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Attn. Ms. Róisín Kelly,
Clerk to the Committee for Regional Development,
Northern Ireland Assembly,
Room 402,
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Stormont,
Belfast BT4 3LR

30th November 2009

Submission to Sustainable Transport Inquiry

Dear Ms. Kelly

Please find enclosed a Submission to the Regional Development Committee as part of its Inquiry into Sustainable Transport in Northern Ireland.

This Submission focuses on the role of Rail as a key component of Sustainable Transport policy and is in two parts; the first sets out key points about the Rail mode and makes some policy Recommendations, and the second is a re-print of major rail investment proposal made to Translink in 2008 which Committee Members may find useful.

We hope you find the Submission useful - many thanks for your assistance.

Yours faithfully

The Lord Laird of Artigarvan

Brian Guckian
Rail & Integrated Transport Researcher

Submission – Part One

KEY ATTRIBUTES OF RAIL AS A CENTRAL COMPONENT OF SUSTAINABLE TRANSPORT POLICY

- The authors concur with the broad principles of Sustainable Transport as ably outlined in the Submission from the Sustainable Development Council of Northern Ireland to the Regional Development Committee

- The authors stress the key energy-efficiency and CO2-efficiency of the Rail mode – typically up to 80% more efficient in terms of oil consumed[1] and between 40% and 60% more CO2 efficient than road transport[2]

- Rail is also far less land-intensive; a single-track railway typically takes up to 85% less land than a dual carriageway / motorway[3]; this percentage rises further when the major ancillary landtake of motorway interchanges / feeder roads are taken into account

- The impact of Rail on the environment is minimal, preserving increasingly valuable arable land, cutting CO2 emissions and reducing oil dependency in transport. Electrified rail can utilise renewable energy

- Cost-Benefit Analysis methods that currently favour road over rail must be urgently revised. It is imperative to correctly and properly internalise the substantial external benefits of the Rail mode. A useful example is the ROI *Strategic Rail Review* carried out by Booz Allen Hamilton in 2003 which conservatively quantified the external benefits of the Rail mode in ROI at some € 18 billion projected over a 20-year period beginning in 2002

- The idea that Rail requires very large populations for viability is false and arises out of a misunderstanding of Rail economics where the external benefits of the mode are ignored. Again, properly internalising the external benefits reduces the perceived "need" for large populations

- Railfreight is often ignored. As well as being essential to reduce the carbon-intensity of transport and to increase its energy efficiency, Railfreight provides another important revenue stream that also reduces an excessive dependence on passenger traffic

- Also, the perception that Railfeight is viable only over long distances is also false. Viable railfreight flows take place on a daily basis along short routes in the UK and ROI. Examples are coal train runs to power stations in the UK and the Tara Mines flow to Dublin Port in ROI

- The Regional Transportation Strategy 2002-2012 urgently needs to be subjected to a Sustainability Audit / Review. Unacceptably, given what is now known about Climate Change and Peak Oil, the RTS proposed heavy spending on roads (63% or almost two-thirds of total proposed allocations) over Rail (just 14% of the total) – an imbalance of over 4 to 1

- It is notable that a re-balancing of the RTS to pay for the Rail investment and expansion programme detailed below would only reduce the road allocation in the RTS to 49% and increase the Rail share to just 28%

RECOMMENDATIONS

- An active, expansive *Rail Development Policy* should be established at all levels of central and local government in Northern Ireland as a central component of broader Sustainable Transport policy[4]
- The DRD should take its cue from Scotland and mainland Europe for this Rail Development Policy
- The DOE must be involved in Sustainable Transport policy, and by extension, the proposed Rail Development Policy
- A dedicated, cross-cutting Rail Development Unit (RDU) could be established within the DRD and the DOE to implement this policy
- Education in Rail, both for central and local government officials, public representatives and the public at large is absolutely essential. There is currently an enormous education deficit in this area that has allowed patently false ideas and myths about Rail to become established in the last number of decades, particularly since the era of the widespread rail closures in the 1960s
- Cost-Benefit Analysis methods that currently favour road over rail must be urgently revised. It is imperative to correctly and properly internalise the substantial external benefits of the Rail mode. A useful example is the ROI *Strategic Rail Review* carried out by Booz Allen Hamilton in 2003. They conservatively quantified the external benefits of the Rail mode in ROI at some € 18 billion projected over a 20-year period beginning in 2002
- The re-introduction of Railfreight in Northern Ireland should be examined urgently, with critical reference to CO2 emission reduction and the need to significantly increase the energy efficiency and reduce the energy intensity of transport
- Electrification of the current and future NI Rail network should be examined
- The Regional Transportation Strategy 2002-2012 urgently needs to be subjected to a Sustainability Audit / Review and the imbalance of over 4 to 1 for road over rail needs to be dramatically improved or even reversed

REFERENCES

[1] Based on data from *2004 Energy Balance*, Sustainable Energy Ireland (SEI);

[2] Based on data from the UK Office of Rail Regulation (ORR) *Rolling National Rail Trends 2008/09* in *The Climate is Right for Trains*, Bombardier Transportation, 2009 (www.theclimateisrightfortrains.com) and *Baseline Energy Statement – Energy Consumption and Carbon Dioxide Emissions on the Railway*, UK Association of Train Operating Companies (ATOC), March 2007

[3] Based on 40m typical motorway mainline footprint compared to 5m footprint for single track Rail

[4] In a recent address to the Railway Study Association, Stephen Joseph, Executive Director of the Campaign for Better Transport stated : "*The Government needs to make rail a core part of a low-carbon transport strategy*" (*Modern Railways* December 2009 pp 56-59)

Submission – Part Two

The following document is for Committee Members' reference and provides additional useful information, as well as setting out a coherent Vision for the development of Rail in Northern Ireland

NORTHERN IRELAND NETWORK ENHANCEMENT

TRANSLINK CUSTOMER SUBMISSION

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About this Submission

NINE is an ambitious rail development programme proposal. It is being made by the author to Translink in his capacity as a regular Translink Customer.

It places particular emphasis on new methodologies in Cost-Benefit analysis (CBA) and addresses several common myths about rail economics.

The proposal was mentioned briefly in an Appendix to a Submission made by the author to the Railways Review Group in 2004. Some material has been repeated from that Submission in this document, but the welcome significant upgrade to the NI Railways network in the intervening period has made much of the previous text redundant.

It is important to note that this document is a Submission, and not a Report or a Study. Rather, it is intended to stimulate ideas and debate, and calls for further feasibility work going forward.

Context

Comments and ideas outlined in this document are framed within the context of key developments in current Rail Transport Strategy. There are many models now available worldwide for sustainable and viable regional rail development, which could be applied in the NI context. Recent work carried out in other parts of the UK, such as Scotland, is particularly relevant[1].

New approaches in Rail Development

The Submission builds upon the increasing awareness of rail transport as a viable and sustainable resource and as a significant contributor to balanced regional development, emissions reduction and energy conservation. This is also commendably reflected in the Regional Transportation Strategy.

Key innovations apparent in 2008 are;

(a) New Economic and Accounting Practices

Rail has traditionally been accounted for using crude income and expenditure-based analyses. At best, these are highly subjective and have ignored the enormous indirect benefits of the mode. More sophisticated tools are now available that radically enhance the viability of many rail schemes by analysing their cost / benefits with better regard to their positive external environmental and social benefits.

(b) New Technology

Innovations such as “smartcard” ticketing provide seamless integration between transport modes and dramatically increases travel convenience, thus stimulating patronage to a high degree. This has been seen to significant extent in London with the Oyster Card.

Additionally, increasingly sophisticated train management methods and signalling practices have permitted the introduction of “clockface timetabling”, which also transforms the “user-friendliness” of rail.

(c) Responses to External Influences

The threat posed by climate change, the costs of road traffic congestion, health problems caused by air pollution, and newly-emerging concerns regarding energy demand and supply have created powerful new conditions for rail development - and new economic analyses addressing these issues make such development possible.

(d) Railfreight Innovations

Tax incentives for the construction of new railfreight facilities or for logistics operators and their customers to incorporate the rail mode into their transport chains have been available in the UK for many years. Two other highly significant advances in Railfreight are firstly, the Minimodal® system which uses techniques adapted from aviation cargo; a low-cost, extremely versatile road / rail freight handling solution which has had a dramatic effect in reducing lorry movements where it has been used the UK, without compromising the economics of the supply chain[2].

The second innovation is the development of new types of ISO container, ranging from refrigerators to oil tanks and car-carriers. This brings a dramatic new versatility to traditional inter-modal freight handling and transfer techniques.

(e) Community Rail Partnership Structure

The Association of Community Rail partnerships (ACoRP) has done outstanding work in the UK in getting communities actively involved in the running of their local rail services, and strengthening integration via feeder bus services, cycle accommodation, pedestrian access etc. Some Community Rail Partnerships have boosted patronage by up to 120%[3].

(f) NI Region Rail Projects

Several rail development projects have been drawn up around the country. The majority of these provide strong links to and from towns not catered for by the existing network, which suffers from being focussed on radial routes emanating from Belfast. The main advantage of these projects is high connectivity, both with other parts of the rail network, and with other transport modes such as road, bus and air. Innovative features are use of low-cost construction methods and operating systems, integration, ease of use, reliability and faster journey times.

These outline projects have now been collected together into a single proposed development package and are detailed in this Submission.

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Current Situation

Northern Ireland has a rich railway heritage, with the network reaching its maximum extent of over 1000 route miles in the early 1900s. Extensive closures, between 1950 and 1970, have reduced this to approximately 207 route miles.

From the onset of road transport in the 1930s, the rail mode has suffered from a limited economic approach. When rail was the dominant form of transport, and privately owned and operated, there were very large volumes of passengers and freight carried. This allowed companies to make clearly-defined profits or losses, determined by direct receipts set against direct operating costs. However, this masked the substantial indirect benefits of the mode, which in the first hundred years of operation related to economic and social development.

As rail lost its pre-eminent position in the first half of the 20th century the privately-owned ownership model, with its requirements for basic calculation of profit / loss, and responsibility to shareholders, was no longer valid. The state began to be involved in the financing of rail, as a way of "bailing out" transport concerns that on paper were beginning to make very heavy financial losses.

Yet the state continued to apply the outmoded accounting model that completely ignored the indirect benefits of rail, and the early 1950s onwards saw attempts to make the railways profitable again in the limited direct receipts / direct costs sense. However, the strategy adopted, of wholesale route closure and rationalisation, incurred heavy direct and indirect costs and is widely criticised today. At the time it was not realised that closure of branch and cross-country lines had a disproportionate effect on the longer routes, in that people tended to transfer to the car mode for their entire journey, rather than drive to the nearest mainline railhead in place of their local service, as was originally envisaged[4].

The early 1970s saw a change in attitudes due to a growing awareness of the impact of traffic congestion, and a recognition to some extent of the indirect benefit of rail, which was framed in terms of the social role the mode had to play. Accordingly, there was much-needed investment, new operating practices and new rolling stock, which brought stability to the network, increased patronage and prevented further contraction.

In NI, the further stabilising of the internal political situation in the mid-1990s made way for a sharp increase in growth in the Region, which allowed NIR to consolidate and enhance its legacy network, with the much-lauded Cross-Harbour Rail Link and Great Victoria St. Station projects coming on stream. This was further boosted by more recent the Bangor Line relay, the re-building of the Bleach Green Junction – Antrim section of the Londonderry line and the introduction of the high-quality C3K rolling stock.

Encouraging though these developments have been, the context in which rail operates and is evaluated has continued to be viewed using a restrictive economic paradigm. The difficulty has been that;

The Indirect Benefits of the rail mode have often been framed solely in vague environmental and social terms, out of kilter in today's global marketplace

This is a vital distinction, and explains why network expansion or enhancement is not often considered. And, the neutral nature of economics is often overlooked by commentators who frequently politicise the debate into left versus right, or capitalist versus socialist, etc.

What is highly encouraging is that a more sophisticated economic analysis of the indirect benefits of rail, arising out of proven cost-benefit techniques, is now available. It takes into account such factors as time savings, reduction in emissions, road accidents prevented, road construction savings, wear and tear on vehicles, and so on. This gives a totally new and much truer picture of rail economics. An example of how this, taken with other factors, can transform the financial performance of a rail network is given below.

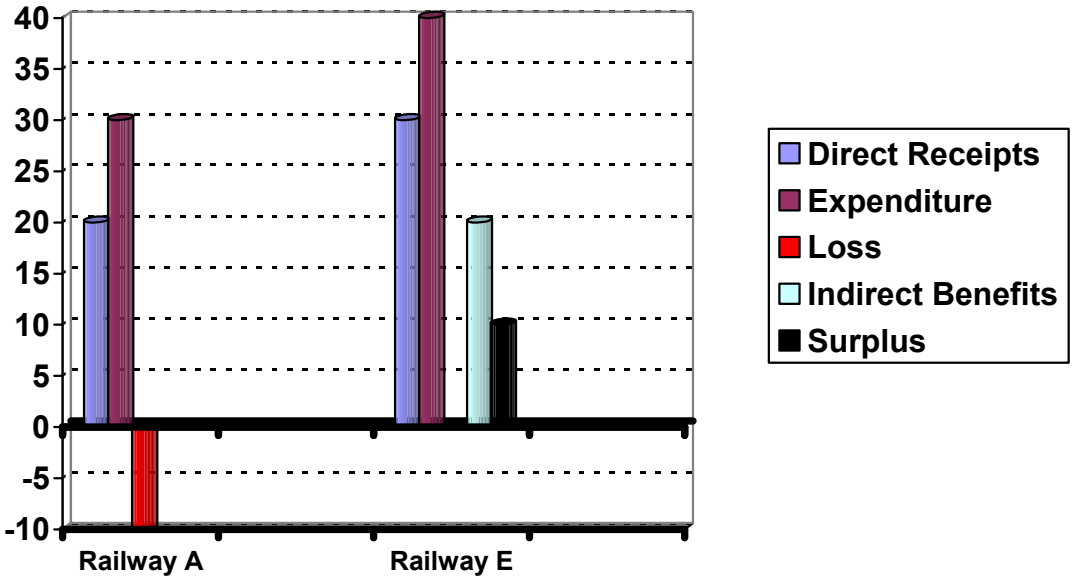

Fig 1 – Railway A is a passenger-only network accounted for purely on operating income and expenditure. It runs high-quality services based on deep local knowledge of customer need, using modern rolling stock and new technology such as integrated "smartcard" ticketing. The network makes a loss, subsidised by the state in the form of a PSO grant. Extensions to the network are resisted, as these are made dependent solely on high levels of fare revenue for justification, and therefore high levels of "population density". Since settlement patterns rarely occur like this, the network is never extended.

Railway E, (the Enhanced Network) on the other hand, has a larger network with higher receipts and expenditure than Railway A, and also carries freight using the most modern techniques. However, the indirect benefits of the rail mode are also accounted for, allowing for network extension that is not dependent on high "population density" values. The PSO grant can be re-positioned as a *dividend* and the network makes a surplus, permitting further investment and expansion.

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New External Influences on Rail Development

The indirect benefits of rail are augmented by the contribution of the mode to combatting Climate Change. Reductions specifically in greenhouse gas emissions generate increasingly significant financial savings. In that regard, it is important to note that figures quantifying the indirect benefit of rail used in this document must at this time be taken to be highly conservative in nature.

A second key driver of rail development in a new economic context is the ability of new technologies to substantially raise passenger ridership and bring freight back onto the railways. Innovations such as the Oyster Card in London represent the application of consumer convenience concepts to transport, dramatically boosting "user-friendliness" and very importantly, facilitating seamless integration across bus, train, tube and light rail modes. In this way, the passenger is presented with a "menu" of travel options in which to carry out a "door-to-door" journey by public transport. Likewise on the freight side, engineering advances have re-introduced flexibility and cost-effectiveness back into physical handling and transfer of cargo – most important in getting businesses to seriously look at incorporating the rail mode back into their purchasing and supply chains.

These key influencers on rail development are now discussed in more detail;

Rail as a Key Component of Climate Change Policy

Climate change, brought about primarily by the continued build-up of Carbon Dioxide (CO^2) gas in the atmosphere, is underway. The effects of this are difficult to predict, but it is generally held that continued polar icecap melting will lead to an increase in mean sea level and disrupt ocean currents. Coupled with changing weather patterns (increased number and strength of storms for example), the result could be widespread flooding and inundation of low-lying land areas. This in turn has serious social and economic implications, with population displacement, disruption to services, reduced industrial output, contraction of markets for goods and services, and so on.

Since the process has already begun, the task must be to reduce its extent and impact, and a package of measures that could be implemented includes:

- Conversion of car / bus / rail vehicle engines to run on biogas, hydrogen, methane or other sustainable, non-polluting[5] fuels
- Shift in energy sources from oil to wind, wave and solar power, etc.
- Air travel limitation
- Re-afforestation
- Allocation of land resources for biofuel production
- Changes in agricultural practices

A carbon-efficient transportation model is given below;

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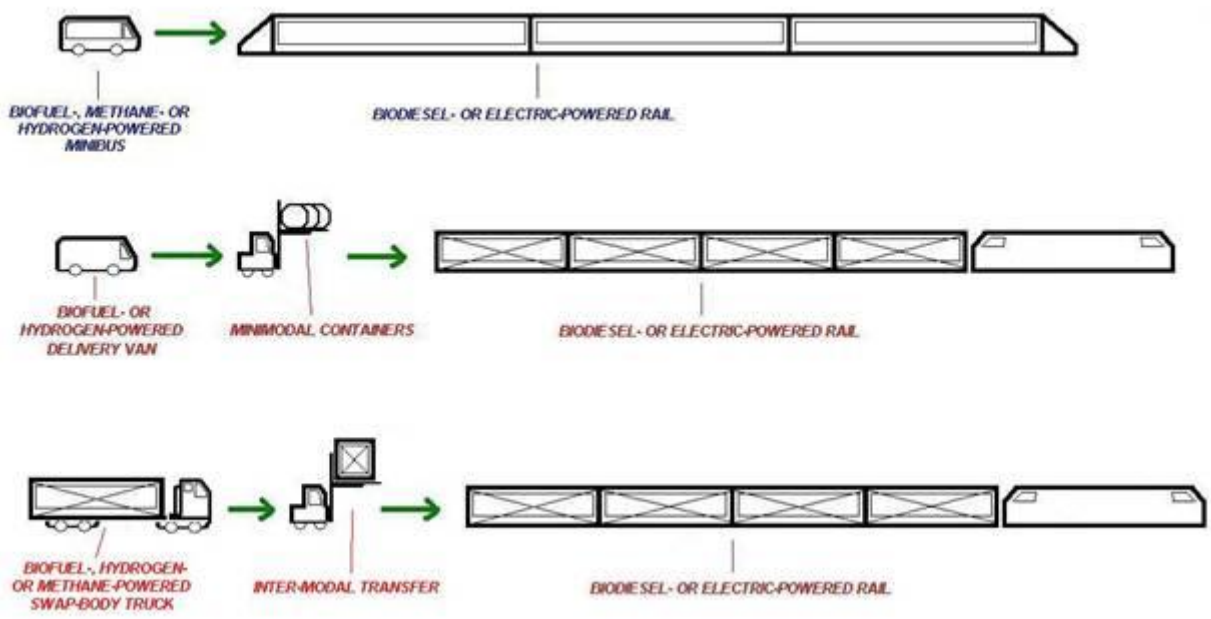

Fig 2 – Passenger and Freight carbon-efficient transportation chains using available or near-available technologies

Modal Switch Technologies

The principal reason the car and lorry has dominated modern land transport is convenience. These provide “door-to-door” travel capability, whereas other modes have lagged far behind in this regard.
Principle barriers in many countries to door-to-door passenger travel by say, bus and rail, have been as follows;

- Segregated ticketing
- Inconvenient timetabling
- Need for cash and exact change
- Distant rail stations
- Lack of bus connections
- Lack of secure car or cycle parking
- Inconvenient pedestrian and cycle access

However, technology now provides the following solutions;

- Fully integrated and reliable ticketing using “Smartcards” (e.g. Oyster)
- Clockface and fixed-interval timetabling
- Cashless systems using pre-paid cards
- Feeder minibuses to stations, often running on “green” fuel sources
- Provision of secure parking facilities for both car and cycle modes
- Provision of cycle tracks and segregated walkways to transport centres

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It can be seen that a cashless ticketing system, fully integrated across all modes, plus frequent minibuses serving rail links with regular-interval services, and clear unobstructed access at both ends, provide an almost seamless “door-to-door” transport system, thus offering a strong alternative to the car.

There are some other factors that need to be taken into account also;

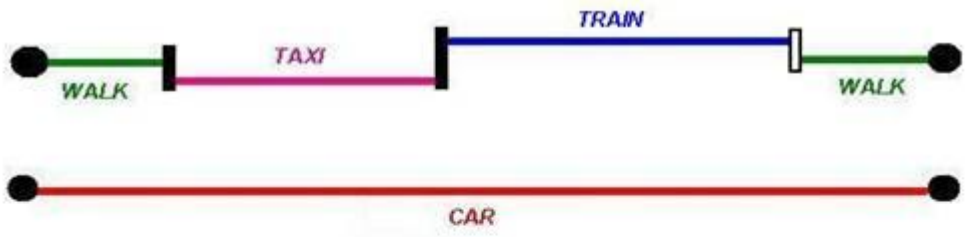
- Car design emphasises attractiveness and desirability
- The mode promotes individualism and freedom

These are more difficult to apply in a group travel situation. However there are successful strategies available;

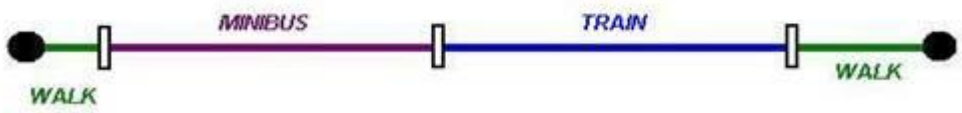
- Bus and train vehicles designed in a much less functional manner with a strong emphasis on aesthetic appeal
- The use of tactics to individualise the group travel experience. This can be done for example by using personalised collectible smart cards, just like early phone cards, and currently, mobile phone covers. One could introduce an integrated ticket product known as say, “MyCard”, for example, with many different designs and perhaps extended functions beyond travel.

It must be said that Northern Ireland has had a very high awareness of the importance and benefits of integrated transport, much more so than several other countries, including the Republic of Ireland. The current programme of building Integrated Travel Centres across the Region, plus numerous other schemes to promote greater accessibility to rail and bus services, plus encouragement of cycling and walking, is proof of an active commitment to this integration, and is very welcome.

Fig 3 – “Smartcard” ticketing makes “door-to-door” public transport realistic



Simple journey diagram contrasting the difference between non-integrated travel modes, and the car mode. The black boxes indicate modal shift with ticket purchase; the white box modal shift where ticket purchase is not required



The same journey but using non-car modes / integrated ticketing. In this case journey convenience is vastly increased.

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On the freight side of rail, historic problems have been costs of physical labour and time delays involved in cargo handling and transhipment. As with passenger journeys, the articulated truck or small and medium heavy goods vehicle (HGV) have dominated the scene because of their ability to offer “door-to-door” service and convenience.

Until recently, railfreight has had to confine itself to bulk or dangerous loads that cannot be moved economically or safely by road. Containerisation offered a way forward for many railways in the 1960s and 1970s, but this historically involved very heavy and costly freight handling equipment and large, dedicated freight yards.

Again, new technology makes it possible for railfreight to once more offer a viable alternative to road freight, and makes the most of inherent advantages such as predictable journey times. Moreover, the reach of rail is extended by incorporating the road mode in a highly efficient and cost-effective manner.

The two main railfreight innovations are:

- A new range of ISO demountable containers that can be handled by reach-stacking equipment (giant forklifts). These handle many varieties of load and can very easily be transferred to conventional articulated trucks with ISO flatbed trailers at the start and end of rail-based journeys (Fig. 2 above). Additionally, the reach-stackers do not require the same extent and specification of hard standing as previous ISO container handling equipment (i.e do not need large-scale freight yards) and the speed and ease of operations are greatly increased – a vital consideration given the “just-in-time” ordering systems used by business

- The MiniModal system – this uses smaller, standardised “mini containers” that can be stacked within a normal ISO container or in normal lorries, vans or rail wagons. MiniModal offers unparalleled flexibility, with loading and unloading possible from normal station platforms using small forklifts, or even directly from the trackside[6]. The low-cost nature of the system, as well as its speed, convenience and versatility, make it a strong option in the huge market for the transport of small- to medium-sized loads.

New freight tracking and management software, with built-in web access, can be used in railfreight with the same effectiveness and value to the customer as it has in air and road freight. Again, railfreight can benefit significantly from the same principles of customer convenience and transferability between modes as applied to the passenger side of rail operations.

Road-building and Rail Development

It’s worth noting that in spite of an enlightened approach to modal integration there still persists in some quarters an unhelpful perception that road and rail are not complementary transport modes, but adversarial ones, with debate being framed within an “either / or” context.

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Thankfully, road-building in NI has moved away from the "predict and provide" policy approach that assumes an inexorable rise in car ownership and use. As shown above, new modal switch technologies offer a powerful alternative to car journeys, and this has a moderating influence on car ownership. It is possible to illustrate the difference between the essentially passive model of car ownership as used in the past, and a newer "active" model showing how car use can be influenced externally (e.g. by modal switch technologies);

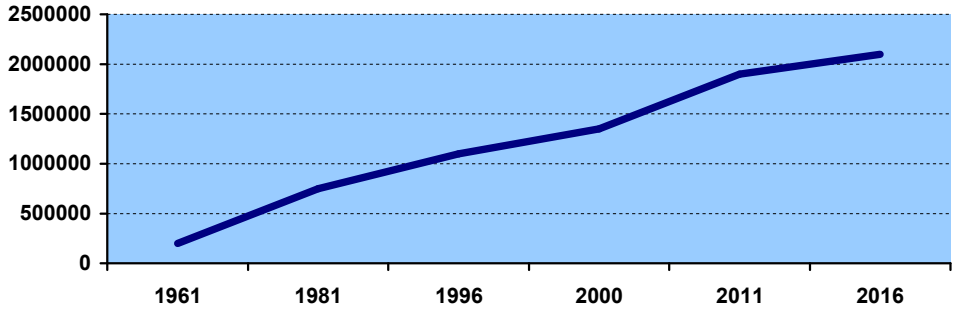

Fig 4 – Previous model (typical, above) assumed continuous growth without external influences

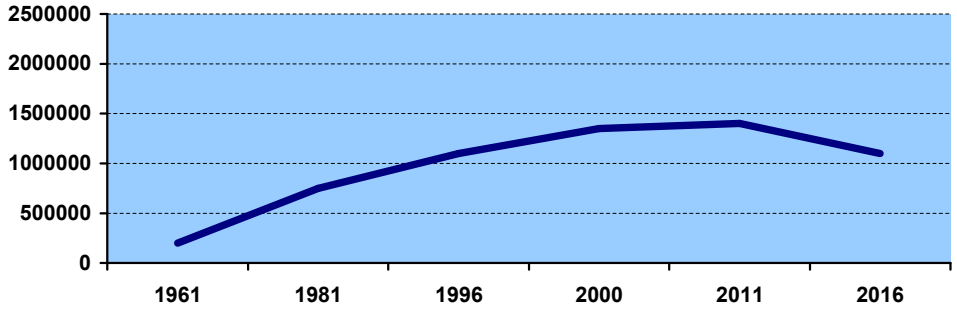

Fig 5 – Revised model showing ownership peak followed by decline due to external influences

It is also now very well known that congestion cannot be eased by road-building, and that the cost-benefit of spending millions to save relatively little on journey times - which are often calculated assuming less than full capacity traffic loadings - has been questioned[7]. Further, the environmental effects of such policy are not confined to emissions, but also involve loss of agricultural land, community severance, and light and noise pollution.

What is also clear is that funding decisions in the past have been made on the basis of a circular argument – that the public and business need more roads at the expense of rail / bus etc. because they largely use the road mode (hence the model described in Fig. 4 above); when in fact they largely use roads precisely **because** there has been lesser pro-rata investment in rail, bus and the other modes. Another important point is that rail development paradoxically benefits road users by freeing up space on main routes, thus making driving safer, more reliable and less stressful, and benefiting Translink and private coach operators.

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Exploding the "Population Density" Myth and Other False Ideas

Extensions to the rail network are routinely dismissed using the mantra-like assertion that "population densities" are not high enough. (Oddly, this argument is never used against road schemes nor water or electricity provision, for example).

Moreover, the "received wisdom" regarding rail investment generally is as follows:

- × Rail carries passenger traffic only
- × Is viable only in an urban environment
- × Requires large population densities
- × Is accounted for purely on *direct* income and expenditure
- × Is expensive to build and operate
- × Only viable over very long distances

As we shall see, none of these assertions are actually true. Unfortunately they are remarkably potent and have been highly successful in stopping even the most cursory evaluation of rail development schemes. This false thinking must now be robustly challenged.

Firstly, a purely passenger-focussed route that does not pursue railfreight opportunities is compromised in terms of how much direct revenue it can raise. This is particularly relevant in Northern Ireland, which has very significant freight potential given its connectedness to major trade centres and seaports, and the ever-increasing costs and impacts of road-based freight.

An "all-purpose railway" approach thereby maximises potential revenue because it can cater for a wide range of passenger and freight services and also lessens the need for the railway to rely on very heavy passenger loadings, and ergo high "population densities".

Secondly, as touched on previously, the perceived "requirement" for "high population densities" is an outcome of a completely wrong understanding of rail economics that is based on a simplistic fare-dependent model for income. Yet if accounted for *correctly* – that is, in a holistic manner, including increasing environmental, economic and social benefits – then the financial picture radically changes.

This false argument also cannot account for the course of existing rail lines, which may connect places of high population density, yet pass through areas of very low population density *en route*. This is true of the Belfast – Dublin, Belfast Londonderry, Belfast – Larne and Belfast - Bangor lines. Thus it is dangerous to make general assertions regarding population densities at particular points on a rail corridor, and then use these to determine whether investment should be made, and to what extent.

Further, average passenger loadings in a given area could be compensated for by higher freight carryings in the same area. Again, it is important to re-state the fact that the "all-purpose" railway, that carries freight as well as passengers, is much

less reliant on high passenger loadings (which are in turn dependent on high "population densities") for viability.

In short, population density is an unreliable and inaccurate tool for measuring the viability of investment in any given rail development project. This is why such a criterion is not used in, for example, road project evaluation.

Thirdly, the perceived expense of rail development is also important, even though the per-km cost of re-opening railways is around one-third that of equivalent road development[8]. A standardised and well-managed design and engineering approach, using low-cost technologies and modular construction techniques, makes rail development wholly realistic.
The common (mis)perception of expense is due to a lack of consideration of the Indirect Benefits of the rail mode and hence an inability to see its value.

Fourthly, it is imperative that the indirect, or external, benefits of the rail mode be accounted for in cost-benefit analysis (CBA) in rail development projects. Failure to do so leads to negative Net Present Values (NPV) and project rejection. It is significant that no major road projects can be justified on direct income grounds alone (e.g. from tolls) and wider criteria are always used in their CBA.

Significantly, the Republic of Ireland *Strategic Rail Review* of 2003, carried out by Booz Allen Hamilton on behalf of the ROI Department of Transport quantified and valued the external benefits of the ROI rail network at € 18 billion over the period 2003 to 2022 (or € 900 M, unadjusted, per annum). This valuation was developed into a metric by the author for "scoring" rail development projects and was used in the previous Railways Review Group Submission. It is employed again here to roughly calculate benefits from specific proposed network extensions.

Quantifying the Indirect Benefits of rail can transform an incorrect and negative attitude to rail investment into a positive, correct one

Finally, one examines the assertion that rail only works over long distances. This assumes that short to medium trips are made by car or bus and that somehow, rail cannot cater for this kind of traffic. But as demonstrated earlier, short to medium rail trips can be made possible by regular interval schedules and integrated "smartcard" ticketing.

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Rail Development in the Context of the Existing Bus Network

"Why re-open former rail lines when there is a perfectly good bus network in place?"

This flawed question, sometimes asked, originates in a fundamental misunderstanding of the role of different modes of transport. Coach and rail are not oppositional transport modes, but rather are *complementary*.

In fact, one can have *competition with integration* – that is, rail and coach operating on the same route, together providing significant sustainable transport capacity against the unsustainable private car mode. Passengers who miss trains can catch a bus, and vice versa, and such practices are common on the European continent.

There is ample room for expansion of *both* rail and coach modes in an environment where car dependency is high, implying a very large potential market for a switch to public transport. For example, the most recent transport statistics show that in 2006, public transport (non-car modes) in Northern Ireland accounted for just **13.4%** of all trips to work[9], implying major potential for taking trip share from the car

This thinking is counter-intuitive, and engagement with it is required in order to free policy-making from a restrictive and debilitating mindset. The "rail versus bus" argument is also a fallacy in that its logical conclusion must entail total closure of the rail network.

Rail also has the following significant advantages:

- 3 times more energy efficient than rubber-tyre transport
- Accounts for just 0.5% of total UK CO2 emissions[10]
- Comfortable over long distances
- Attractive to high-value business users
- Adds significant sustainable transport capacity in a given corridor
- Considerable scope for railfreight using latest in low-cost freight handling technologies

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Enhancing the Network: Network Extension and Re-opening Programme

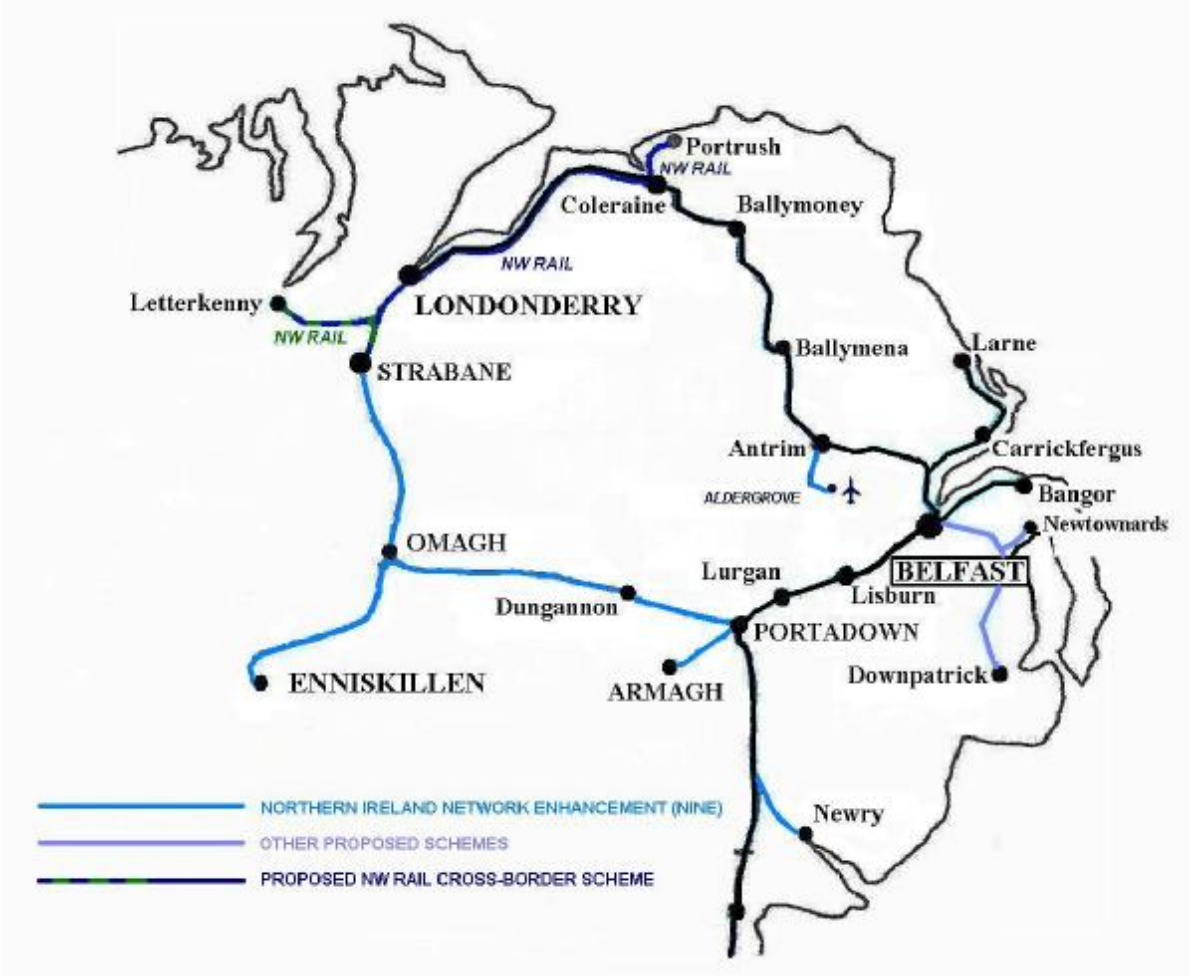

Fig 6 – NINE Outline Map

NINE encompasses the following nine towns / locations:

Londonderry
Strabane
Enniskillen
Omagh
Dungannon
Armagh
Newry
Portadown
Belfast International Airport (Aldergrove)

There is overlap at Derry with the cross-border NW Rail proposal which was made to both NI and ROI governments and their transport concerns in 2003. For the purposes of this proposal, the Strabane- Londonderry section of NINE is incorporated into the NW Rail proposal (available separately). NW Rail further overlaps with the proposed WRX (Western Rail Corridor Extension) scheme from Sligo to Letterkenny in the Republic and on to Derry. This is outside the scope of this document, though relevant documentation is available.

NINE in Detail

ENNISKILLEN / STRABANE TO OMAGH & PORTADOWN

This forms the major part of the NINE proposal and involves approx. 87 route miles (140km approx.) of single track railway on the former alignments.

The work could be carried out in two phases, structured so that benefits and revenue (mainly from local & commuting traffic) would flow immediately;

Phase 1 – Portadown to Dungannon & Omagh to Strabane

Phase 2 – Dungannon to Omagh & Enniskillen to Omagh

Significantly, the combined mileage of Phase 1 (15 miles & 19 miles, giving a total of 34 miles), as well as that of Phase 2 (26 ¾ miles & 25 ¾ miles, giving a total of 52 ½ miles), compares very favourably to the current Waverley Route re-opening project in Scotland (35 miles from Edinburgh to Galashiels) and the Western Rail Corridor in the Republic (36 miles Ennis to Athenry).

In other words, a two-phase approach is eminently manageable and achievable given today's technology and working methods.

Fig 7 - Suggested project breakdown (above) with twelve work bases from which each railhead would be extended; and 2-stage phasing of project (below)

Outline Cost-Benefit Analysis

It is not possible in this Submission to carry out detailed CBA; this must be left to Others. Instead, a very basic "scoring" method is used, using the metric developed by the author and mentioned earlier. Derivation of this metric, which is based on environmental and other savings calculated for the ROI *Strategic Rail Review* in 2003, is given in Appendix II.

Defined Sections – Phase 1	Route Km	Total IB / Yr	Capital Cost
PORTADOWN – DUNGANNON	24	9,334,656	64,800,000
OMAGH - STRABANE	30	11,668,320	81,000,000
Phase 1 Total		21,002,976	145,800,000
Defined Sections – Phase 2			
DUNGANNON - OMAGH	43	16,724,592	116,100,000
ENNISKILLEN - OMAGH	41	15,946,704	110,700,000
Phase 2 Total		32,671,296	226,800,000

Indirect Benefit baseline € 486,180 / Km / Yr = STG£ 388,944 / Km /Yr
Capital Cost baseline STG£ 2.7 million / Km, Exchange Rate €1 = £ 0.8

From the outline data used, it can be seen that Phase 1 of this NINE scheme could generate total annual benefits, conservatively estimated, of £ 21 million per annum approx. on a total estimated capital investment of £ 145.8 million, with recoupment suggested within a 7-year period.

Phase 2, using the same methodology, could generate estimated total benefits of £ 32.7 million per annum approx. on a total estimated capital investment of £ 226.8 million, with suggested recoupment in a similar period.

These results point to a likely positive Net Present Value (NPV) in any detailed – and holistic – CBA that might be carried out. However reasonably high patronage of services is also required, and the methodology assumes positive policy-based measures to encourage modal shift to rail, including use of feeder minibus and bus services to stations, etc.

It should be noted that the baseline capital investment per km figure used is based on closely correlating data from both the ROI *Strategic Rail Review* 2003 and the cost-per-km figure for the current Borders Rail re-opening project in Scotland. These yield figures close to £ 2.7 million per kilometre, and importantly, "greenfield" cost parameters have been used even though in this case the proposed scheme is intended entirely to be on the former route alignments.

Finally, the project would have very important tourism benefits. Arguments regarding low population levels in tourist areas often ignore the fact that local populations can increase significantly in the tourist season.

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Engineering Feasibility

Mindset

The Portadown – Omagh – Enniskillen / Strabane proposal contains several engineering challenges. It is vital that a constructive, positive approach be taken. Many perceived "obstacles" to rail re-opening projects, such as bridge-building, land acquisition, etc. also occur in road-building, but are treated in that context positively, not negatively.

It is also important to recall that the engineering footprint of a single-track railway is relatively minor at approx. 5m, whereas a dual carriageway or motorway construction project can often involve a "landtake" of up to 37m.

Great Northern Way, Omagh (Omagh Throughpass)

Far from impacting on this corridor through Omagh – which importantly follows the former railway – reintroduction of the rail route here could complement rather than compete with road traffic.

Working closely with Roads Service and Omagh District Council, careful design and engineering would ensure a successful outcome. A positive and innovative approach is vital, and indeed the engineering work could be put out to tender as a Design Competition, firmly positioning the task as a creative challenge rather than a perceived "obstacle".

Fig 8 – Insertion of single-track railway into Omagh Throughpass (Dublin Road example) can be accomplished by bringing the line in along the landstrip to the right of the photo, and behind the retaining wall extending out from the road bridge, with a new road bridge across the line to the right (out of sight). Alternatively, the retaining wall could be moved to the right and the visible road bridge extended. These are just some engineering possibilities that can be considered at the design stage.

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Omagh Station

Consideration could be given to re-constructing the station in a triangular format, to permit through running from Enniskillen to Londonderry and Enniskillen to Portadown, additional to the Portadown – Derry main line. Alternatively, the junction could be re-built in the more conventional "Y" format, but facing Portadown rather than Derry as it had done in the past. Trains could thus run direct from Enniskillen to Portadown for the first time, with passengers from Enniskillen to Londonderry changing at the station (preferably with cross-platform interchange). This could generate significant patronage, as the line would be re-positioned as Enniskillen – Portadown – Belfast, rather than Enniskillen – Derry as in the past.

Also, the station would not have to be in the precise location as formerly, and could be much more compact. Consideration however should be given to railfreight handling capability.

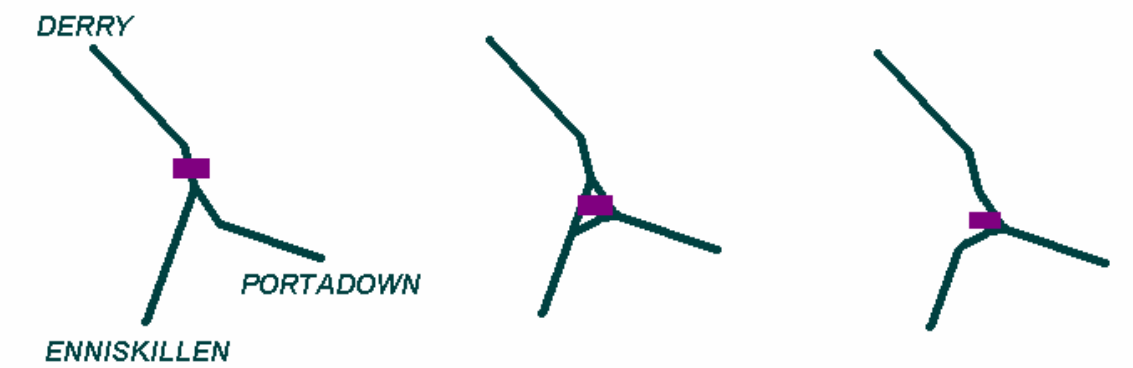

Fig 9 – The original Omagh station was located just north of the junction with the Enniskillen and Portadown lines (left). Under NINE, the station could be re-built in a triangular format, allowing through running of services in all directions (centre). Alternatively, the junction could be re-built facing Portadown, with passengers travelling from Enniskillen to Londonderry changing at the station. If the station was located in the "vee" of the junction, cross-platform interchange would be possible. Also, the station would not have to be located at the original site.

Dungannon Railway Park

Again, far from impacting on this popular amenity in Dungannon, reintroduction of the railway here could be sensitively integrated into the landscape. The railway is immensely beneficial, and excellent design, as well as full participation by the local community, would ensure ownership of the project and a positive outcome for all.

Other Challenges

Of course there are a great number of additional works that would have to be carried out, including several river crossings between Omagh and Strabane, Dungannon Tunnel, alignment severance, etc. etc. Again, the ruling mindset must be to tackle these challenges in a creative manner, and indeed Translink has an excellent track record in rail engineering achievement, through the Cross Harbour, Great Victoria St., Bangor Relay and Antrim – Bleach Green rail development projects.

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PORTADOWN TO ARMAGH

This NINE project restores rail services to Armagh, which was last served in 1957. The re-opening proposal is more modest in that it uses single track with passing loops instead of the double-track alignment as originally built.

With a large catchment, and significant commuting and local travel potential, this project would have significant benefit, as well as encouraging greater tourist and business travel to this important historic town and commercial centre. Noting also that in time, completion of NINE projects would also generate entirely new and sustainable journey patterns in the region – e.g., Armagh – Dungannon, Armagh – Omagh and Armagh - Newry Town (all changing at Portadown).

Outline Cost-Benefit Analysis

The basic "scoring" method devised by the author and based on environmental and other savings calculated for the ROI *Strategic Rail Review* in 2003 yields the following outcome:

Section	Route Km	Total IB / Yr	Capital Cost
PORTADOWN – ARMAGH	**17**	**6,612,048**	**45,900,000**
Total			**45,900,000**

Indirect Benefit baseline € 486,180 / Km / Yr = £ 388,944 / Km /Yr
Capital Cost baseline STG£ 2.7 million / Km

It can be seen that this NINE scheme could generate total annual benefits, conservatively estimated, of £ 6.6 million per annum on a total estimated capital investment of £ 45.9 million, with recoupment in a 7-year period.

This result points to a likely positive Net Present Value (NPV) in any detailed – and holistic - CBA that might be carried out. Again, however, reasonably high patronage of services is also required, and the methodology assumes positive policy-based measures to encourage modal shift to rail, including use of feeder minibus and bus services to stations, etc.

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GORAGHWOOD TO NEWRY

Newry has suffered down the years through having its direct rail connection on the Goraghwood – Warrenpoint route removed in 1965. The present Newry station on the Belfast – Dublin mainline (formerly Bessbrook) is somewhat removed from the main urban centre and – despite the provision of a high-quality connecting bus transfer service – this is a disincentive for those using the town centre for business and leisure to switch from the car mode in the kind of numbers required to achieve significant modal shift to rail.

Importantly, this NINE project not only restores direct connection into the town centre – thus providing a hugely attractive incentive for travellers to switch to the rail mode – but even more beneficially allows frequent rail services to be extended from Portadown to Newry without the kind of capacity and operational problems that would occur if the current Newry station was used as a terminus for extended services into Belfast.

A further great attraction is the very modest level of investment, relatively speaking, that would be required. The distance is relatively short at 6km and it is understood that Roads Service has built bridges over the former alignment in new road schemes that have been built in the area since 1965, at the behest of Newry & Mourne Council.

Outline Cost-Benefit Analysis

The basic "scoring" method based on environmental and other savings calculated for the ROI *Strategic Rail Review* in 2003 yields the following outcome:

Section	Route Km	Total IB / Yr	Capital Cost
GORAGHWOOD – NEWRY TOWN	**6**	**2,333,644**	**16,200,000**
Total			**16,200,000**

Indirect Benefit baseline € 486,180 / Km / Yr = STG£ 388,944 / Km /Yr
Capital Cost baseline STG£ 2.7 million / Km

It can be seen that this NINE scheme could generate total annual benefits, conservatively estimated, of £ 2.3 million per annum on a total estimated capital investment of STG£ 16.2 million, and with recoupment again in 7 years.

This result points to a likely positive Net Present Value (NPV) in any detailed and holistic CBA that might be carried out.

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BELFAST INTERNATIONAL AIRPORT RAIL LINK

The final NINE project includes this much-sought-after facility. It is worth noting that conventional thinking that specifies that airports should generate in the region of 10 million passengers a year to make a rail link viable is wrong, as it is based on enormously expensive electrified, double-track rail technology.

Yet there is no reason whatsoever that a service could be provided at a far lower, yet high-quality, specification, using conventional diesel railcar technology as currently employed by NI Railways and simple single-track working.

Rail Link Format & Interface with Circle Line Proposal

The easiest way to link the Airport to the main line network is via a short spur to the ex-NCC Lisburn-Antrim line that passes the airport perimeter, and thence on to Antrim over this existing (though largely disused) line.

The attraction of this proposal is very low infrastructure and operating costs, with services shuttling between the Airport and the main Belfast – Londonderry line at Antrim. At Antrim, passengers could go northwest to Ballymena, Coleraine and Derry, as well as southeast into Belfast. The northwest travel pattern and associated very large potential catchment and customer base is surprisingly often overlooked in discussions about an airport rail link. This layout thus maximises revenue by exploiting a very wide range of travel options for people using the Airport.

In the longer term, the rail link could very easily be absorbed into a circular rail service from Belfast to Lisburn, the Airport, Antrim and return to Belfast via Mossley West and Bleach Green Junction (Fig 11, overleaf).

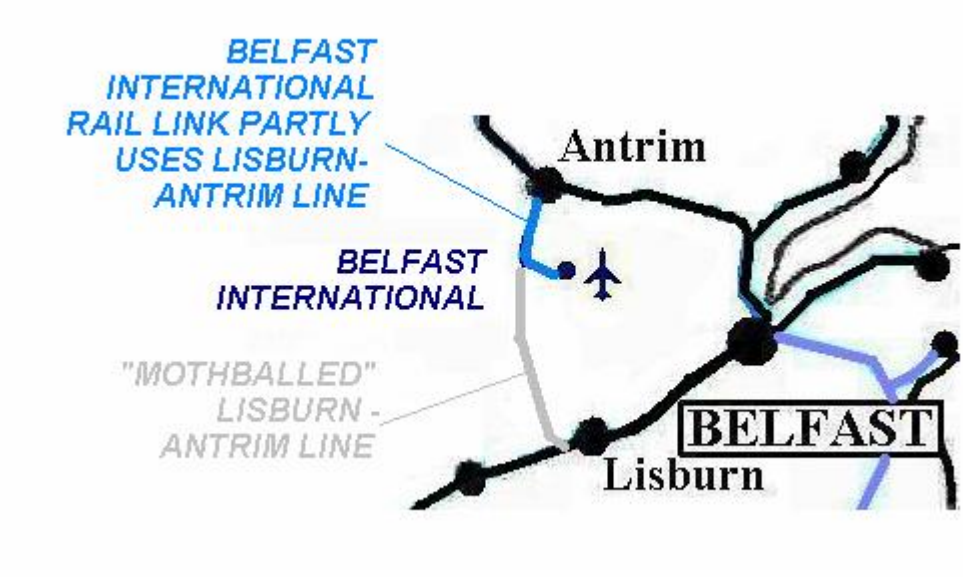

Fig 10 – Initial Belfast International Airport rail link uses Lisburn-Antrim line

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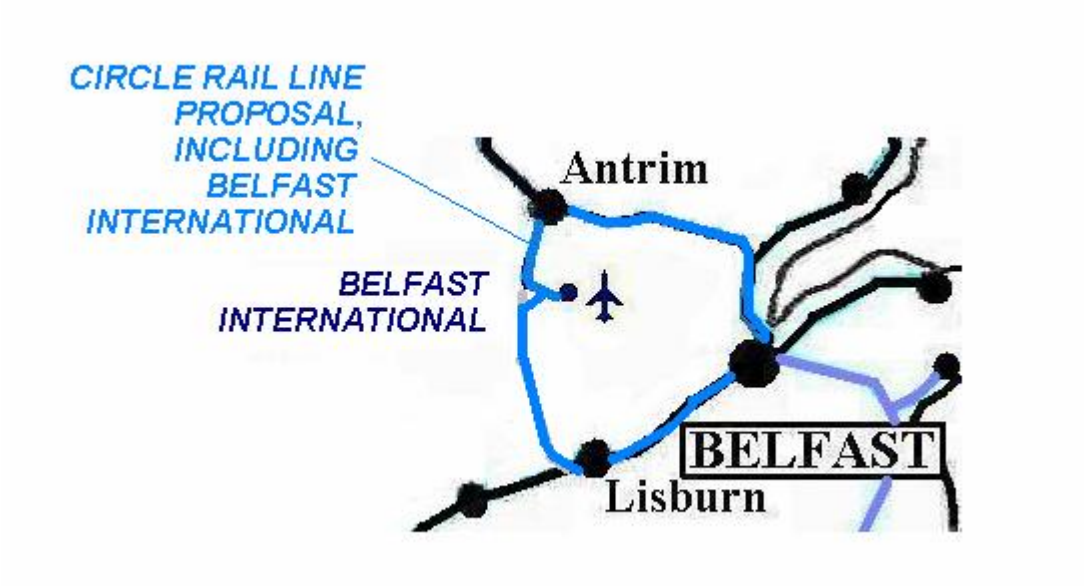

Fig 11 – Airport link can later be incorporated into proposed Belfast Circle Line

Outline Cost-Benefit Analysis

The scoring method yields the following outcome:

Section	Route Km	Total IB / Yr	Capital Cost
BELFAST INT. – ANTRIM	**10**	**3,889,440**	**27,000,000**
Total			**27,000,000**

Indirect Benefit baseline € 486,180 / Km / Yr = STG£ 388,944 / Km /Yr
Capital Cost baseline STG£ 2.7 million / Km

It can be seen that this NINE scheme could generate total annual benefits, conservatively estimated, of £ 3.9 million per annum on a total estimated capital investment of £ 27 million.

This result points to a likely positive Net Present Value (NPV) in any detailed and holistic CBA that might be carried out; however it should be noted in this case that the requirements of Belfast International Airport would likely mandate a far greater spend on station construction, specification, etc. Therefore it is quite likely that the project would come in at a greater cost than £ 27 million.

Even so, if the project were to cost say, 50% more, coming to £41 million approx., recoupment of the investment could still theoretically take place in a 10-year timeframe, which is still well within standard infrastructure recoupment periods.

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NINE Projects Investment Summary

Total investment required for NINE, as well as estimated externality (indirect benefit) valuations for each proposed project, is given below;

NINE Project	Route Km	Total IB / Yr	Investment
PORTADOWN – DUNGANNON (1)	24	9,334,656	64,800,000
OMAGH – STRABANE (1)	30	11,668,320	81,000,000
DUNGANNON – OMAGH (2)	43	16,724,592	116,100,000
ENNISKILLEN – OMAGH (2)	41	15,946,704	110,700,000
PORTADOWN – ARMAGH	17	6,612,048	45,900,000
GORAGHWOOD – NEWRY TOWN	6	2,333,644	16,200,000
BELFAST INT. – ANTRIM	10	3,889,440	27,000,000
Network Enhancement Total	171	66,509,404	461,700,000

€ 486,180 / Km / Yr x 0.8 = £ 388,944 / Km / Yr

Fig 12 – Table scoring total IB against proposed investment

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NINE Population Levels Comparison

The population level table below shows how towns currently not served by rail, but listed for rail network extension under NINE (in red), have populations and / or catchment areas significantly higher than other towns or even villages that are already served by NI railways services;

Armagh	**54,263*** (Unitary Authority Area)
Strabane	**38,248*** (Do.)
Newry (Town)	**33,433**
Ballymena	28,717
Carrickfergus	27,201
Ballymoney	26,894* (Do.)
Coleraine	24,089
Antrim	20,001
Omagh	**19,910** (Excluding Catchment)
Larne	18,228
Enniskillen	**15,000** (Do.; & Excl. Tourists)
Holywood	12,037
Dungannon	**10,983** (Do.)
Portrush	6,372
Whitehead	3,702
Moira	3,682
Castlerock	1,336

The data also shows that increased seasonal population levels due to tourism must be taken into account, particularly regarding Enniskillen, given its position as a gateway to Ulster's Lakelands, etc.

Note that the above table is based on limited access to population statistics. In any detailed analysis, careful study of absolute population level, catchment areas and transitory population levels would have to be carried out in order to ascertain an accurate measurement of potential ridership, taking into account policies to get passengers to the railhead via e.g. local feeder minibus services.

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Northern Ireland Network Enhancement - Absolute Investment Level

A final consideration is the need to look at proposed investment in rail within the context of the current Northern Ireland Regional Transportation Strategy (RTS) 2002-2012:

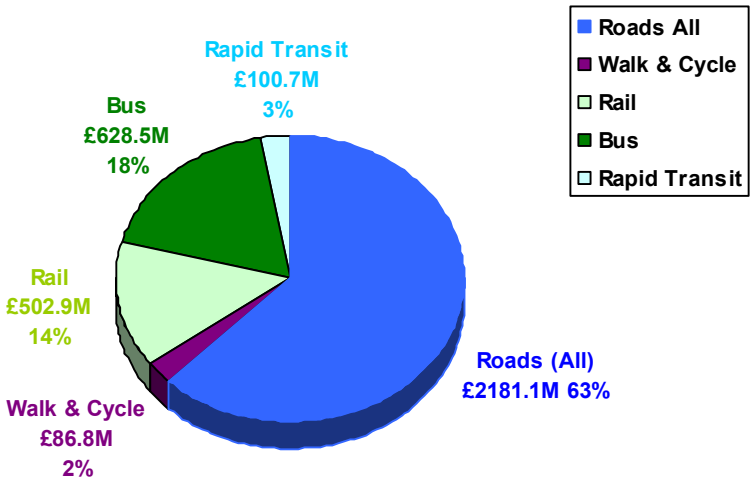

Fig 13 – Chart showing breakdown of planned expenditure in Regional Transportation Strategy 2002-2012 (Source: RTS 2002-2012)

It can be seen from the chart that the intended total roads spend is 4.3 times that of rail. Taken with the fact that almost two-thirds of the overall transportation expenditure is consumed by roads, this highlights a significant imbalance that implies that environmental, economic and social sustainability does not in fact appear to have been a consideration when the RTS was being drafted, despite what the main text of the Strategy might assert. By way of contrast, taking £461.7 million from the intended roads budget to pay for NINE results in a re-balancing of the overall spend, with rail taking a more positive share of 28% and road being curtailed to 49%:

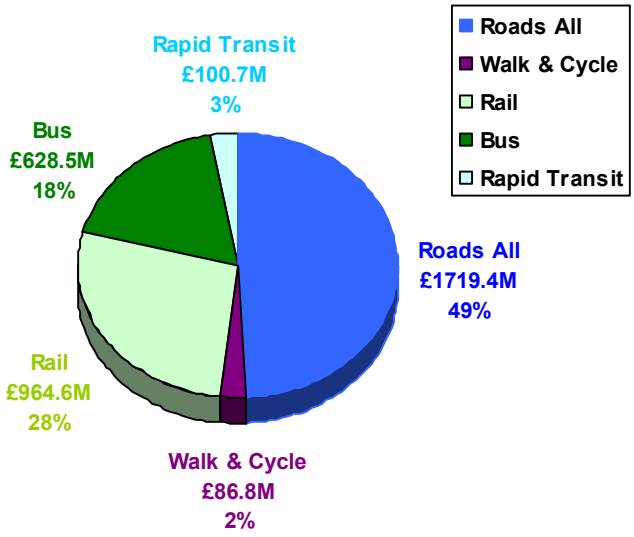

Fig 14 – Re-balanced RTS spend to facilitate NINE

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Summary

- ✓ **This Submission is not a Report or a study, but is designed rather to stimulate ideas and debate, and calls for further feasibility work**
- ✓ **The threat posed by climate change and peak oil is creating a powerful new economic context for rail development, augmenting existing factors such as the need for reductions in traffic congestion**
- ✓ **NINE restores rail services to Strabane, Omagh, Enniskillen, Dungannon, Armagh and Newry Town, and creates a new rail link from Antrim to Belfast international Airport**
- ✓ **Implementation of NINE is costed at £ 461.7 million and is estimated to generate annual benefits of £ 66.5 million**
- ✓ **NINE requires a positive engineering mindset and a willingness to take on inevitable challenges**
- ✓ **The outline economic analyses in this Submission confront the falseness of current models used to evaluate rail investment, demolishing the "population density" fallacy**
- ✓ **A return to Railfreight is now possible due to new Inter-modal and Minimodal technologies**

Compiled by B. Guckian 6/5/2008

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References :

[1] Scottish rail development (Stirling-Alloa; Gretna-Annan; Borders Rail Link) highlights the failure of unsustainable, individualised, car- and HGV-based Anglo-American transport policies, and shows the way forward in these islands;

[2] cf www.minimodal.com; author has no connection with this company;

[3] Source : Transport 2000; Commission on Integrated Transport;

[4] Christian Wolmar “Broken Rails” Aurum Press 2001;

[5] There are strictly speaking no “non-polluting” fuels. The phrase is used in this context to refer to fuels that do not emit significant quantities of greenhouse gas nor other harmful pollutants upon combustion

[6] E.g. timber loading in Scotland

[7] SACTRA (Standing Advisory Committee on Trunk Road Assessment) Report of 1994;

[8] Based on ROI road- and rail-building costs (Sources: ROI Dept. of Transport and ROI *Strategic Rail Review* [Booz Allen Hamilton 2003])

[9] Source: *Northern Ireland Transport Statistics 2006-07*, DRD / Northern Ireland Statistics & Research Agency

[10] Source: ATOC (Association of Train Operating Companies)

Photo Acknowledgements:

Cover: Translink

Page 17: www.wesleyjohnston.com

APPENDIX I

Northern Ireland Rail Network Past & Present

NB – Detail maps are to be found in "Johnson's Atlas & Gazetteer of the Railways of Ireland", by Stephen Johnson, Midland Publishing Ltd. 1997, ISBN 1 85780 044 3

Map from "Irish Railways Past and Present Volume 1" by Michael H.C. Baker, Past & Present Publishing Ltd.; © Michael H.C. Baker 1995

APPENDIX II

Derivation of IB Data

The IB data referred to in this report was derived from Booz Allen Hamilton's quantification of the indirect benefit of the rail mode to the Irish Republic between 2003 and 2022. The €18 billion figure for the period stated by BAH in the *Strategic Rail Review*[10] was compared to the total *in situ* route mileage of the current Iarnród Éireann network. The latter figure was metricated and used to divide into the BAH total indirect benefit figure. This produced a baseline figure of €486,180 per route kilometre per year, as used herein*†.

It's important to point out that the *in situ* route network figure included non-operational routes where the track is in place under "care and maintenance" by IÉ, as well as the operational ones. This was done intentionally, (a) to reflect the potential of the full network, and (b) to depress "optimism" from having a high IB figure to start out with. This would have happened had the smaller, operational route mileage figure been used. This report also showed how the depressed figure still leaves out very significant benefits accruing from balanced regional development, increased railfreight operation and climate change moderation via reduced CO^2 emissions.

These steps were done deliberately, to account for any variations in the IB figure per route kilometre, so that the figure used (€486,180 / km / yr) would be as low as possible, and could be used with confidence as a baseline figure, below the lowest level of variation. This is illustrated in Fig A below. Note that dividing €486,180 by 365 yields a per-day benefit-per-kilometre of €1332 and dividing this further yields only **€1.33 (£1.06) per metre per day**, graphically illustrating how conservative the IB baseline figure actually is. It is also vital to stress that variations in IB per km, like population density as discussed earlier, are not directly related to the overall benefit, nor indeed to types of traffic (e.g. line sections with low benefits to passengers may have high benefits for freight). This is why road projects, for example, discount these factors.

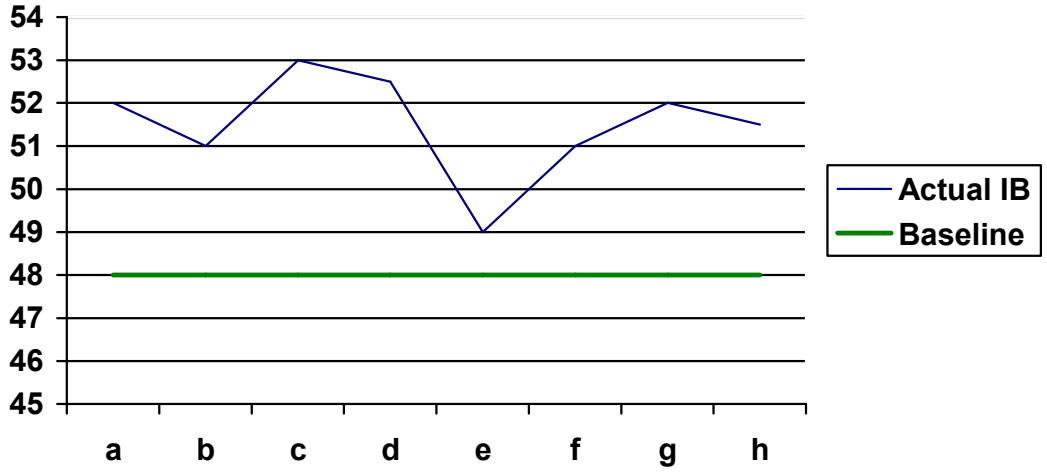

Fig A – How the Baseline IB Figure was minimised to take account of possible variations in Indirect Benefit per section of line

** Inflation having been cancelled out on both sides of the investment / return equation*
† Unadjusted, contemporary Sterling equivalent values were used in this document