard to infrastructure condition. To achieve this steady state position would require an additional investment so that none of the assets are in the degraded element of their life cycle, as is the case today.

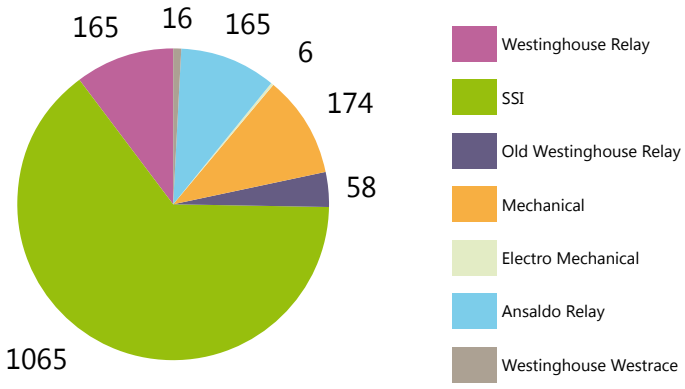
12.5 Future Needs: Signalling & Telecommunications Maintenance & Renewal

12.5.1 Signalling

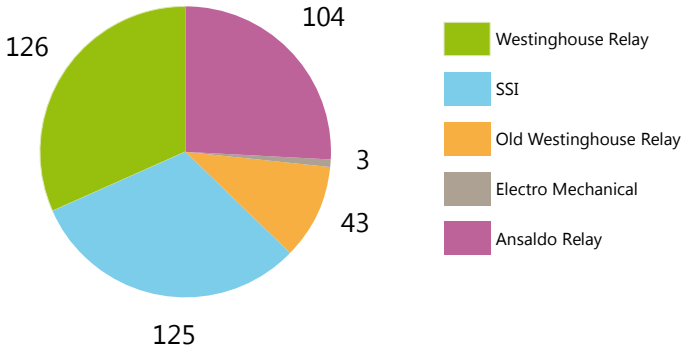
Signalling is critical to the safe operation of trains. Signalling systems are distinguished by interlockings of different generations, from old mechanical types through to modern solid state types. The extent of the renewals required can be measured, in broad terms, by the age profile of the signalling and the type of interlocking control (modern or outdated). Some 1,065 kilometres of the 1,649 kilometres signalled is with modern SSI interlocking (see Figure1). Conversely 578 kilometres are not modern and will fall due for renewal soonest. Figure 1 also contains analysis to the mainline and DART network (Dublin – Cork, Dublin – Belfast and DART). It is obvious that there is a large proportion of the critical routes signalled by relay and other methods all of which are much older and more in need of replacement i.e. 68 per cent of these lines have not being re-signalled in over 20 years.

Figure 12.1: Distribution of the Rail Network by Interlocking Type (kilometres)

Kms Network By Interlocking Type



Kms of Mainline & DART - Interlocking Type



Dublin-Cork renewals: The re-signalling over the last ten years covered approximately 15 per cent of the Cork line. A total of €232m will need to be spent on the Cork line over the next twenty years with a further €23m required after this period. This is consistent with the age profile of the asset base, the majority of the signalling being presently over 20 years old. This line is the main artery for the operational network. The majority of the signalling is relay based with extensive cabling to the field equipment. Of the 270km route length, only 75km is under 15 years old with 150km being between 20 and 30 years old and the remainder over 30 years old.

Dublin-Belfast renewals (North of Malahide): The Dublin-Belfast line was re-signalled in the period 1994 to 1996 with solid state interlocking. This section of the network is now 16 years old and will be approaching the end of its anticipated life by 2021. Therefore, it will fall for renewal within the next twenty years at a cost of €42m with €18m required post 2030.

DART renewals: A project is currently underway to re-signal from Lansdowne to Malahide/Howth, with a cost of €121m. The remainder of the DART network covering the area from Greystones to Lansdowne (approximately 23 kilometres) will fall due for renewal in the next twenty years at a projected cost of €133m. The signalling in this area was installed in 1983 and is a relay based system with an expected life of 35 years. The system will not be maintainable in a state to meet the operational, safety and reliability requirements demanded of a rapid transit system. There will not be any viable option other than plan for its upgrade to meet the current and projected demands placed on such a system.

These lines account for €527m of a total renewal requirement of €650m. The consequences of non renewal will be a rapid deterioration in reliability and maintainability resulting in reduction of service availability, increased safety concerns due to degraded operations and a general run down of service to the public.

The routine maintenance expenditure requirement is estimated at €540m over twenty years. Thus, the total maintenance and renewal requirement is €1,190m over twenty years or €60m per annum.

12.5.2 Telecommunications

The product life cycle of telecommunications systems varies significantly from system to system and is typically in the range of 5 to 20 years. Operator terminals would be on the shorter end of this scale, while portable radio equipment would be around 7 years, PC-based outstations around 10 years, transmission equipment around 15, with life expectancy of fibre optic and copper cabling in the order of 20 years. In addition to the normal day-to-day maintenance of our telecommunications infrastructure, it will be necessary to plan for the renewal/replacement of systems as they become life-expired.

Much of the Iarnród Éireann telecommunications infrastructure has been renewed over the last ten years, following the development of the national fibre backbone communications network and the Mini CTC re-signalling programme in the late 1990s and early 2000s. However, further works are required in the short term to renew the obsolete on-board CAWS/ATP equipment and roll-out GSM-R, to replace the current obsolete analogue radio system, throughout the network. In the medium term (6-13 years) provision is included for works on the transmission network, much of which dates from the late 1990s, as it falls due for renewal. This network is critical as it provides the backbone communications bearer that supports all other signalling, communications and IT services throughout the entire rail network.

The current systems have been assessed in terms of their installation date, the product life cycle and their remaining serviceable life, to determine the renewal timeframe. Similar replacement costs have been assumed. The aggregate renewal expenditure requirement is estimated at €191m over the twenty years to 2030.

12.5.3 Renewal of Electrification Equipment

The Electrification System is comprised of the combined operation of the following sub-systems:

- Traction Power (conditioning and supply);
- Overhead Line (power distribution and power return); and
- ECO Desk (monitoring and control of the Traction power).

The equipment within each of these sub-systems is of different vintages, requiring renewal of them at different stages over the period to 2030.

With regard to traction sub-stations and equipment for example, there are three generations of sub-stations: the "1983 French", the "1999 Adtranz" and the "2005 Balfour Beatty" sub-stations. Each is fitted with sub-station equipment of their particular era, requiring different maintenance regimes and replacement timescales.

Similarly, for overhead lines and equipment (OHLE), there are two generations of OHLE: the original "1983 OHLE" from Howth to Bray and "1999 OHLE" which comprise the extensions from Howth Junction to Malahide and from Bray to Greystones.

With regard to traction, the five sub-stations and two switch houses of the French system date from 1983 and have now been in operational service for 28 years. Various elements of equipment within these facilities are now in need of renewal. In contrast, the 1999 Adtranz" and the "2005 Balfour Beatty" sub-stations are generally serviceable for some years into the future, but some elements of the 1999 Adtranz facilities will need renewal as 2030 is approached. A total traction renewal expenditure of €6.1m is required up to 2030. This includes a provision for the replacement of the ECO desk.

Turning to OHLE, the contact wire and messenger wire are the main components requiring replacement, various other families of components (mainly the supporting structures/systems), now 28 years old will, require refurbishment or replacement attention depending on their condition. If the present traffic pattern continues, then it is possible that the contact wire will last for some 15 years. Thus replacement will be required by 2019 and a replacement programme is expected to commence in 2015 at a cost of €5.4m in total. Other elements of OHLE renewal will cost a further €7.2m. The latter includes replacement of road rail trucks. A total electrification renewal expenditure of €18.6m to 2030 is envisaged.

12.5.4 Overview of Signalling, Telecoms and Electrification Maintenance and Renewal Expenditure Requirements

A total signalling, telecoms and electrification expenditure of €1,400m is envisaged for the period up to 2030, comprising €1,190m in signalling maintenances and renewal, and €191m and €19m in telecoms and electrification renewal respectively.

The safety driven investment under the Railway Safety Programme had its primary aim to address years of under investment in SET asset renewals. The "steady state" or "maintainable position" for SET assets has not yet been reached. The remaining mechanically signalled areas coupled with the need for renewals on other life expired systems will have to be addressed before such a "maintainable position" is reached.

Therefore, the cost profile provided is based on the requirement to maintain the condition and provision of SET assets at a state that can be practically achieved. For example, renewal of mechanical signalling with solid stat signalling is a practical solution while renewal on a like for like basis is neither practical or possible and would, be more expensive due to the outdated technology of mechanical signalling.

12.6 Total Infrastructure Maintenance & Renewal Expenditure

Table 12.4 summarises the total infrastructure maintenance and renewal expenditure requirements for the period from 2011 to 2030. An aggregate expenditure requirement of €4,296m is identified, which equates to €215m per annum. It should be noted that this annual requirement is not directly comparable with expenditure levels under the Railway Safety Programme, as not all maintenance and renewal expenditures were encompassed by that Programme.

With regard to the phasing of this expenditure, there will be an above average expenditure requirement in the period up to c. 2019. This is due to the need to continue the process of track renewals on the Dublin-Cork line in the immediate future.

A reduction in journey times can be achieved through upgrading of the track assets and associated geometry. The major impacting elements in such an initiative are in the changes to the geometry or alignment of the track as well as suitable treatment of the underlying formation that supports the track.

Reduced journey times can be achieved by carrying out this work as required over the full linear length of a given route. The timeframe in which these reduced journey times can be delivered is directly related to the level of renewal per year. Significant renewal activity over the next number of years will deliver reduced journey times quicker as more miles will be addressed per year. Conversely, if a steady state level of renewal is provided with a similar spend level per year, then reduced journey times over the whole route will be achieved at a slower overall rate.

It should be noted that the projected level of spending of €215m per annum is the gross expenditure requirement for infrastructure maintenance and renewal. Infrastructure maintenance and renewal expenditure amounted to €199m in 2010 and are budgeted to be €205m in 2011, so that a net incremental spend of €10 per annum is envisaged.

Table 12.4: Total Infrastructure Maintenance and Renewal Expenditures 2011-2030 (€m)

Expenditure Category	Aggregate Projected Expenditure (€m)	Average Projected Expenditure Per Annum (€m)	Budgeted Expenditure 2011 (€m)	Actual Expenditure 2010 (€m)
Track and Structures	2,896	144.8	129.0	126.6
Signalling and Telecoms	1,400	70.0	75.8	72.1
Total	4,296	214.8	204.8	198.7

12.7 Benchmarking Iarnród Éireann's Expenditure of Maintenance & Renewal of Infrastructure

12.7.1 Benchmarking Data

The best available benchmarks for repair and maintenance spending by rail infrastructure managers are the measures gathered by UIC for its annual Lifecycle Infrastructure Cost benchmarking exercise.

UIC has been carrying out benchmarking of railway infrastructure costs since 1996. Summary results of these annual exercises are publicly available. Currently, fourteen European Infrastructure Managers, including Iarnród Éireann, take part in this exercise. Detailed results of the benchmarking are available to participating Infrastructure Managers. UIC aims to measure the total costs of providing rail infrastructure over the lifecycle of the infrastructure i.e. including both maintenance and renewal costs. The data reported by UIC to the general public are relatively high level. Lifecycle costs of providing track including maintenance and renewals, measured in 1000's of Euro per main track km. for reasons of confidentiality, published data do not identify individual rail infrastructure managers.

12.7.2 Averaging UIC Results over Time

A Rail Infrastructure Manager will plan maintenance and renewal spending over a multi-year framework. The optimum schedule of renewal spending may require significantly different spending levels from year to year depending on the age profile of the assets held by. As a result, the figures for a single year may not be representative of the costs incurred by the Infrastructure Manager.

UIC tracks spending over a number of years and this shows that spending on renewals does vary over time. Goodbody used this information on changes in spending over time to estimate the spending of each Infrastructure Manager over the 12 years to 2007. These estimates were of spending in real terms, i.e. were in 2007 prices. Goodbody then calculated an average spend by each Infrastructure Manger over the 12 years to 2007. The results of this exercise are set out in Table 12.5.

Iarnród Éireann is depicted by the letter "Q". Thus, the results indicate that, despite the substantial expenditure on maintenance and renewal of the Irish system under the Rail Safety Programmes, Iarnród Éireann's expenditure levels were some 18 per cent below average.

Table 12.5: Average Maintenance and Renewal Costs 1996-2007, (2007 prices, and purchasing power parities)

Infrastructure Manager	Maintenance	Renewal	Total
	€'000/main track km	€'000/main track km	€'000/main track km
C	29.8	10.1	39.9
D	21.9	7.4	29.4
E	26.9	28.4	55.3
F	35.3	19.5	54.8
G	33.2	22.5	55.7
H	72.1	31.9	104.0
J	49.1	71.2	120.3
K	48.4	37.5	85.9
M	40.8	38.6	79.4
N	NA	NA	NA
Q	27.5	31.9	59.4
U	16.2	21.1	37.3
X	30.3	11.6	41.9
Y	78.8	96.1	174.9
Average	39.3	32.9	72.2

As indicated in Table 12.4, the average annual expenditure on maintenance and renewal of the rail network in the period to 2030 is €215m. Based on a track length of 2,227 kilometres, this gives an expenditure level of €96,500 per track kilometre. In order to compare this figure to those of Table 12.5, it had to be adjusted to 2007 prices and purchasing power parities. This process resulted in an adjusted figure of €79,900 per route kilometre, or 11 per cent above the average for all Infrastructure Managers. Benchmarking railways is an extremely difficult process, as the nature of railway networks differs substantially in terms of network density, level of electrification, extent of multiple tracking, and presence of structures such as bridges and tunnels. As a result, comparisons should be treated with caution. Iarnród Éireann will shortly commission a more detailed benchmarking exercise to provide a more detailed understanding of how the Irish railway network compares with its European counterparts in terms of the level of infrastructure maintenance and renewal expenditures.

12.8 Future Needs: Rolling Stock Maintenance

rish Rail operates a diverse fleet of electric and diesel powered rolling stock with the majority being less than 10 years old. The normal life expectancy specified for modern rolling stock is 30-35 years. This "life cycle" is underpinned by scheduled running maintenance and heavy maintenance with the latter typically covering any maintenance with a planned interval of at least one year. In addition to this maintenance the life cycle would usually feature a major refurbishment at a 10-15 year interval.

The maintenance schedules are usually set by or derived from the original vehicle manufacturer and over the first third of the vehicle life this maintenance schedule is typically refined. Running maintenance encompasses inspection level events at 2-12 week intervals on a repeating cycle. Vehicles are presented for heavy maintenance at a system level whereby the vehicle systems are maintained / overhauled on a component exchange basis with the removed components overhauled off the vehicle. As a result downtime is much reduced and vehicle availability is greater.

Heavy maintenance intervals are typically 6-8 years for most running gear and systems and 4 years for engines. Vehicles are repainted on an 8-10 year interval principally to deal with corrosion.

In 2006 and 2007, Iarnród Éireann undertook a significant refurbishment and modernisation of the Siemens Class 8100 DART electrical units. These were the original DART trains dating from 1984 and the 76 vehicles were essentially rebuilt. This was the first modern Iarnród Éireann fleet to undergo such a refurbishment and the costs involved reflected the modernisation required particularly on electronic and safety systems. It is also noted that this fleet was more than 20 years old and had never benefited from a prior refurbishment thus the starting point was much lower than would normally be expected.

Running maintenance costs include all light maintenance, cleaning and fuel / electricity and are therefore something of a constant expenditure. Heavy maintenance because of the longer intervals, features peaks and troughs of expenditure tailing off towards the end of the asset life as expenditure is reduced or deferred in the final few years of operation.

Because of the low average age all of Iarnród Éireann's passenger rolling stock can be expected to run until 2030, this includes the heavily modernised and updated original DART fleet even though it will be 46 years old at that point. Within the LCC provided there is no provision for the replacement of any rolling stock. The only stock expected to be withdrawn by 2030 is the Class 071 GM locomotive dating from the 1970s. There are only 18 of these remaining in service and the operational hours are low in any case. These typically operate freight services and permanent way maintenance trains.

There are two well established reasons to undertake heavy maintenance on rolling stock. Firstly there is a requirement to address safety critical systems to ensure correct and safe operation of the railway. Secondly there is a requirement to preserve functionality and thus provide a reliable product to the end user.

In addition to the benefit on performance the impact on fleet safety is improved. Heavy maintenance programmes by their nature intervene in safety critical systems such as braking systems and areas known to present a fire risk. The 75 per cent reduction since 2007 in on train fire incidents as reported by the Railway Safety Commission demonstrates this fact.

Table 12.6: Iarnród Éireann Rolling Stock Numbers and Type, 2011

Type	Class	Date of Build	Number
InterCity Rail Cars	22000	2007	234
Other DMUs	29000	2003	116
	2600	1994	17
	2700	1999	27
	2800	2000	20
EMUs	8100	1984	76
	8500-8510	2000	28
	8520	2005	40
	8200	2000	10
Loco-hauled	201	1994	34
	071	1975 est.	18
	MK4 carriages	2006	67
	Enterprise	1994	14
Wagons	Various	Various	254
On-Track Machines	Various	Various	22

One of the major risks to LCC on modern rolling stock is the prevalence of electronic systems. A life of 10 years to component obsolescence is typical and replacement costs can be very high. Typical on board systems include passenger information systems and driver management systems.

It is expected that the annual heavy maintenance cost for the IE fleet is €28m-€33m depending on the exact programme of work. A typical engine raft overhaul on an InterCity Rail car required every 4 years costs €100k and with 256 such rafts it can clearly be demonstrated how the costs can peak.

A total cost of €2.3bn is forecast for the period to 2030 as the LCC for the IE fleet but not including any vehicle replacement.[58]

Iarnród Éireann's fleet is summarised in Table 12.6 which provides data on the type, number and age of rolling stock. Based on a detailed profiling of running and scheduled maintenance activities in respect of each of these elements of rolling stock, a total rolling stock maintenance requirement of €2,317m has been identified for the period 2011-2030 for the fleet as a whole. This amounts to €115.9m per annum

[58] Fuel and electricity costs are not included

12.9 Overview

By the end of 1990s, the rail system was experiencing significant safety problems, which necessitated a response in terms of increased maintenance and renewal activity and a focus on safety management systems. The Railway Safety Programme was intended make good existing deficiencies in the rail network, so that the railway could be operated safely and at adequate line speeds.

Safe operation of the railway requires continuing expenditure on track maintenance and renewal. This means that an adequate level of expenditure on maintenance and renewal is a prime requirement for continued rail operations, and deserves priority consideration for funding. In particular, an ongoing renewal programme is required, if maintenance expenditures are not to become excessive. The future requirements over the period 2011-2030 are as follows'

Track infrastructure and structures maintenance and renewal expenditure needs are €2,896m or approximately €145m per annum. The bulk of the expenditure relates to track maintenance and renewal. The total signalling, telecommunications and electrification maintenance and renewal requirement is €1,400m over twenty years or €70m per annum.

The projected level of spending on track and structures of €215m per annum is the gross expenditure requirement for infrastructure maintenance and renewal. Infrastructure maintenance and renewal expenditure amounted to €199m in 2010 and are budgeted to be €205m in 2011, so that a net incremental spend of €10 per annum is envisaged.

A total rolling stock maintenance requirement of €2,317m has been identified for the period 2011-2030 for the fleet as a whole. This amounts to €115.9m per annum.

There will be an above average expenditure requirement in the period up to c. 2019. This is due to the need to continue the process of track renewals on the Dublin-Cork line in the immediate future. This will yield benefits in terms of improved line speeds.


Cárta Cliste Dichlibeáil
Smart Card Tag Off
Rail Smart Card
Dublin Short Hop Zone
irishrail
No/Uimhir 1812953199
Cuir Ticéad Iarnr
Insert Rail Ticke
insert ticket as shown
Cuir ticéad anseo

13 Fares Policy

13.1 Introduction

This Section presents a brief review of Iarnród Éireann's policy on fare structures and levels. Its aim is to raise issues and propose changes to fares policy that should be further considered within the context of the 2030 strategy.

Fare structure in this context refers to the ticket types that are on offer and the level of fares offered by each type. The geographic structure of fares i.e. the elaboration of fares for each station origin-destination pair has been the subject of an internal Iarnród Éireann review and is not further discussed here.[59]

The Section commences with an overview of the regulation of rail fares and the objectives that should inform rail fares policy. It then analyses the existing fare structure and customer access to fare information and provides an overview of fare structures and levels elsewhere in Europe.

13.2 Regulation of Fares

Under the Dublin Transportation Act, 2008 as amended by the Public Transport Regulation Act 2009, the National Transport Authority has powers to enter into direct contract awards that impose public service obligations on Iarnród Éireann. The 2008 Act also provides that a public services contract shall provide for the following in respect of fares:

- The fares to be charged and provision for their variation, including the increase or decrease of fares;
- The fare system to be used; and
- Requirements regarding ticketing and the provision of information to passengers.

As the public service contract between the NTA and Iarnród Éireann is a network-wide contract, these stipulations refer to the fare system as a whole, on both the ICN and non-ICN networks. The current public service contract provides that:

"Pending the development and implementation of a fare scheme under Section 59 of the Act of 2008, any increase in controlled fares in respect of Services shall be subject to the prior written approval of the Authority. This requirement for the prior written approval of the Authority shall not apply to discounted fares, pre-paid fares, concessionary fares or multi-journeys."

The fare scheme to which reference is made permits the Authority to specify the nature, conditions and level of fares to be charged on public passenger transport services and for any ancillary matters. The controlled fare is the single adult fare between any two places when purchased on the day of travel. The contract also provides that Iarnród Éireann should give reasonable advance notice to the public of any change in fares.

Approval of fares on the ICN resides with the NTA, insofar as any increase in the single adult fare must have the prior written sanction of the NTA. Apart from this constraint, Iarnród Éireann has leave to vary the fare structure in respect of reduced and premium fares.

Iarnród Éireann is free to propose to the NTA a change in the level and structure of fares with a view to altering the level of fares revenues (and thus the compensation that is required under the terms of the public service contract) or patronage of the system.

[59] Review of Mainline Fare Structures. Report of a Working Group, March 2010.

During discussions with Iarnród Éireann, it was indicated that one of the problems with the current regulatory arrangements is because the single fare is the controlled fare, it is set at a higher level than might be dictated by market conditions, so that Iarnród Éireann can offer lower fares so as to exploit market price elasticities.

To the extent that this is a problem, it could be overcome by a change in regulatory regime to stipulate maximum basic walk-up single and return fares, leaving the company free to determine actual walk-up and advance purchase fare levels within the maxima set.

13.3 Iarnród Éireann Fares Policy Objectives

Iarnród Éireann's fare policy is not explicitly stated. This reflects the fact that there are no clear overall objectives set for Iarnród Éireann.

Very recently, Iarnród Éireann has come under increasing financial pressure as operating revenues have declined as a result of the economic downturn. The company has to contain operating losses to ensure that it lives within the PSO grant aid that it receives. As Exchequer resources have also come under strain, there is pressure to reduce the level of that grant-aid. In these circumstances, a primary focus of fares policy in the short to medium term must be on revenue raising. In improving revenue raising it is important that loss of patronage is minimised, as this will prevent economic losses in terms of increased road congestion and environmental dis-benefits arising. It should be noted in this regard that there are win-win situations where fares could be raised for inelastic demand segments, with little loss of patronage and thus insignificant diminution in social benefits.

In order for fares policy to influence demand behaviour, the various fare options must be clear to the consumer

Based on the above considerations, it is proposed that two objectives should be set for fares policy:

- To provide a transparent and accessible fares structure and ticket purchase system that facilitates customer choice; and
- To provide a fares system that exploits opportunities to increase revenues, where the loss of social benefits is not excessive.

The extent to which the fares structure should be guided by the last objective depends on the level of PSO grants offered by the State, which in turn reflects the state of Exchequer finances. Given the problems with Exchequer deficits that are anticipated over the medium term, it is likely that the objective of using the fare system to raise revenues will take on greater importance over the initial period of the Strategy at least.

13.4 Existing Fare Structures

13.4.1 Introduction

Iarnród Éireann's long distance fare structure reflects both past legacies and the regulatory and commercial environment in which it operates today. The fare structure along InterCity routes was initially distance based and this basic principle is still evident to a large degree today. As patronage and economic prosperity increased, premium rates could be charged for peak travel while discounted fares were increasingly applied to off-peak days or trains.

More recently, discounted advance purchase fares have been introduced, so that the fare structure makes a broad distinction between walk-up and advance purchase types. As might be expected, the walk-up fares are available at any time, while the advance fare must be pre-bought. The walk-up fare in turn is made up of walk-up basic fares, walk-up flexible return fares, and walk-up discount/saver fares.

13.4.2 Walk-up Fare Types and Prices

Table 13.1 depicts the range of adult fares available for Dublin-Cork journeys. In addition to these there are student and family fares available as discount. With regard to adult fares the basic walk-up fare is €66 single and €71 return. This feature whereby return fares are heavily discounted is an aspect of the Irish system.

Walk-up flexible return fares are available for 5-day and monthly periods. However, the 5-day return is at the same price point as the basic return. Thus, the 5-day return is a redundant fare type for this journey.

This situation is apparently repeated across a range of routes and journeys, but not all. For example, for Dublin- Rosslare Europort route, the 5-day return is above the day return fare. However, in this instance the 5-day return and the monthly return price points are identical. For other journeys, there is no difference at all between day 5-day and monthly return fares. For yet other routes, such as Dublin-Waterford, the basic single, basic return and flexible fares are the same.

Table 13.1: Fare Types and Pricing: Dublin-Cork and Dublin-Waterford

Fare Type	Dublin –Cork (€)	Dublin – Waterford (€)
Walk-up Fares:		
Basic Single	66.00	34.50
Basic Day Return	71.00	34.50
Flexible 5-day Return	71.00	34.50
Flexible Monthly Return	78.50	34.50
Saver Single	N/A	27.00
Saver Day Return	51.00	27.00
Advance Purchase:		
Low	10.00	10.00
Medium	20.00	
High	36.00	18.00

Source: Iarnród Éireann

The lack of differentiation between price points for return fares indicates that for many routes some of these fare types are redundant or not on offer. Apart from confusion for the customer, this raises the question as to why a premium for a flexible return fare is an appropriate approach for one route but not another, and why that premium increases with duration of validity on one route and not another. A simpler approach could encompass a distinction between a day return and a flexible return fare that applies to all other fares within a given period of validity.

The saver day return fare is available on selected Cork originating morning services on Tuesdays to Thursdays and Saturdays only. On other routes, saver fares are available for both single and day return journeys for Monday to Thursday and Saturday. This means that saver fares are varied along the dimensions of single or return, route, origin and day of the week. This presents obvious challenges in communicating these offers to customers and in customers' understanding of them. It also raises the question as to whether the price elasticity of demand is so varying along these dimensions as to warrant such a differentiated structure. Even if the elasticities are different, do the difficulties that consumers' have an understanding what is on offer detract from benefits of such a differentiated policy?

The result of offering day saver return fares is that very often that the saver return price is less than the basic single fare. In other cases, where a day saver single fare is offered, the day saver single and return are identically priced. These aspects of the ticket type structure and pricing must seem anomalous to many customers and raise doubts about the rationality of the fares on offer. Again, it would not be easy to communicate such a structure to the customer either in print or at the ticket office.

13.4.3 Advance Purchase Fares

These tickets can only be purchased in advance and are available on a quota basis for selected trains. In practice they are available in the off-peak (i.e. outside the morning and afternoon/early evening) and are generally not available for Fridays or Sundays. Customers must travel on specific trains or are subject to penalties.

Advance Purchase fares increase patronage through effectively being a means of off-peak pricing, both in terms of time of day and day of the week. At present, they do not serve to exploit the increased willingness of customers to pay higher prices for short notice booking. This is because, subject to availability, they can be purchased on-line very close to departure at an unvarying price. They are not a yield management system in this sense.

Iarnród Éireann was to the forefront of railway companies in introducing these fares but they are now more commonplace in other systems, where they operate on a yield management basis.

As currently operated, Advance Purchase fares fulfil largely the same role as saver fares where the latter exist. That is, both types of fare offer discounts for off-peak trains, although the scale of discounts are higher for Advance Purchase fares.

To fully exploit price elasticities, in line with the objective of exploiting opportunities to increase revenues, where the loss of social benefits is not excessive, the Advance Purchase fare system would need to be related to time of booking and become a full yield management system. Such an approach could encompass a pricing structure whereby advance purchase fares approach the walk-on saver fare as the day of departure approaches.

13.5 Customer Access to Fare Information

13.5.1 Customer Knowledge of Fare Structures

The complexity of the Iarnród Éireann fare structure has been set out above. The capacity and willingness of customers to deal with a complicated fare structure is related to journey frequency. That is, if individual customers are making frequent journeys by rail, they have greater opportunity and incentive to understand the fares on offer.

Route surveys indicate that over half of travellers on a given route are either travelling for the first time or use the route once a year or less often. This suggests that frequency of use of given rail routes and overall frequency of use of the rail mode is very low. This is not surprising given the extent to which visiting friends and relatives and leisure activities dominate rail journey purposes. In these circumstances, rail users do not have strong incentives to understand the fares system. It also raises the possibility that occasional users may have an exaggerated view of the rail fares that are available. This is an area where further market research may be of use in understanding levels of knowledge and perceptions of fare levels.

13.5.2 Publication and Dissemination of Fare Structures

There is no online overview of the fare structure that would help the customers understand the options available. This is perhaps not surprising, given the complexity and variability in the fare structure.

Iarnród Éireann does not publish a hardcopy price list for walk-on or discount fares. However, given the scale of the rail origin-destinations and thus journeys, hard copy is not the best means of providing fare information. A web-based system would be preferable. Currently, on-line dissemination for walk-up fares is of a very limited nature. For example, the portion of the website dedicated to "Fares" only shows "some examples of promotional offers (Adult fares)". It may not show the route of interest to the customer at all. If it does, it will not be specific about the actual price for a particular train time. In reality, you must contact Iarnród Éireann by phone to establish the walk-up fare.

On-line price information for advance purchase fares is also far from ideal. When purchasing tickets in advance on the web, passengers cannot see at a glance the range of train times and fare prices open to them. Instead, it is necessary to query the system, one by one, by clicking on the green Euro sign to reveal the fare. There is a need to move to a web based information system that allows the customer to nominate when they would like to travel and offers train times and fare options for consideration. Such a system is currently under development.

13.6 Iarnród Éireann Fares Policies in a Comparative Context

13.6.1 Introduction

It is useful to benchmark where Iarnród Éireann's fare policies are in comparison with other European Rail Systems to inform decisions about the level and structures of fares. This Section compares the fares structures and fare levels in other European rail companies. This cannot be done in an exhaustive one in the context of the current study. However, the broad features of fares policies and fare levels abroad are outlined.

13.6.2 Fare Structures Abroad

Fare structures differ from country to country and there is also considerable variation within countries. This makes comparisons across international boundaries more difficult. Given these limitations, Table 13.2 gives a broad overview of long distance fare structure in eight different countries. Four broad conclusions can be drawn:

- The central European countries (Germany, France and the Netherlands) still broadly adhere to distance based pricing. For the past two years in particular, Spain and Italy have been transitioning from distance based pricing to systems incorporating yield managed. Historically the UK has been the most discount-based but, in recent years, it has actively interwoven yield managed fares into its pricing strategy. Iarnród Éireann's fare system incorporates elements of both distance and discount pricing and, traditionally, is probably most closely aligned with the UK;

- The UK has a considerable discount for walk-up fares during off-peak hours. Indeed, nowadays it is fundamentally embedded in their "Advance, Off-Peak, Anytime" ticketing system. Iarnród Éireann does not operate a generalised off-peak walk-on fare;

- Countries that traditionally priced rail fares on the basis of distance exploit the various price elasticities by offering discounts via railcards and loyalty cards. In Germany, for instance, Bahncards offer discounts of 25 and 50 per cent on basic fares; and

- Traditionally, the UK and Ireland have been the most aggressive users of Advance Purchase fares[60]. However, train operating companies in the UK took this process a step further by incrementally increasing the fare price as departure date neared. This transformed their pricing strategy into a fully-fledged yield management system, something that has yet to happen in Ireland.

[60] They have recently been joined by Spain and Italy

Table 13.2: Comparison of Fare Structures in European Countries

	Distance or Discount Based Pricing?	Are Off-Peak Walk-Up Fares Available?	Are Discounts Mainly via Railcards?	Are Advance Purchases Heavily Discounted?	Are Yield Managed Fares Available?
Ireland	Combination	✗	✗	✓	✗
UK	Discount	✓	✗	✓	✓
France	Distance	✗	✓	✓	✓
Germany	Distance	✗	✓	✗	✗
Italy	In transition	✗	✓	✓	✓
Netherlands	Distance	✗	✓	✗	✗
Spain	In transition	✗	✓	✓	✓
Denmark	Distance	✗	?	✗	✗

Source: Goodbody Economic Consultants

13.6.3 Fare Levels Abroad

As indicated above, an exhaustive comparison of fare levels is not possible within the context of the current study. However, to provide some insights into comparative fare levels, a direct Dublin-Cork journey was compared with a representative route for seven other countries, each involving a journey from the principal city to a town or city approximately 200-300km. A number of fare types were analysed as follows:

- The Walk-up Basic Single (Anytime);
- The Walk-up Basic Return;
- The Walk-up Discount/Saver Single;
- The Walk-up Discount/Saver Return;
- The Advance Purchase Single; and
- The Advance Purchase Return

The following general points should be noted about the overall structure of fares:

Walk-up Basic Fares

The single walk-up fare in Ireland is broadly on a par with equivalent fares abroad, with the exception of the UK. Fares in the UK are substantially in excess of the European norm.

The policy of offering basic return fares at a substantial discount to two single fares is very much a UK and Irish phenomenon.[61] For other countries, the return fare is typically double the single.

Irish basic return fares are offered at a much more substantial discount to single fares that the UK equivalent.

Walk-up Saver Fares

Off peak reduced fares are routinely available in other European countries. Sometimes lower fares for off-peak times are achieved not through differential pricing but by having more than one train operating company deliver services.

Ireland is unique in offering a discount/saver return fare below the basic single.

Advance Purchase Fares

While the UK and Ireland were first to make the transition to Advance Purchase, these pricing techniques are quickly becoming more commonplace in Europe. Advance purchase fares are available in the UK, France, Germany, Italy, and Spain. Where they exist, they are varied by time of purchase i.e. they represent a yield management pricing strategy. Renfe in Spain is the most recent company to adopt such a policy.

Despite Ireland being a high price high wage economy, advance purchase fares in Ireland are pitched very low in comparison to the rest of Europe.

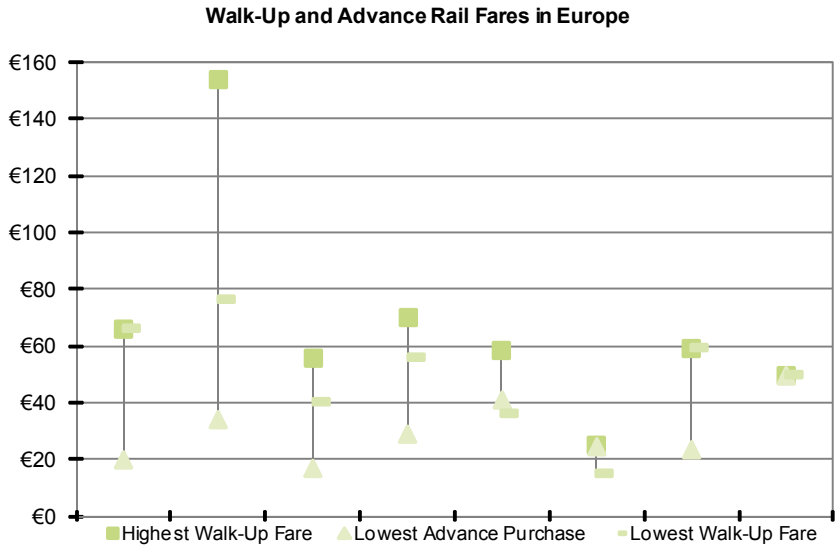
[61] As is the practice of return fares being dependent on the length of stay

Table 13.3: Comparison of Main Long Distance Rail Fares in Selected European Countries

			Walk-up	
Country	**Origin - Destination**	**Straight Line Distance in km**	**Unrestricted Single**	**Unrestricted Return**
Ireland	Dublin-Cork	220	€66.00	€71.00
UK	London to	262	€154.01	€308.02
	Manchester			
France	Paris-Dijon	262	€55.40	€110.80
Germany	Berlin-Hamburg	254	€70.00	€140.00
Italy	Rome-Bologna	302	€58.00	€116.00
Netherlands	Amsterdam to	175	€24.60	€43.80
	Maastricht			
Spain	Madrid to	272	€59.20	€94.70
	Zaragoza			
Denmark	Copenhagen	157	€49.53	€99.07
	to Arhus			

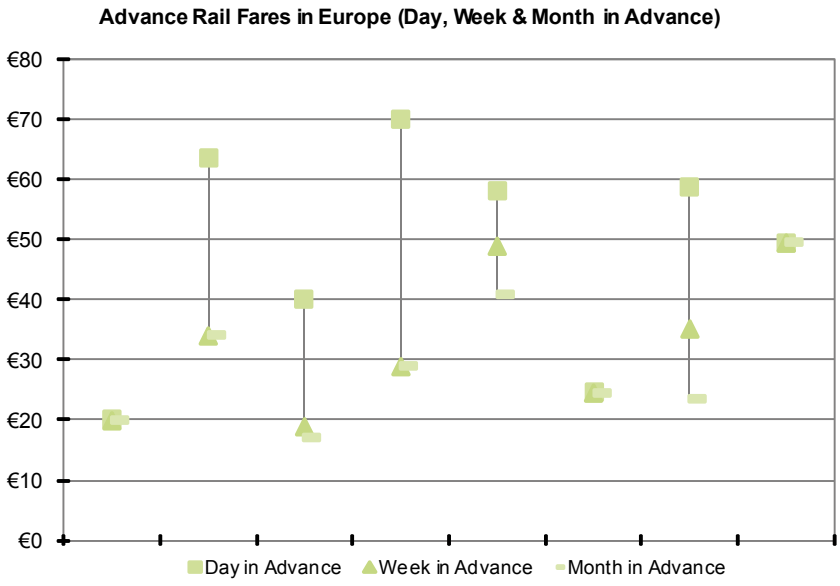
		Advance Purchase		
Off-Peak Single	Off-Peak Return	When Purchased	Single	Return
€66.00	€51.00	Day Before	€20.00	€40.00
		Week Before	€20.00	€40.00
		Month Before	€20.00	€40.00
€76.65	€181.87	Day Before	€63.48	€102.28
		Week Before	€34.09	€59.96
		Month Before	€34.09	€52.90
€40.20	€80.40	Day Before	€40.20	€80.40
		Week Before	€19.00	€38.00
		Month Before	€17.00	€34.00
€56.00	€112.00	Day Before	€70.00	€140.00
		Week Before	€29.00	€58.00
		Month Before	€29.00	€58.00
€36.00	€72.00	Day Before	€58.00	€99.00
		Week Before	€49.00	€98.00
		Month Before	€41.00	€82.00
€14.80	€26.30	Day Before	€24.60	€43.80
		Week Before	€24.60	€43.80
		Month Before	€24.60	€43.80
€59.20	€94.70	Day Before	€58.80	€94.05
		Week Before	€35.25	€70.50
		Month Before	€23.55	€58.80
€49.53	€99.07	Day Before	€49.53	€99.07
		Week Before	€49.53	€99.07
		Month Before	€49.53	€99.07

Figure 13.1: Comparison of Walk-Up and Advance Rail Fares in Europe



Source: Goodbody Economic Consultants, Various Websites

Figure 13.2: Comparison of Advance Rail Fares only in Europe



Source: Goodbody Economic Consultants, Various Websites

13.7 Conclusions & Recommendations

13.7.1 Fares Policy Objectives

It is recommended that two objectives should be set for fares policy:

- To provide a transparent and accessible fares structure and ticket purchase system that facilitates customer choice; and
- To provide a fares system that exploits opportunities to increase revenues, where the loss of social benefits is not excessive.

Given the problems with Exchequer deficits that are anticipated over the medium term, it is likely that the objective of using the fare system to raise revenues will take on greater importance over the initial period of the Strategy at least.

13.7.2 Changes to the Fare Structure

The complexity of the existing fare structure may be a deterrent to ICN rail use, especially as rail demand is characterised by infrequent users. This complexity poses challenges for the publication and dissemination of information on fare types and structures.

A brief review of fares structures and levels has indicated a number of issues that give rise to proposals for change. These include proposals to:

- Reduce the discount offered for walk-up basic return journeys or alternatively re-balance walk-up single/return fares with a lower single fare than is currently offered;
- Amalgamate the two existing flexible return fares into a single flexible fare and apply across the system;
- Standardise, to the maximum extent possible, the days on which walk-up saver fares are offered;
- Consider an approach of ensuring that walk-up saver return fares are always in excess of the basic single walk-up fare;
- Consider an approach of always having the walk-up return saver fares in excess of the equivalent single saver fare;
- Consider whether the lowest advance purchase fare should be raised for longer journeys;
- Migrate the existing advance purchase fares to a time-of-purchase related yield management system;
- In this revised system, consider having advance purchase fares approach the walk-up saver fares as the day of departure approaches;
- Upgrade web-based fare information and make available an improved train and fare search capability; and
- In proposing a change in the fare structure, consider the additional fare system complexity that is being created and weigh this against the possible benefits of the changes proposed.

These and other proposals for changes to fare structures and levels need a more comprehensive appraisal than has been possible in the context of this study. It is recommended that Iarnród Éireann undertake a more comprehensive review of the issues as matter of urgency.

13.7.3 Implementation Issues

Most of the above issues are recognised within Iarnród Éireann and steps are being taken to upgrade fare systems to cope with anticipated reform of the fare structure. These initiatives include the development of a new pricing engine, revenue management system, web site, and new booking office ticket machines. It is essential that the resources necessary to fund these developments be found, if revenues are to be maximised.

While some of the possible reforms of the fare structure highlighted above are dependant on completion of these initiatives, others are not. Given the improved level of service and the increased quality of rolling stock now being or about to be offered, there is now a window of opportunity to introduce reform backed by the improved offer to the customer.

14 Conclusions & Recommendations

14.1 Background

The Government's Statement of Common Purpose indicates that it will draw up a new National Development Plan for the period 2012-2019 that reflects Ireland's changed economic circumstances. This Plan is to be based on a comprehensive study of Ireland's public investment priorities over the period. A key element of the Plan will be the requirement to subject major capital projects to thorough cost-benefit analysis and evaluation. This Rail Network Strategy Review is a contribution to the preparation of such a Plan. It may be noted that it adopts an evidence-based approach and identifies investment priorities on the basis of a detailed cost benefit analysis.

Following a review of the major national and regional transport and settlement strategies, a broad strategic goal for the rail network has been identified as follows.

'To provide safe, accessible and integrated rail services that contributes to sustainable economic and regional development in an efficient manner'.

14.2 Recent Trends & Developments

In the past decade, infrastructural improvements have been complemented by significant investments in rolling stock. As a result, Iarnród Éireann has the youngest inter city fleet in Europe and service capacity and reliability of the ICN have much improved. Passenger demand has responded, averaging 4 per cent per annum growth over a long period. Demand peaked in 2007 at 45.5m passengers for the railway as a whole, before falling back to 38.2 m in 2010. Passengers on the ICN amounted to 21.4m in 2010 or 56 per cent of all passengers in 2010. Total railway revenue has followed a similar pattern, and is currently 17 per cent below its 2007 peak. Despite cost saving initiatives, amounting to c. €75m over three years, the operating deficit for the railway as a whole amounted to €14.3m in 2010, and declining public subvention has increased the difficulty of keeping operating deficits in check. The recent global economic downturn together with the national property and banking crises have forced the Government to significantly reduce and re-prioritise infrastructural spending in the short to medium term. Funding supports for such services are likely to come under increased pressure in future.

14.3 Performance of the InterCity Network

Dublin-Cork

The Dublin-Cork corridor remains the dominant corridor on the rail network, carrying a high level of passenger demand, and a significant level of inter-city movements, particularly by business travellers, who account for over 35 per cent of total rail passengers. It also competes strongly with car for trips between Dublin and Cork City, accounting for approximately 50 per cent of non-bus trips. Other routes perform less well, with lower market shares.

Dublin-Galway

Although overall patronage on the Galway services is relatively low, the demand on services between Dublin and Athlone/Ballinasloe is quite strong, and is comparable with sections of the Cork and Belfast corridors. In fact, the Galway corridor performs a very strong inter-city function, with only 16 per cent of passenger kilometres accounted for by commuters. Rail competes poorly on journey times with road transport on the Dublin – Galway route, although the train can offer competitive journey times to intermediate destinations such as Tullamore.

Dublin-Belfast

The Dublin to Belfast corridor carries a relatively high level of passenger demand, although much of this is accounted for by outer-commuting services to Drogheda and Dundalk. InterCity services perform extremely poorly in relation to the route's population catchment and trip length. The low level of business travel on this corridor is particularly notable.

Dublin-Limerick

Limerick is provided with the highest number of connections from Dublin compared with any other regional destination. Connections are provided at Limerick Junction to all Dublin – Cork services, with further direct, albeit stopping, services provided from Dublin (Heuston). The journey time via Limerick Junction is also good. As a result, demand is relatively strong, and the route performs relatively close to its full potential. Nevertheless, the interchange requirement remains a barrier to travel on this route. The interchange also poses additional delay to Dublin – Cork Services.

Dublin-Waterford

Although subject to recent increases in service frequency, the Dublin to Waterford corridor continues to suffer from a number of barriers including the relatively high journey time in comparison to road, the isolation of the mainline rail station in Waterford from the City Centre, and the limited population catchment along the corridor. Journey times are hampered by the arrangement in Kilkenny, and by permanent speed restrictions through difficult terrain, and this all contributes to the route falling significantly short of its full potential demand.

Dublin –Sligo

Patronage on the Sligo route responded well to improvements to frequency and rolling stock quality in recent years. The route carries significant traffic from the commuter areas within the Greater Dublin Area, and demand to/from areas northwest of Longford is somewhat weaker. The route enjoys a moderate train frequency (8 trains/day) for a limited population, using high quality rolling stock and at a journey time that is comparable to that by road. The route also terminates in Connolly Station which boasts good access to the City Centre.

Dublin-Westport/Ballina

The Westport and Ballina service is one of the longer routes from Dublin, and patronage is relatively strong when compared to the catchment population – mainly as a result of the tourism potential on the line. Even so, the high proportion of concessionary travellers on this route has been noted, which make up a significant proportion of leisure travellers. The demand at Castlebar is particularly strong, and confirms the important role of rail in servicing the Castlebar-Ballina linked hub.

The journey time is reasonable in comparison to road journey times, and would become more competitive with any improvements to line speed between Dublin and Athlone. The main deficiency on this route is the low frequency which restricts availability of services, and the requirement to interchange for Ballina services.

Dublin-Tralee

The Tralee routes generate quite strong levels of demand in comparison to the population catchment. As with the Westport/Ballina route, this is due to the high volume of tourism, although a significant level of that demand includes concession travellers which comprise in the region of 30 per cent on parts of the Mallow – Tralee corridor.

The long travel times by road from Dublin to Killarney and Tralee supports the use of the railway, and patronage is resilient, despite the need for an interchange at Mallow for the majority of services.

Dublin –Rosslare

The Wexford service is relatively isolated from the core InterCity railway network. The high commuting demand arising from coastal towns in Wicklow and North Wexford dominates the route. Rolling stock is variable and the InterCity experience can be extremely poor, particularly for peak time departures from Dublin.

The journey time to Wexford is not unreasonable, but demand is restrained by limited service frequency and the variable rolling stock quality. Overcrowding is also prevalent on peak services to and from Dublin.

Other Routes

The Waterford – Limerick Junction, Ballybrophy – Limerick and Manulla Junction – Ballina lines all carry quite low passenger volumes and low levels of passenger kilometres. The existing demand on the Ballybrophy to Limerick line is especially poor. However, this reflects very limited passenger demand into Limerick City. Instead, this line primarily acts as a feeder service from Nenagh and Roscrea onto InterCity services at Ballybrophy.

There is very limited demand for movement between the regional cities. Travel by rail between Cork, Limerick and Galway is extremely low, as is demand between Waterford and Limerick. Analysis confirms that this is also generally the case for road travel, where the volume of city centre to city centre movements is relatively low, other than for:

- Trips between the Regional Cities and Dublin City; and
- Trips between Regional Cities and large towns within their catchment.

This dictates against substantial investment in providing connections between the regional cities, other than in those areas where the catchments of connected cities partially overlap, and InterCity connections allow both catchments to be connected with their relative city centres on a single service. Whilst this is the case with Galway-Limerick and to a lesser extent Limerick – Waterford, it is not the case with Cork – Limerick.

14.4 Service Levels

Service frequency varies considerably across the network to match demand. However, catchment analysis confirms that the Belfast and Galway routes have relatively low service frequencies compared to the population they serve. Line speed is an important attribute of service quality and is dictated by track quality, the number of stops that a service provides, and driver behaviour. The Cork and Limerick routes exhibit the least amount of slow speed running, whilst the Rosslare, Waterford and Sligo services exhibit the highest levels. A high

percentage of slow running was also observed on the Belfast and Galway routes, suggesting that there may be scope for improvement in travel times through addressing existing temporary and permanent speed restrictions, and through reducing the requirement for stopping. The high percentage displayed by the Belfast service is of particular concern as there were only four scheduled stops on that particular service. A key issue on that route is the presence of significant speed restrictions north of the border.

14.5 Future Patronage

It is anticipated that without further service improvements, passenger numbers will not recover their 2007 peak of 45.5m until after 2015 based on forecast economic and demographic trends. The long term predicted growth rate is 1.9 per cent. The projection is for ICN traffic to increase from 21.3m in 2009 to 31.1m in 2030. This represents an increase of 46 per cent or 1.8 per cent per annum. This may represent a conservative forecast, as there is potential for rail to win traffic from both car and air modes, as a result of increased energy prices and reduced subvention of air services. Increased competition from the bus mode is likely to arise only if a policy shift to liberalisation of the bus market takes place. The growth rate in passenger demand reflects lower population and GNP growth rates in the post Celtic Tiger period.

14.6 Future Role of the ICN

The key role for the ICN over the period to 2030 will be to contribute to the maximum extent possible to value for money, economic productivity and competitiveness, while ensuring safe, sustainable and integrated services. The ICN has a number of key advantages over other modes in this regard:

- It provides direct city centre to city centre links at a time when the service sector has increased in importance and high value-added services continue to located in city centres;
- The level of service offered by ICN is unaffected by road congestion at the approaches to urban areas, which means that the rail mode offers a degree of reliability, which is becoming more and more valued by trip-makers;
- It contributes to economic productivity by permitting business travellers to work when travelling;
- Where service frequencies are high, it further improves economic productivity by facilitating return journeys between the major urban areas within one day, without driver fatigue and safety issues arising; and
- It has an as yet unexploited role to play in providing transport services for tourists.

14.7 Strategic Priorities

These considerations point to a number of strategic priorities that should inform the development of a strategy for the ICN. These are:

- The need to ensure that the renewal of the track system is safeguarded and that adequate resources are devoted to maintenance and renewal of track infrastructures and rolling stock;
- The need to build on the infrastructure and rolling stock investments already made to ensure that they make the maximum contribution possible to economic development;

- Within this context, to provide service frequencies and service improvements that will prove attractive to users in general and business users and car available passengers in particular;

- Other things being equal, to concentrate future investments and service improvements on linkages between the major agglomerations. This suggests that the radial routes connecting Dublin to Cork, Belfast, Limerick, Galway and Waterford should be the focus of future rail development;

- To support National Spatial Strategy objectives by improvement of the key non-radial rail links between Cork, Limerick and Galway where transport volumes are of sufficient density; and

- To improve rail links and services to the major airports that act as access points for tourists.

In addressing these issues, given that funding resources are likely to be scarce for the foreseeable future, the investment needs and service improvements must be based on a value for money approach and in the context of ensuring that revenues are maximised to the greatest possible extent.

14.8 Future Investment Strategy

To increase patronage and enhance the economic role of the railway, a three phase investment strategy is proposed. This strategy recognises the current state of Exchequer finances and is predicated on adequate resources being devoted to infrastructure and rolling stock maintenance and renewal, in order to preserve the gains made in service levels. An estimated spend of €215m per annum on infrastructure maintenance and renewal is required over the period to 2030. This is similar to existing levels of spending. Rolling stock maintenance and renewal spending of €116m per annum will be required.

Phase 1: 2010-2015: Consolidating the Gains through Quick Wins

This Phase has three elements:

- Relatively small investments to reduce journey times on rail corridors, with the prime emphasis on the Cork and Galway routes, where there is high existing or potential passenger demand;

- Using existing rolling stock to provide increased frequency on selected routes; and

- Short-term improvements to services to Dublin Airport, through development of a Dublin Parkway station for InterCity customers from the south and west. (This is in addition to the separate development of a direct DART spur to the Airport from Clongriffin, which will initially serve passengers from the east coast, the City centre and Northern Ireland.

These investments would show a large return in both passenger benefits and fare revenue for Iarnród Éireann, if they were carried out immediately. The proposal to invest in the short term to increase journey times was based on relatively modest improvements to line speeds. If further short-term reductions in journey times are possible, then the benefits of this strategy would be enhanced.

Phase 2: 2015-2020: Responding to Long Term Growth

The introduction of more ambitious investments in infrastructure and service frequency improvements, such as for example double tracking from Portarlington to Athlone and the early opening of a DART airport link between Clongriffin and the Airport, as well as improvements that are reliant on growth in demand to exhibit a satisfactory economic return, such as upgrades to Limerick Junction and Athlone Stations.

Phase 3: 2020-2025: Electrification of the Core Rail Network

When sufficient growth has occurred and rolling stock replacement is approaching, electrification of Dublin-Galway and Dublin Cork will yield significant returns. This should encompass direct services to Dublin City Centre and Dublin Airport via the DART Underground.

14.9 Route Investment Strategies

Analysis indicates that improving InterCity journey time to at least 2:00 hours on the Dublin to Galway, Limerick, Waterford and Belfast routes and at least 2.30 hours on the Cork route would establish rail as a strong option for such connections, and will bring a high level of consistency and transparency to the network. Measures to improve journey times and or improve frequencies on these and other routes were considered. An investment of €50 million per annum on the removal of speed restrictions over the next five years could be expected to deliver even more competitive journey InterCity times than those set out above. Given the focus of transport policy on the promotion of sustainable development, electrification of the more highly trafficked routes is envisaged for the longer term.

The route investment options were subject to cost-benefit analysis to determine their economic return, priority and phasing. The recommendations on a route by route basis are:

Dublin-Cork: A modest short term investment programme aimed at reducing journey times would yield a large economic return. This is based on achieving a journey time of 2.30 hours or better. Further improvements, identified by Iarnród Éireann to achieve a 2 hour journey also merit consideration in the short term given the central importance of this route for the other InterCity services to and from the south and west.

The economic return to electrification depends on the timing of the investment. If this investment were to take place in the near future when the current fleet of InterCity carriages are all still within their useful life, the relevant costs of electrification would include the full cost of a new electric fleet (EMUs), and the investment would not be justified. However, if electrification is postponed until the current fleet is being replaced, the relevant capital cost of electrification would be limited to the cost of the civil works needed to the line. This would make electrification an attractive investment at that juncture. When the DART Underground is in place, electrification combined with a spur to Dublin airport from Clongriffin will open up large parts of the network to through running to the airport.

Dublin-Galway: Similarly to Dublin-Cork, a short term investment programme aimed at reducing journey times to no more than 2 hours would yield a large economic return. Iarnród Éireann has identified measures that could be introduced in the short term to reduce the journey time to 1hr 30 minutes. These are worthy of further consideration.

An hourly service on this route would be attractive in the short term, if it can be introduced with

the existing fleet and without significant capital investment or negative impacts on existing stopping patterns. This appears to be the case.

Further growth in passenger numbers and increases in the value of these passengers' time will make double tracking from Portarlington to Athlone an attractive investment in the medium term, particularly to improve the reliability of the service.

In the longer term, electrification can be justified on the same basis as Dublin-Cork. In fact, the Dublin-Galway line offers a better return on electrification than the latter.

Dublin-Belfast: If journey times can be reliably reduced to 2 hours with a limited set of investments, then such spending is justified. Additionally, as extra rolling stock is likely to be available in the short term, the introduction of an hourly service should be considered.

Predicted levels of travel between Dublin and Belfast by all modes are not high enough to justify the cost of electrifying the line. This remains true even if electrification is postponed to when rolling stock is being renewed, although this should be kept under review in the context of wider policies.

Dublin-Limerick: Service improvements such as introducing more direct services and upgrading Limerick Junction do not show a high economic return in the short term. However, upgrading these services should be considered in conjunction with the equivalent investments in the Dublin-Cork service, which will generate journey time savings.

Dublin-Waterford: An investment to reduced journey times to two hours is justified if it can be achieved for a relatively modest investment in civil works. The Waterford services will benefit from time savings generated on the main Dublin – Cork route. Similarly there is clear potential to realise significant net gains by improving access by passengers to Waterford train station.

Dublin-Westport/Ballina: An increase in service frequencies to up to 8 per day would yield an economic return, if rolling stock is available. In the medium term, proposals to upgrade Athlone station and to introduce a shuttle service with existing fleet involving interchange with the Galway service at Athlone should be considered.

Dublin-Rosslare: Upgrading the quality of service to an InterCity level in the short term produces enough extra patronage and is of enough benefit to existing passengers to justify the investment required. However, increasing frequencies to eight per day requires a larger investment that cannot be justified at current levels of demand on this route.

Dublin-Tralee: A relatively modest investment to upgrade Mallow station is appropriate.

Waterford-Limerick Junction: A range of service improvements were considered, but none proved viable, given limited demand along the route.

Limerick-Ballybrophy: If the service from Ballybrophy stopped at Nenagh rather than Limerick it would be possible to run eight services a day with the same rolling stock needed for five services a day between Ballybrophy and Limerick. There is evidence that such a change in the service pattern may be worth considering.

In the context of reduced subvention levels and funding from the automation of level crossings there is a need to carefully consider options to reduce costs on the Waterford – Limerick Junction and Limerick – Ballybrophy lines. The options range from closure to more targeted services over sections of the routes.

14.10 Line Service Closures and New Rail Lines

A number of new rail lines have been proposed by various interests. Of these, a sketch appraisal indicates that only the Athenry-Tuam line merits further consideration, taking account of the performance of Phase 1 of the Western Rail corridor between Ennis and Athenry. None of the others perform sufficiently well to be further considered.

14.11 Rail Freight

Recent developments have indicated that opportunities continue to arise for the carriage of bulk materials and unit load traffics, where relatively long distances and port oriented traffics are involved. Carriage of additional traffic by rail could provide an economic if not financial rate of return. As the costs of climate change rise, the economic benefits of using rail freight will grow. For certain traffics, these benefits may then outweigh the costs of providing services, so that the use of the rail mode over road freight haulage should be favoured.

The previous Government commitment to introduce an allowance (subsidy) per tonne for freight transported by rail suffers from the drawback that it is not budget delimited. Given the current Exchequer position and the competition for scare resources, it is considered that such a policy is no longer justifiable. It is recommended that Government supplant this approach by a grant facility that would be available to both enterprises and Iarnród Éireann to support projects where a clear economic return exists, as demonstrated by a cost-benefit analysis that encompasses environmental and other economic benefits.

14.12 Fare Structures

The single walk-up fare in Ireland is broadly on a par with equivalent fares abroad, with the exception of the UK. Fares in the UK are substantially in excess of the European norm.

The policy of offering basic return fares at a substantial discount to two single fares is very much a UK and Irish phenomenon. For other countries, the return fare is typically double the single. Irish basic return fares are offered at a much more substantial discount to single fares that the UK equivalent. Ireland is unique in offering a discount/ saver return fare below the basic single.

While the UK and Ireland were first to make the transition to Advance Purchase, these pricing techniques are quickly becoming more commonplace in Europe. Where they exist, they are varied by time of purchase i.e. they represent a yield management pricing strategy. Despite Ireland being a relatively high price high wage economy, advance purchase fares in Ireland are pitched very low in comparison to the rest of Europe.

The current rail fare structure, which is complex, may be a deterrent to ICN rail use, especially as rail demand is characterised by infrequent users. This complexity also poses challenges for the publication and dissemination of information on fare types and structures. There is a need to simplify and rationalise fare structures, upgrade web-based fare information, and make available an improved train and fare search capability.

A number of key reforms to the fare structure need to be considered:

- Reduce the discount offered for walk-up basic return journeys or alternatively re-balance walk-up single/return fares with a lower single fare than is currently offered;
- Amalgamate the two existing flexible return fares into a single flexible fare and apply across the system;
- Standardise, to the maximum extent possible, the days on which walk-up saver fares are offered;
- Ensure that walk-up saver return fares are always in excess of the basic single walk-up fare;
- Set the walk-up return saver fares above the equivalent single saver fare;
- Raise the lowest advance purchase fare for longer journeys;
- Migrate the existing advance purchase fares to a time-of-purchase related yield management system; and
- In this revised system, consider having advance purchase fares approach the walk-up saver fares as the day of departure approaches.

These and other proposals for changes to fare structures and levels need a more comprehensive appraisal than has been possible in the context of this study. It is recommended that Iarnród Éireann undertake a more comprehensive review of the issues as a matter of urgency.

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