TSUG

Transport Statistics Users Group

Monthly Review: May 2018

This month's review has shown that since 2004 in UK, NO_x emissions from diesel buses have been reduced by a factor of 20, while those from diesel cars have reduced by less than a third, owing to two government funded incentive mechanisms. In 2017, 10.1 billion trips were taken on public transportation in the United States, according to the APTA which was 2.9% lower than in 2016. San Francisco's BART's 2017 crime data showed a nearly 40% increase in arrests compared to 2016. German Rail (DB) recorded a 37% increase in ridership on its ICE high speed service linking Frankfurt, Cologne and Brussels in 2017, while traffic on the Frankfurt - Cologne - Amsterdam corridor reached a new high. DB achieved a 5.2% increase in revenue in 2017 to €42.7bn which led to a 37.1% increase in pre-tax profit to €968m. According to SBB's annual results released on March 20, there was an increase in income despite heavy losses in the domestic rail freight market. Hainan Airlines reported a net profit of CNY3.3bn ($507m) in 2017, up 6% over the CNY3.1bn reported in 2016. Heathrow Airport managed to handle 3.1% more passengers than in 2016. IATA Statistics showed that the upward trend in passenger volumes is continuing to be supported by robust global economic conditions. Average journey length (RPK/passenger) has significantly increased with the advent of long-haul low-cost, pioneered by Norwegian. "The increased use of RNAV and RNP procedures has resulted in a concentration of lateral tracks near airports due to the increased precision of these procedures," according to an MIT Report. More than 965m people flew on domestic and international flights in the US in 2017, up 3.4% from the 933.1m who travelled by air in 2016, according to the DoT. The New York MTA launched a new online dashboard detailing customer-focused performance metrics for bus routes as part of MTA New York City Transit's strategy to improve service across the city's bus network. In December 2017, MNDoT has published a a report on "Using mobile device samples to estimate traffic volumes". PennDoT is also conducting similar research. A new study found that the indirect, hidden costs of driving, such as sitting in traffic and searching for parking, carry a significant economic burden for drivers in the US —$3,037 for each driver in 2017. Bengaluru has the slowest traffic in India with an average speed of 17.2 km/h, followed by Hyderabad (18.5 km/h) and Chennai (18.9 km/h). Ireland plans to increase shipping capacity on direct sea routes as an alternative to truck traffic between Ireland and continental Europe. Due to sanctions on Russia, the future of alumina production in Ireland is uncertain. We have a Letter to the Editor and Kit Mitchell's Statistics Digest

Dr Shanta Bir Singh Tuladhar and Andrew Sharp

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Dates of the next TSUG seminars

Date	Venue	Topic
Wed-18-May	TfL	Transport Staffing: Supply, Demand and Changing Labour Market
Wed-20-Jun	TfL	Low Cost Airlines
Wed-11-Jul	TfL	Transport Appraisal

The seminars can be booked through the TSUG website at www.tsug.org.uk/seminars.php

Statistics Digest

STATISTICS DIGEST May 2018

This digest lists major sets of statistics that have been released recently or which are due to be released. Regular monthly and quarterly releases are not included. The web links given allow free downloads of the documents cited.

Recent releases from Department for Transport

Recent releases from Department for Transport	
12 April	Vehicle licensing statistics: 2017
https://www.gov.uk/government/statistics/vehicle-licensing-statistics-2017	
12 April	Road freight statistics: October 2016 to September 2017
https://www.gov.uk/government/statistics/road-freight-statistics-october-2016-to-september-2017	

Forthcoming releases from Department for Transport	
3 May	Renewable Transport Fuel Obligation: Year 10 (2017 to 2018) report 3 (15 April 2017 to 14 April 2018 supply)
https://www.gov.uk/government/collections/biofuels-statistics	
10 May	Young car drivers road safety factsheet
10 May	Older car drivers road safety factsheet
24 May	Journey time statistics
https://www.gov.uk/government/collections/journey-time-statistics	
30 May	Seafarer statistics 2017
https://www.gov.uk/government/collections/maritime-and-shipping-statistics	
June	Road traffic estimates in Great Britain: 2017
https://www.gov.uk/government/collections/road-traffic-statistics	
June	Road lengths in Great Britain: 2017
https://www.gov.uk/government/collections/road-network-size-and-condition	
June	Travel time measures for the Strategic Road Network and local 'A' roads: April 2017 to March 2018
https://www.gov.uk/government/collections/road-congestion-and-reliability-statistics	
June	Provisional road traffic estimates, Great Britain: April 2017 to March 2018
https://www.gov.uk/government/collections/road-traffic-statistics	

Seminar Write-up

Discussion on 18th April 2018 'Trade and Transport'

Discussion during and after ***Andrea Prophet's paper***

Andrew Sharp asked whether the incoming CDS system would provide data on the UK origins and destinations of goods through Heathrow. The answer was that it would not. Kit Mitchell asked if estimates are made of the flow of electrical energy in and out of the UK in the same way as data were collected on flows of natural gas. BEIS does collect this information. On the recording of components entering and leaving the country during the manufacture of a product such as a motor vehicle, all movements should be recorded but HMRC cannot follow supply chains in detail.

To establish the credibility of data, checks are done on three ratios; value versus mass, value versus supplemental unit, and mass versus supplemental unit. The checks tend to focus on high value goods such as oil, gold and cars.

A question explored the 'Rotterdam effect', concerning goods going to Rotterdam for onwards transport to a third country. The Netherlands imports about twice as many TEU (container units) per unit GDP as anywhere else, because of its role as a trans-shipment port. OECD has studies of this process.

On a question of the reliability of import data as indicated by the extent initial data is revised, BEIS is looking at this.

Discussion during and after ***James Wells' paper***

A questioner stated that 400 more companies will have to fill in customs declarations after Brexit. Should we expect over-analysis of these additional declarations? James Wells said he would like to back-cast import and export data, to assess the implications on discontinuities such as this but unfortunately this is not possible. A difficulty is that at the moment the system changes because of Brexit, demand for statistics will peak because of interest in Brexit.

ONS is producing interactive maps of trade between countries to help people find data. James Wells demonstrated some of these during his presentation. These should be live and publicly available in July 2018, initially based on trade for the previous year.

- ***Kit Mitchell & Andrew Sharp***

Members can find past seminar slides here: http://www.tsug.org.uk/past_seminars.php

General News

Letter to the Editor

Dear Editor

Thank you for this interesting miscellany. But I am indebted to Mike Lunan of the Friends of the Far North Line for the information that the shortest scheduled journey time on the National Rail network is actually between Culrain and Invershin, which are only one minute apart (on opposite shores of the Kyle of Sutherland).

And if Underground journeys are permitted, then there is one which qualifies both for the shortest distance between origin and destination and the longest alliterative sequence: Hounslow East - Hounslow Central - Hounslow West - Hatton Cross - Heathrow Terminal 4 - Heathrow Terminals 2&3 - Hatton Cross - Hounslow West - Hounslow Central - Hounslow East.

Yours

John Cartledge

"A Breath of Fresh Air: New Solutions to Reduce Transport Emissions"

This report was published by the IMechE in January. It looks at ways of reducing transport emissions on different modes.

Looking at buses, it comments that since 2004, NO_x emissions from diesel buses have been reduced by a factor of 20, while those from diesel cars have reduced by less than a third. This has been largely brought about by two government funded incentive mechanisms.

HGVs represent 21% of surface transport CO_2 emissions. Euro VI trucks are achieving a 77% reduction in real-world NO_x emissions compared to Euro V vehicles.

There has been a significant growth in refrigerated vehicles, which emit up to six times as much NO_x and 29 times as much particulate matter as a Euro VI truck. Between 5% and 25% of HGVs in central London are refrigerated.

Freight traffic in London is almost a third of morning peak traffic: 80% is vans. The market for commercial vans has doubled since 2009.

Each year, rail freight is estimated to save about a million tonnes of CO_2 by taking the place of 7m HGV journeys and 1.6bn HGV kilometres.

In 2015, total domestic and international aviation emissions increased by 1% to 34.8m tonnes of CO_2. Most of this came from international flights. A Boeing 737-300 burns about 13kg of fuel/minute during ground taxiing: a stop during taxiing costs around £50 in fuel. The report says that low-emission surface access to airports is fundamental.

The age profile of the aircraft fleet has changed recently, with 3000 new aircraft being delivered in the last 3 years. The proportion of aircraft in the fleet 15 years old or more has increased by 3.5% since 2013 to 24.5% of the global fleet.

Where areas of the sea are not within Emission Control Areas, the sulphur content of maritime fuels is limited to 3.5%. This is 3500 times more than is permitted in HGV fuel. About 80% of the world's fleet burns this high-sulphur fuel. International shipping is estimated to contribute 5% to air pollution. Using low-sulphur fuel instead is reckoned to increase shipping costs by 12% - and transportation accounts for 2% - 3% of total production costs of typical clothing items.

Looking at alternative energy solutions, the report comments that the well-to-wheel emissions of an electric bus charged using the UK grid are 60% lower than a diesel bus.

It also notes that we need to produce a range of vehicles matched to usage profiles to make the biggest impact.

Hydrogen has been much talked about as a potential fuel. The energy consumed in its manufacture (because it does not occur naturally) depends on the method used. In the UK, we use steam reforming of natural gas: this is energy intensive with a large carbon footprint. A lower-energy method is the electrolysis of water.

LPG fuelled vehicles generate 14% fewer CO_2 emissions than petrol cars and 10% fewer than diesel vehicles (all on a well—to-wheel basis). LPG is particularly clean burning, and produces less particulates as well as 50% less NO_x than petrol and 20 times less than diesel. There are 1400 filling stations in the country which can supply LPG. Only 0.1% of the car fleet and 0.3% of the van fleet uses it; although it is much more common in the rest of Europe with 46,436 filling stations across Europe and 8m LPG vehicles (3% of the car fleet).

About 4% of transport fuels are now biofuels, with about 0.8% of the world's total energy supply coming from these in 2015. The UK produces less than 2% of the world's biofuel: about 75% of the biofuel used is imported, and shipping adds between 7% and 38% to the total carbon emissions where it is transported over 10,000 km.

The UK policy of putting cycle lanes by congested roads was not good: cyclists use more energy and breathe more deeply, inhaling more pollutants. However, cycle lanes can be productive: a 3.5m wide single carriageway can accommodate 2000 people/hour in cars but 14000 on bikes.

Traffic congestion is an important factor: in nose-to-tail traffic, tailpipe emissions are four times greater than in free-flow.

Freight consolidation can help: a number of London Boroughs cooperate to have all deliveries to a single consolidation centre, from where they are taken to where they are wanted by smaller more efficient vehicles. This has resulted in a 46% reduction in vehicles delivering to council sites and a 45% reduction on distance travelled. This achieved a 41% reduction in CO_2, an 51% reduction in NO_x and a 61% reduction in particulates.

Shell has developed a drop-in gas-to-liquid fuel which gives impressive reductions in pollution – 6% less NO_x, 28% less particulates, 14% less CO and 11% less HC. The report thinks this could be particularly useful for rail transport.

Particulate matter – from brakes and tyres in particular – is a problem.

Recommendations for individuals – non-powered transport is a valid alternative, when using non-powered alternatives, try to avoid busy roads, try to avoid travelling at the busiest times, try to keep trees between you and traffic (they filter off particulates), when walking on hills, use the side of the road where traffic is coming down – vehicles coming downhill use less fuel and cause less pollution.

US Transit in 2017

From transportationtodaynews.com

Last year, 10.1 billion trips were taken on public transportation in the United States, according to the American Public Transportation Association (APTA). This was 2.9% lower than in 2016.

The drop is attributed to a 4.3% fall in bus ridership. Ridership increased in only four of the 29 public transit systems examined in APTA's study: Phoenix, Arizona; San Francisco, California; Arlington Heights, Illinois; and Seattle, Washington.

Ridership for subways also decreased, by 2.1%.

Ridership for commuter rail grew in 18 transit systems, but overall ridership dropped 0.2%.
Heritage trolleys, modern streetcars, and trolleys saw ridership grow in 11 transit systems, but overall ridership fell 0.8%
.
Paratransit ridership grew 0.4%.

Rail

BART Arrests

Source: Progressive Railroading

San Francisco's Bay Area Rapid Transit (BART) recently released its 2017 crime data showing a nearly 40% increase in arrests compared to 2016.

In 2017, BART police officers made 1,730 arrests compared with 1,238 arrests in the previous year. The increase in arrests came amid an increase in electronic thefts (presumably thefts of electronic equipment) on the BART system. Last year, 417 electronic thefts were reported on BART, up 52% from 2016.

In addition, BART recorded a 24% increase in violent crimes on its system. Since some cellphone thefts involve the use of force or fear, they're considered robberies, which are classified as violent crimes.

The 2017 crime figures also reflected BART's increased focus on fare evasion. Last year, there were 8,223 instances in which BART police officers issued citations, warnings or otherwise contacted suspected fare evaders. That marks an 88% increase from similar instances in 2016.

This year, BART will continue to crack down on fare evaders. The agency also is deploying a team of community service officers and hardening station infrastructure to make it more difficult to enter without paying.

BART carried 126m passengers in 2017.

DB Iinternational Services in 2017

Source: International Railway Journal

DB ICE at Brussels Midi

German Rail (DB) recorded a 37% increase in ridership on its ICE high speed service linking Frankfurt, Cologne and Brussels in 2017, while traffic on the Frankfurt - Cologne - Amsterdam corridor reached a new high.

In 2017, 1.1m passengers travelled by ICE on the Frankfurt - Brussels route, while the number of

passengers using the Frankfurt - Amsterdam ICE service reached a record 2.5m. In addition, DB recorded a 10% increase in traffic on the Inter-City service linking Berlin, Hannover, Bad Bentheim and Amsterdam, despite a relatively long end-to-end journey time of 6 hours 22 minutes.

DB increased the number of daily round trips between Frankfurt and Brussels in 2016 from four to six, and says in view of the growing demand, it plans to add a seventh in 2019. DB competes with Thalys on the section between Cologne and Brussels, with Thalys operating five trains/day.

DB is the sole operator on the Amsterdam - Düsseldorf - Cologne - Frankfurt route and operates seven ICEs daily (six on Sundays), one of which continues south to Mannheim, Karlsruhe and Basle.

Meanwhile both the Dutch infrastructure manager Prorail and Netherlands Railways (NS) are calling for improvements in cross-border long-distance services, particularly higher speeds on the Dutch network. The introduction of multi-system ICEs, currently used exclusively on Amsterdam - Frankfurt services, on the Amsterdam - Berlin route would eliminate the need for a locomotive change at the border station of Bad Bentheim. This would also enable 250km/h running between Hannover and Berlin, compared with 200km/h for the current locomotive-hauled IC trains; and reducing the number of stops on this section could also strengthen rail's competitive position on the Amsterdam - Berlin route.

German Rail in 2017

German Rail (DB) achieved a 5.2% increase in revenue in 2017 to €42.7bn which led to a 37.1% increase in pre-tax profit to €968m.

Both long-distance and regional passenger services in Germany recorded a 2.6% increase in passenger-km to 40.5 billion and 42 billion respectively. More than 142 million journeys were recorded on ICE, IC and EC trains in 2017 – which is the third successive year of increased passenger numbers.

The new high-speed line between Berlin and Munich is doing particularly well: since the line opened in December, more than twice as many passengers have travelled between the two cities as in the same period a year before. Over a million passengers used the line in the first 100 days.

Regional operator DB Regio achieved the highest contract award rate it had seen in the past five years, winning 74% of the total train-km that were put out to tender in 2017. However, rail freight suffered a 2.2% drop in tonne-km from 94.7 billion in 2016 to 92.7 billion in 2017. DB says the proportion of non-DB operators running trains on the national network increased slightly from 30.1% in 2016 to 30.9% last year.

DB Arriva achieved a 4.9% increase in revenue in 2017 to €5.3bn, while DB Schenker performed even better with an 8.6% increase in revenue to €16.4bn. These two subsidiaries account for nearly half of DB's revenue.

DB is failing to meet some of its targets laid down in its Future Rail strategy. Overall punctuality was 93.9% in 2017, lower than the 94.4% achieved in 2012 and below the 2020 target of 95%. Long-distance passenger punctuality also dropped from 78.9% in 2016 to 78.5% last year. Unsurprisingly passenger satisfaction, which has a target of 79% by 2020, fell from 76% in 2016 to 75.8% in 2017.

Swiss Federal Railways in 2017

SBB High Speed Train at Milano Centrale Station

Swiss Federal Railways (SBB) published its annual results on March 20, revealing an increase in income despite heavy losses in the domestic rail freight market. Consolidated net income increased 4.8% year-on-year to SFr 399m ($US 421m), mainly due to higher productivity, improved results in the passenger, property and infrastructure sectors, and the RailFit20/30 efficiency programme launched in 2016. This programme is well on course, having achieved savings of SFr 785m by the end of 2017. Operating income continued to improve, increasing 5.1% to SFr 9.4bn, while operating expenses were up by 2.8% to SFr 8.94bn.

Average passenger journeys continued the upward trend of recent years, increasing 0.6% to 1.26 million a day, while punctuality (arrival within three minutes of schedule) rose 0.2% to hit a six-year high of 89%.

Earnings from passenger traffic were up 33.4% to SFr 186m, while property sector revenues remained stable at SFr 435m. Infrastructure earnings also improved from a deficit of SFr 103m to a positive SFr 100m.

SBB Cargo suffered a massive loss of SFr 239m, after a small but encouraging profit of SFr 1m the previous year. This was entirely due to the slump in the domestic sector, which made a loss of SFr 245m as wagonload volumes plunged 14.5%. SBB Cargo is exploring ways of restructuring this loss-making sector, including staff cuts and increased use of automation and digitalisation. SBB Cargo International doubled its result to SFr 8m, despite the devastating effect of the seven-week closure of the Rhine Valley Line at Rastatt in Germany.

Air

Hainan Airlines Results for 2017

Hainan Airlines reported a net profit of CNY3.3 bn ($507m) in 2017, up 6% over the CNY3.1 bn reported in 2016. The carrier cited robust market demand growth, especially in the international sector, for the increase.

The Haikou-based carrier's operating revenue jumped 47.3% to CNY60 bn while operating expenses increased 65.2% in CNY51.8 bn. Fuel costs grew 85.7% to CNY14.6 bn.

Overall, passenger boardings grew 52.5% to 71.7m. International routes saw an increase of 75.3% to more than 4m. Average load factor was 86.1%, down 1.8 points over 2016. Passenger capacity grew 49.1% to 141 bn available seat kilometres against a 46.1% increase to 121 bn revenue passenger kilometres.

On December 31, 2017, Hainan operated a fleet of 410 aircraft, comprising 81 Airbus, 250 Boeing and 79 Embraer ERJ aircraft. The airline opened 76 international and regional routes in 2017: it is committed to speeding up intercontinental

expansion to the US and Europe from China's secondary cities and it also plans to open new routes to the gateway cities of Latin America and Africa.

Heathrow in 2017

Heathrow Airport Holdings recently published its annual report for 2017.

Despite the airport being full, it managed to handle 3.1% more passengers than in 2016. Largest markets were Europe (32.4m), North America (17.4m) and Asia Pacific (11.3m). The region with the largest growth was Middle East, up 9.5% from 7m to 7.6m: this was partly due to additional A380 flights by Emirates, Etihad and Qatar and additional flights by Oman Air. European traffic was up 2.4% because of fuller larger planes and more flights – in particular to Italy, Russia, Belgium, Denmark, the Netherlands and Portugal with over 70,000 extra passengers in each market.

Heathrow Express revenues were up from £120m to £127m: there is a note against the 2016 figure to the effect that it has been restated by £14m because the revenue from TfL (allowing the Piccadilly Line to run to Heathrow) was included in the Heathrow Express revenue. This is a little opaque: it seems likely that the £14m was the revenue Heathrow earned from the Piccadilly Line extension to Terminal 5 (although a more authoritative answer would be appreciated).

IATA Statistics

IATA published its Air Passenger Market Analysis for February 2018 in early April.

Year-on-year growth in industry-wide revenue passenger kilometres (RPKs) rebounded in February following the distortion in January from temporary factors including the timing of Lunar New Year.

The upward trend in passenger volumes is continuing to be supported by robust global economic conditions. The industry-wide load factor was at a record high for the month of February at 80.4%. All regions except the Middle East saw record highs for the month, while the domestic load factor in India exceeded 90% for the first time ever.

Carriers based in Latin America recorded the fastest international RPK growth of all regions in February.

Industry-wide revenue passenger kilometres (RPKs) increased by 7.6% year-on-year compared to February 2017, up from 4.6% in January. Overall, global RPKs grew by 5.9% year-on-year over the first two months of 2018 combined – the slowest annual growth over this period in five years. However, year-to-date RPK growth so far in 2018 has been affected by the comparison with the very strong upward trend in seasonally adjusted passenger traffic in early 2017. IATA estimate that this has reduced the annual growth rate so far this year to date by around 0.6 percentage points relative to where it would have been had the traffic trend not been so strong a year ago.

Global passenger volumes have continued to trend upwards in recent months, with passenger volumes currently rising at an annualised rate of 6%-6.5%. While this is slower than the full-year pace of growth seen in 2017 (7.6%) it is still well ahead of the ten-year average rate (5.5%).

Norwegian's Results

Data for Norwegian Air Shuttle have recently been added to my spreadsheet, which looks at 4-quarter moving totals of key traffic and earnings data.

Revenue in the 4 quarters to Q4, 2017 was just over 31,000m NOK (the Norwegian krone is worth just under 10p). In the 4 quarters to Q4, 2015 it was just under 22,500m.

Revenue passenger kilometres (RPK), at 66,320m, are up significantly on the Q4, 2015 figure of 42,284m: available seat kilometres are similarly up (72,341m against 49,027m).

Passenger numbers are up from 25.75m in the year to Q4, 2015 to 33.14m in the year to Q4, 2017.

Revenue/passenger has generally trended up, from 873 NOK to 938 NOK: revenue/passenger-kilometre has trended down from 0.53 to 0.49 NOK.

Average journey length (RPK/passenger) has significantly increased with the advent of long-haul low-cost, pioneered by Norwegian. In the year to Q4, 2015, average journey length was 1642km: it is now 1910km.

Russia – Air Transport Trends

There is an interesting – and quite comprehensive – article on this at http://www.rusaviainsider.com/insight-russian-air-transport-flight-path-stability/

Slow Down for Quieter Take-offs

Research conducted by the Massachusetts Institute of Technology (MIT) International Center for Air Transportation examined potential modifications to NextGen performance-based navigation (PBN) procedures to reduce noise impacts on communities around Boston Logan International Airport. "The increased use of Area Navigation (RNAV) and Required Navigation Performance (RNP) procedures has resulted in a concentration of lateral tracks near airports due to the increased precision of these procedures," according to the report.

"While this increased precision has allowed operational benefits such as improved safety, reduced ATC workload, higher runway throughput, reduced fuel burn, better terrain avoidance, and lower approach minimums, it has also resulted in noise concentration and community opposition as aircraft fly consistent and repetitive tracks over the same communities. Ideally, PBN technology and procedures could be used to reduce overflight noise while retaining operational benefits."

The MIT team focused initially on procedures that demonstrate clear predicted noise benefits, limited operational and technical barriers, and a lack of equity issues in which noise is redistributed from one community to another. These so-called Block 1 procedures consist primarily of reducing climb speed for jet departures from Runways 33L and 27, modifying RNAV standard instrument departure definitions for Runways 15R, 22L, and 22R, and introducing an overwater approach procedure for Runway 33L.

The report recommends that pilots reduce departure climb speed to 220 knots for all aircraft that can safely do so. "Typical jet aircraft departures involve an acceleration to 250 knots shortly after takeoff. At this speed, the NASA Aircraft Noise Prediction

Program (ANOPP) noise model indicates that, for modern aircraft, airframe noise dominates engine noise. By reducing departure climb speed to a level where airframe noise is similar to engine noise, total source noise can be minimized."

In the case of a Boeing 737-800 departing runway 33L, reducing speed to 220 knots would mean 15,361 fewer people living within the DNL 65 dB noise contour, according to the report. It would increase flight time by 30 seconds and result in an increase of 6.8 gallons in fuel used. The team used ANOPP for procedures in which aircraft speed and/or configuration was a key factor in realizing noise benefits, and FAA's Aviation Environmental Design Tool (AEDT) for procedures where modified track definitions were expected to provide the primary noise benefits. "This is because AEDT does not fully account for airframe noise changes arising from speed and con-figuration changes."

Noise analysis was conducted on a single-event basis, calculated for the maximum noise level (LMAX) and sound exposure level (SEL), to evaluate the noise reduction potential for each individual operation rather than integrated impacts.

The technical recommendations presented in this report are not developed to an implementation-ready stage. Rather, the work completed to date represents a preliminary feasibility analysis for each recommended procedure. Prior to implementation of any of these recommendations, the FAA will need to execute internal verification and validation processes.

The next stage of the research calls for identifying and developing Block 2 procedures. These will be more complex because of potential barriers related to operational, technical, and equity issues.

US Air Travel in 2017

From Business Traveller

More than 965m people flew on domestic and international flights in the US last year, up 3.4% from the 933.1m who travelled by air in 2016, according to the US Department of Transportation (DoT).

In 2017, domestic passenger numbers increased 3% to 741.6m, while 223.4m passengers took international flights to or from the US, up 4.8%.

Both US and foreign airlines benefited from the trend: US carriers transported 3% more passengers on domestic flights and 3.5% more travellers on international flights, while foreign airlines carried 6.5% more passengers on US routes in 2017.

Southwest Airlines carried more passengers overall than any other airline, followed by Delta, American, United, and JetBlue. American transported the most international passengers, followed by United, Delta, JetBlue, and British Airways.

Atlanta Hartsfield-Jackson International Airport boarded the greatest number of airline passengers, while New York's JFK was the top gateway for international travellers.

Bus

New York City – Bus Performance Dashboard

New York MTA Bus at LaGuardia Airport

The New York Metropolitan Transportation Authority (MTA) launched a new online dashboard detailing customer-focused performance metrics for bus routes as part of MTA New York City Transit's strategy to improve service across the city's bus network.

The data on the bus performance dashboard is based on farebox, GPS, and other information and can be filtered by borough; types of service, such as local/limited, express, or Select Bus Service (but not by individual route); and time periods, such as weekday peak or off-peak hours. No other transit system in the world is considered to provide the same level of detail in an online dashboard.

Although service reliability for buses is largely dependent upon road conditions and traffic law enforcement, NYC Transit is committed to making improvements to its fleet, safety, service management, customer amenities, transparency, and customer service, as well as working with city government and community partners to make routes more efficient.
The dashboard is live now at http://busdashboard.mta.info/ and displays data on multiple metrics including:

- Average bus speeds (new metric).
- The average time customers wait at bus stops longer than scheduled (new metric).
- The average time customers spend on trips longer than scheduled (new metric).
- The percentage of customers whose trips are completed on time (new metric).
- Percentage of service delivered vs service scheduled.
- Mean distance between bus equipment failures.
- Passenger environment quality.

Road

Mobile Devices and Traffic Statistics

In December 2017, a report, "Using mobile device samples to estimate traffic volumes" was published. The research was done by Texas A&M University Transportation Institute (TTI) for Minnesota Department of Transportation (MNDoT).

MNDoT needs accurate and comprehensive traffic volume data. Traditionally, this has been collected by counting sensors (permanent and portable) – but they wondered if traffic flows could be accurately be measured by using mobile devices (smartphones and navigation devices) instead.

TTI estimated the accuracy of average daily and average hourly traffic volume estimates produced by Streetlight Data by comparing them with actual counts. The mean absolute percent error for daily flows was 61% over all sites, but ranged from 29% at high-volume sites to 68% at low-volume sites. The mean error was strongly influenced by numerous outliers at low-volume sites. They conclude that the methodology has potential, but needs enhancement to improve accuracy and granularity.

Streetlight Data combined two datasets they get from source data providers: these are GPS-enabled navigation data (presumably from in-car navigation systems) and location-based services (presumably from smartphones). These data are normalised using the US census population estimates, and calibrated using permanent traffic monitoring sites. They did this for 69 sites chosen as a representative sample of the State's roads. They then used the results to generate traffic volume estimates for a further 7,837 count sites – although some had to be removed, either because volumes were too low for accurate estimates or because there were multiple roads in close proximity.

High traffic volumes lead to greater accuracy, presumably because of the larger sample sizes of mobile devices around. Streetlight's estimates were always higher than MNDoT's figures. And there are numerous outliers, especially in low volume sites.

Hourly traffic volume estimates are more accurate than daily ones.

Similar research is being done on the East Coast by the I-95 Coalition in conjunction with the University of Maryland: no results are available yet.

Mobile Phone Data for Traffic Study

From PennLive

Motorists driving through the intersection of Routes 54 and 642 in Pennsylvania are taking part in a traffic study for the Pennsylvania Department of Transportation (PennDOT). Data related to origin, destination and direction of travel is coming from their cell phones or navigation devices. Modern technology is being employed to try to make the junction safer. The four-lane divided highway was completed between the I-80 and Danville: close to the middle of that stretch is the intersection with Route 642, the scene of numerous accidents.

PennDOT last year proposed a roundabout as a safety improvement, but it was met with public opposition. Although a roundabout is still an option, PennDOT's consultant is gathering more information, some of which is coming from cell phones or navigational devices. No personal information is used: all that is seen is a dot moving through the area. StreetLight Data of San Francisco is providing information including the number of vehicles passing through the intersection or making turns. The company's algorithms are designed to filter out data from multiple devices in a vehicle and bicycle and pedestrian trips. Only location records are received or stored by StreetLight: it is impossible to trace the location record back to any specific device.

New Study Finds Parking is the Largest Cost of Driving

From Metro Magazine

A new study found that the indirect, hidden costs of driving, such as sitting in traffic and searching for parking, carry a significant economic burden for drivers in the US —$3,037 for each driver in 2017. The findings of the first-ever "Cost of Driving" study, by INRIX, calculated vehicle ownership costs in 30 major cities in the US, UK and Germany.

The average US driver faced a total driving cost of $10,288 in 2017, made up of direct (maintenance, fuel, insurance, and parking and toll fees) and indirect or hidden (wasted time and carbon, parking fines and overpayments) costs. Traffic and parking related costs made up 45% of the total cost of ownership in the US

INRIX Cost of Driving Index – US City Results

On the local level, New York City (NYC) was the most expensive city for drivers out of the 30 cities studied. In 2017, the total cost of driving in NYC was nearly twice the national average at $18,926/driver, mostly due to the cost of parking. New Yorkers parked more often (10 times/week), paid more frequently (60%) and paid the most (average off-street rate of $28 for two hours). At $10,203/driver, Detroit had the lowest total cost of car ownership mostly due to cheaper on-street and off-street parking rates.

Rank	City	Direct Costs		Indirect Costs**		Total Cost of Driving
		Car Ownership	Parking	Congestion	Parking Pain	
1	New York City	$7,237	$5,395	$2,960	$3,334	$18,926
2	Los Angeles	$7,237	$2,405	$2,808	$2,383	$14,834
3	San Francisco	$7,237	$2,801	$2,226	$2,361	$14,625
4	Washington D.C.	$7,237	$2,170	$2,045	$1,846	$13,297
5	Chicago	$7,237	$2,096	$1,982	$1,576	$12,890
6	Boston	$7,237	$2,045	$2,075	$1,497	$12,853
7	Seattle	$7,237	$1,274	$1,834	$1,504	$11,848
8	Atlanta	$7,237	$872	$2,205	$1,264	$11,578
9	Dallas	$7,237	$723	$1,671	$1,210	$10,841
10	Detroit	$7,237	$815	$1,251	$900	$10,203

INRIX Cost of Driving Index – Country Results

The average US driver faced a total driving cost of $10,288 in 2017, which was 55% more than the average UK driver and 14% more than the average German driver. However, US drivers use their cars more than their German counterparts (13,467 miles driven annually in the US and 8,709 miles driven annually in Germany), but the congestion impact is smaller.

Country	Direct Costs		Indirect Costs		Total Cost of Driving
	Car Ownership	Parking	Congestion	Parking Pain	
US	$5,645	$1,607	$1,642	$1,394	$10,288
U.K.	$4,260	$1,244	$1,398	$1,337	$8,239
Germany	$4,376	$1,062	$2,347	$1,556	$9,341

The direct Cost of Driving includes parking and car ownership charges. INRIX Research calculated car ownership costs by multiplying the annual mileage travelled from the US Federal Highway Administration (FHWA) by the Inland Revenue Service stated mileage rates that can be reclaimed when using a vehicle for business purposes — $0.537 in 2017. This figure is updated annually and is designed to reflect the average cost of running a vehicle in the US. Multiplying this by the average annual mileage provided by the FHWA provided an estimate of the annual cost of running a car.

Car ownership costs include:

- Purchasing or leasing a vehicle including finance costs
- Depreciation
- Maintenance and servicing including tyres
- Insurance
- Fuel
- Parking and toll fees
- Taxes
- Time, fuel and value of carbon emissions generated by sitting in congestion
- Time, fuel and value of carbon emissions generated by searching for parking
- Overpaying for parking (for example putting 2 hours in when you need 30 minutes)
- Parking fines

** The indirect Cost of Driving includes the cost of congestion and 'Parking Pain'

Road Traffic in India

Traffic in Delhi

Ola (Ani Technologies Pvt. Ltd.) released its study about traffic scenario in India. The company shared average traffic speed in seven Indian cities - Bengaluru, Delhi, Mumbai, Pune, Kolkata, Chennai and Hyderabad.

Some of the key findings of the study are:
1. The overall **average traffic speed has dropped by 2.9 km/h**, with Bengaluru registering an average traffic speed of 17.2 km/h this year, compared to 25 km/h for Delhi.
2. **Bengaluru has the slowest traffic in India** with an average speed of 17.2 km/h, followed by Hyderabad (18.5 km/h) and Chennai (18.9 km/h).
3. The **Outer Ring Road in Delhi is the major traffic bottleneck** for the traffic, which is surprising as there are 6 flyovers or underpasses on the 47 km route.
4. The **highest traffic during the morning peak** in most of the cities is between **9:15 and 9:52.** Bengalureans left home 25 minutes later while Chennaiites left home 15 minutes earlier on average.
5. **Delhilites shared the most number of rides** last year and saved 1.14 million litres of fuel. Delhi is also the city with the most numbers of registered cars.

Where's Uber?

A recent article in the Financial Times noted Uber's presence in cities around the world in early 2018.

North America	312
Central & South America	172
Europe	98
Asia	101
Australia and New Zealand	25
Africa	15
Middle East	13

The Asia total was about to decrease, as part of a deal with a Chinese company.

Sea

UK Bypass

Truck traffic between Ireland and continental Europe is likely to be negatively impacted by Brexit. To avoid this, plans are being made to increase shipping capacity on direct sea routes.

Direct routes between Dublin and Zeebrugge and Rotterdam are being proposed by a Luxembourg based company using two new ships. Brittany Ferries is planning a new service between Cork and Santander. A new large ferry is coming into service in summer between Dublin and Cherbourg: this will increase capacity on the route from 120 trucks/week to 1155 (although in the high season some of the capacity will be reserved for cars rather than freight). Operator is Irish Continental Group, which is also boosting capacity between Dublin and Holyhead from 2020.

It is reported that capacity on the Dublin – Holyhead route is currently 1000 trucks/day each way: Rosslare – Fishguard and Pembroke services have a combined daily capacity of 250 each way. Much of the capacity is taken up with traffic transiting the UK.

At the moment two-thirds of Irish exporters ship to continental Europe by ferry and across the UK by road.

Transit times on direct routes will be longer, but the likely need for checks for customs, the Department of Agriculture and then Immigration is forecast to impact on reliability.

Ireland to be hit by Russian Sanctions?

From the Financial Times and www.alcircle.com

In order to produce aluminium, bauxite is refined into alumina. This is then smelted – a process which demands much energy - into aluminium, which can be processed to produce cans, cars and such-like.

Rusal's Aughinish Alumina, on the Shannon estuary near Limerick on the west coast of Ireland, is the largest alumina refinery in Europe, the only one in Ireland and the largest operated by Rusal. As a result Ireland is a major bauxite importer: it is a major customer of Rio Tinto. However, Russia is now subject to sanctions following

chemical weapons use in Syria and the UK and the future of alumina production in the country is uncertain.

Ireland has been one of the top five bauxite importing countries since 2006, recently increasing at the rate of 4%/year.

The current annual capacity of the Aughinish refinery is over 1.915 million tonnes of alumina. Year after year it has been implementing the latest refining technologies available to ensure it remains one of the top as well as low-cost alumina producers in the world. In 2016, Ireland imported 3.25m tonnes of bauxite from Guinea, 1.1m tonnes from Brazil and smaller amounts from Guyana, Greece and the UK.

International trade data shows that Ireland imported 4.603 million tonnes of bauxite in 2016, up 4.3% cent from the previous year. In 2015, total bauxite import in the country was estimated at 4.41 million tonnes. In 2017, however, bauxite imports were projected to drop by 7.6% year-on-year to total at 4.25 million tonnes. Following sanctions, this is likely to drop further.

Ireland saw an increase in alumina exports over the last three years. It exported about 2m tons of alumina in 2015, while in 2016, the country exported about 2.13m tons. The 2017 figure is thought to be 2.4m tons, mainly to France (0.74m tons), the Netherlands (0.22m tons) and Sweden (0.21m tons).

In 2016 the port of Shannon Foynes saw 10.9 million tonnes of cargo: it is the second largest port by tonnes after Dublin.

The future of the plant and its 450 employees is not known: the impact on the port and the neighbourhood will be considerable.

Note that some sources use Imperial tons and others metric tonnes: this is reflected in the text.