TfN Future Travel Scenarios

Background

The strategy so far has been developed using suites of existing evidence and analysis. We have ambitious plans to grow and improve the modelling and analysis capability within TfN to support and develop the way we build business cases.

The following sections detail how we will mobilise the activity. Using TfN's Future Travel Scenarios as a starting point, we have undertaken further work to produce forecasts of freight movements associated with potential changes in future land-use, economic growth and different policy outcomes.

TfN's Future Travel Scenarios (published December 2020)1 apply a comprehensive consideration of the economic, environmental, social, spatial and technological future uncertainties which will influence how people, businesses and goods interact with the transport network in the future.

The Future Travel Scenarios highlights various factors that are external to TfN's direct control, acting as 'reference cases' with which we can test the performance of TfN strategies and policies in pursuing our vision and objectives across different scenarios. The factors explored during this work are categorised as:

1. Growth in the population and economy;
2. Spatial planning policy and economic distribution;
3. National policy on environment and sustainability;
4. Technological change and advancement; and
5. Social and behavioural change.

Our approach opens up these factors and their complex interactions with travel demand and land-use, with the aim of inserting them into the heart of our long-term planning and decision making. This enhanced understanding provides a mechanism which with to ensure we are robust, resilient and agile to wide-ranging and cross-sector uncertainties, and we can approach future uncertainty with confidence.

The Future Travel Scenarios were developed in partnership with Local Authority partners, national delivery partners and academic experts and informed by local strategies and priorities.

[1] https://transportforthenorth.com/future-travel-scenarios/

Our Future Travel Scenarios will form an integral part of TfN's decision-making processes. In conjunction with our Analytical Framework and Appraisal Framework, they will be used to test and refine TfN transport strategies, policies and programmes so that we support transport interventions, solutions and policy measures that meet our objectives across a range of futures.

Our four TfN future travel scenarios are summarised below:

Just About Managing - What if society continues to develop in line with existing trends?

- This scenario sees a state of inertia, although this should not be taken as neutral. It sees a future where people do not alter their behaviours much from today, or give up certain luxuries, although there is a gradual continued trend towards virtual interaction. Economic growth continues at a moderate rate, but it is largely consumption-led and unequal, lacking agility and vulnerable to shocks. This scenario is led by markets, without much increase in political direction, with its biggest driver being economic.

Digitally Distributed - What if society achieves our transformational growth outcomes by using technological solutions to create connection and agglomeration across towns and cities?

- This scenario sees a future where digital and technological advances accelerate, transforming how we work, travel and live. In general, we embrace these technological changes and the move towards a distributed, service-based transport system. Long-term climate change targets are met, but there is slow progress in the short-term due to a general preference for individualised mobility over traditional public transport. This scenario is led by technology, with the biggest drivers being technical advances and a willingness to embrace mobility-as-a-service and shared mobility in the long-term.

Prioritised Places - What if society becomes more focused on place, place-making and community than growth or connectivity?

- This scenario sees a significant shift in political and economic direction to ensure that no place is left behind. Every area, including cities, towns and rural and coastal areas, has a bespoke local economic strategy, supported by investment in local assets, specialisms and economic and social infrastructure. Community, localism and place-making across the North is applied to build a sense of local identity to improve local economies. There is a focus on work-life balance and social equity within and between places.

This scenario is led by a change in priorities, with its biggest driver being the push for a fairer redistribution of economic prosperity.

Urban Zero Carbon - What if society achieves transformational growth outcomes by using policy intervention to maximise energy-efficient city growth?

- This scenario sees a significant shift in public attitudes towards action on climate change, and strong national Government response to meet it. There is a boost to economic productivity to levels consistent with the NPIER, primarily through a combination of urban agglomeration and place-making. Transport users demand and embrace publicly available transit and active travel options, as there is a blurring of the line between 'public' and 'private' with increasing shared mobility systems online. This scenario is led by attitudes to climate action and urban place-making, with the biggest drivers being strong Government policy and trends of urban densification.

TfN's Future Travel Scenarios Report[2] provides a comprehensive overview of the process undertaken to develop the new Future Travel Scenarios. It also delves into the contextual factors underlying each scenario, resulting stats and figures, and explores the expected implications of each future state.

Evidence of Freight Future Scenarios

TfN commissioned MDS Transmodal (MDST) to undertake a freight future scenarios study in 2020. The study takes the land use and qualitative definitions of individual scenarios specified by TfN and applies them within the Great Britain Freight Model (GBFM) to provide quantitative assessments of the distribution of economic activity, economic growth, road network performance and technological take-up.
The freight measure options that are used to structure the assumptions of the four future scenarios include:

- Carbon pricing, which reflects a policy environment that encourages the use of "greener" transport and leads to differential increases in fuel costs across modes;
- Road pricing, which leads to increased road costs, varying by road type;
- Autonomous vehicles, which leads to differential rates of uptake through time across modes generating mode specific reductions in vehicle operating costs;
- Warehousing, which defines whether or not new warehousing location is increasingly concentrated around railheads in the future

[2] TfN_Future_Scenarios_Report_FULL_FINAL_V2.pdf (transportforthenorth.com) Accessed June 2021

- Brexit impact, means additional costs of trading with the EU on customs checks, cabotage and drivers' wages; and
- Larger ships, showing the trend towards larger vessels especially on longer sea crossings.

Population growth differs by area type to reflect different spatial planning measures seen across our 4 TfN Future Travel Scenarios. Scenario Prioritised Places has the highest growth in rural area, indicating a fair redistribution of economic activities across all types of areas. The assumptions made for employment, GVA and population growth are all specified by TfN and consistent with the car future travel scenarios assumptions.

Table 1 provides a summary of freight measure assumptions made for each future scenario.

Table 1 Summary of Freight Future Scenarios Model Assumptions

Scenario/input	Just about managing (JAM)	Prioritised places (PP)	Digitally distributed (DD)	Urban Zero Carbon (UZC)
Population	As provided by TfN			
Employment	As provided by TfN			
GVA/head	As provided by TfN			
Labour cost	As implied by TfN's GVA / head nationally			
Fuel	WebTAG			
Carbon pricing	zero	zero	£1/litre eq.	£1/litre eq.
Road pricing	zero	Non-user costs added to user costs	zero	Non-user costs added to user costs
Autonomous vehicles	moderate	low	high	moderate
Land use	Neutral	Rail based	Neutral	Rail based
Road network performance	Base year HGV distance and time skims retained for future scenarios			
Brexit	Extra £100 on all driver-accompanied HGV ferry services			
Larger ships	Larger ships on longer crossings			

Key findings from the study are:

- Road is likely to continue to be the most heavily used freight mode in the UK, however, all four freight future scenarios have shown a certain degree of mode shift from road to rail comparing to the current baseline situation. Just About Managing sees a future that is led by markets without much increase in political direction, economic growth continues at a moderate rate. It therefore has the least mode shift among all freight future scenarios.
- Digitally Distributed is driven by technical advances and has a high uptake of autonomous vehicles. Freight takes advantage of lower road operating costs and therefore has the second least mode shift from road to rail.
- Urban Zero Carbon is led by attitudes to climate action and urban place-making, it shows sees Government policy in embracing publicly available transit and active modes. It therefore shows the highest mode shift to rail. Table 2 provides a summary of key observations from the freight scenarios modelling work. In comparison to a 5.9% rail Tonnes KMs mode share in 2018, Just About Managing (JAM), Prioritised Places (PP), Digitally Distributed (DD) and Urban Zero Carbon (UZC) have a rail mode share of 6.2%, 12.7%, 7.7% and 14.8% respectively for year 2050.

Table 2 Freight Future Scenarios Modelling Output Summary, Year 2050

	Population	Road Pricing and Land Use	Autonomous Vehicles	HGC PCUs	HGV PCU kms	Tonnes	Tonnes kms	Rail Modal Split
2018		-	-	-	-	-	-	5.9%
JAM	+	Neutral	Moderate	7.4%	33.7%	6.1%	31.1%	6.2%
PP	+	Non-user costs added to user costs and rail based land use	Low	9.4%	11.7%	7.1%	13.7%	12.7%
DD	++	Neutral	High	8.7%	23.1%	6.7%	20.8%	7.7%
UZC	++	Non-user costs added to user costs and rail based land use	Moderate	10.5%	5.9%	7.6%	9.4%	14.8%

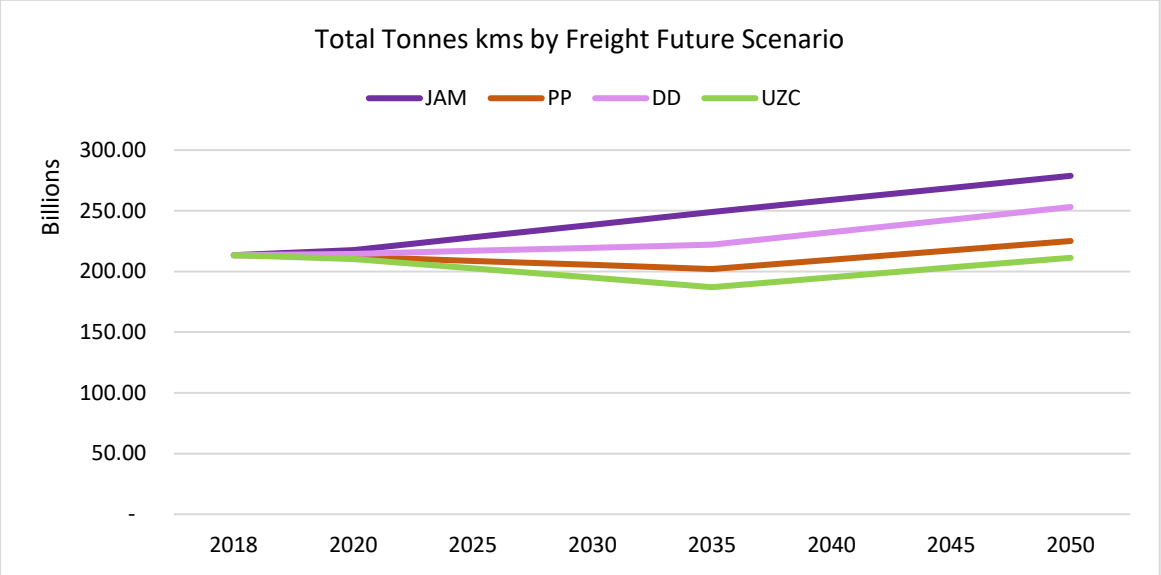
2018 - 2050 output analysis

- Scenario UZC has the most significant reduction in HGV PCU KMs comparing to scenario JAM (a decrease of 27.8%). This is a result of having the highest road costs as a measure of decarbonisation policies which come to the fore. The high road freight costs have led to longer distance freight demand switching from road to rail, it has also encouraged relatively rapid growth of shorter distance hauls.

- Total tonnes KMs shown in Figure 1 refer to all road freight including domestic road, European and non-European inland freight through ports. Scenario JAM shows the highest tonnes KMs with steady growth from 2018. Although scenarios DD and UZC have assumed the highest population growth which means more goods movements in these scenarios, carbon pricing has dampened down

the freight traffic in a greater scale and therefore led to lower tonnes KMs comparing to scenario JAM.

Figure 1 Total Road Freight Tonnes KMs for All Freight Future Scenarios



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- Table 3 provides a summary of rail freight tonnes demand by commodity category. It shows a significant growth in intermodal rail freight demand particularly in scenario UZC. This is due to several assumptions favouring rail over road in this scenario.
- Likewise, there is a large growth in construction materials demand in scenario UZC. This is also due to the rail-favouring assumptions made for this scenario, and an assumed growth in the market as the market sees an increase in the use of "super-quarries" carrying aggregates over long distances by rail, at the expense of local quarries typically served by road.
- Catering for this rail freight demand would take a large investment in terminals and wagons, and would require sufficient capacity to be available on the network.

Table 3 **Rail freight tonnes demand by commodity category (Annual million tonnes)**

	2016/2017	2035 1_JAM	2035 2_PP	2035 3_DD	2035 4_UZC	2050 1_JAM	2050 2_PP	2050 3_DD	2050 4_UZC
Intermodal	19.07	28.67	71.66	35.09	84.84	39.16	98.69	46.59	115.17
ESI Coal	6.28								
Biomass	6.47	7.52	7.56	7.75	7.74	7.52	7.61	8.10	8.05
Waste	1.23	1.23	1.22	1.25	1.25	1.23	1.22	1.28	1.29
Construction materials	23.55	22.19	41.97	31.99	42.01	35.41	58.16	41.25	60.52
Spoil (construction)	0.74	0.44	1.30	1.06	1.30	1.12	1.66	1.35	1.69
Petroleum	4.71	4.71	5.30	5.04	5.42	4.92	5.42	5.27	5.64
Chemicals	0.90	0.88	1.05	0.98	1.09	0.94	1.10	1.05	1.17
Industrial Minerals	1.34	1.18	1.85	1.56	1.87	1.48	1.92	1.71	1.97
Metals	7.44	6.94	9.86	7.84	10.08	7.99	10.09	8.64	10.57
Automotive	0.45	0.48	0.55	0.52	0.59	0.50	0.55	0.53	0.60
Iron Ore	4.26	4.26	4.28	4.39	4.39	4.26	4.30	4.59	4.58
Coal Other	1.95	1.95	1.96	2.00	1.99	1.95	1.96	2.06	2.05
Other	0.33	0.41	0.68	0.43	0.72	0.43	0.68	0.45	0.74
Empty returns for containers carrying bulks	0.41	0.42	0.44	0.43	0.46	0.42	0.44	0.44	0.47
Engineering	6.66	6.66	6.65	6.71	6.71	6.66	6.65	6.78	6.78
Grand Total	**85.79**	**87.92**	**156.34**	**107.04**	**170.46**	**113.98**	**200.44**	**130.09**	**221.30**

- Taking M62 corridor as an example, Table 4 shows a summary of road and rail tonnes KMs for each freight future scenario. With limited rail freight network and facilities, rail freight mode share is

dramatically low. There is also no opportunity for a greater mode shift from road to rail. It implies that without adequate rail infrastructure in place, there would be relatively limited space for the exogenous policy interference to take effect for the purpose of encouraging model shift from road to rail.

Table 4 Road and Rail Freight Demand for Future Scenarios – M62 Corridor

	Tonnes_km road	Tonnes_km rail	Rail modal split
2018	8,168,354,747	41,336,675	**0.50%**
2035 JAM	8,372,585,961	56,554,386	**0.67%**
2035 PP	9,208,706,338	149,326,691	**1.60%**
2035 DD	8,515,862,272	58,151,472	**0.68%**
2035 UZC	9,329,308,134	177,979,248	**1.87%**
2050 JAM	8,402,562,014	60,600,598	**0.72%**
2050 PP	9,532,439,376	245,551,796	**2.51%**
2050 DD	8,622,432,842	63,378,171	**0.73%**
2050 UZC	9,807,220,365	295,309,568	**2.92%**