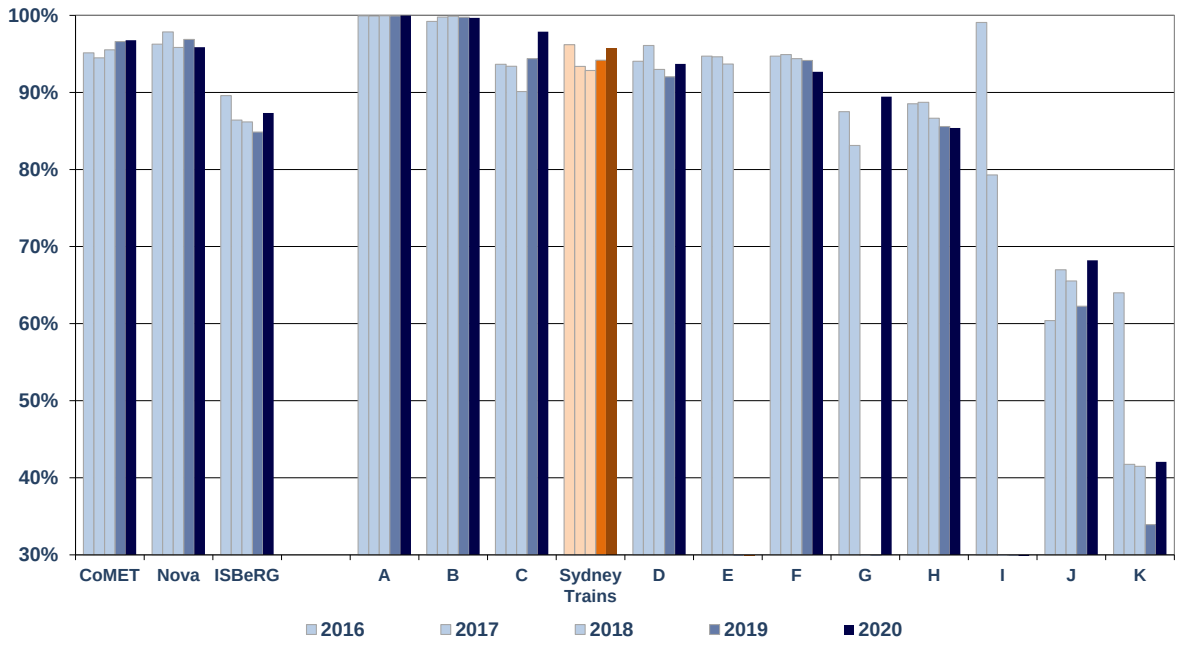
Sydney Trains Update (CY2020): Comparison with International Benchmarking Groups

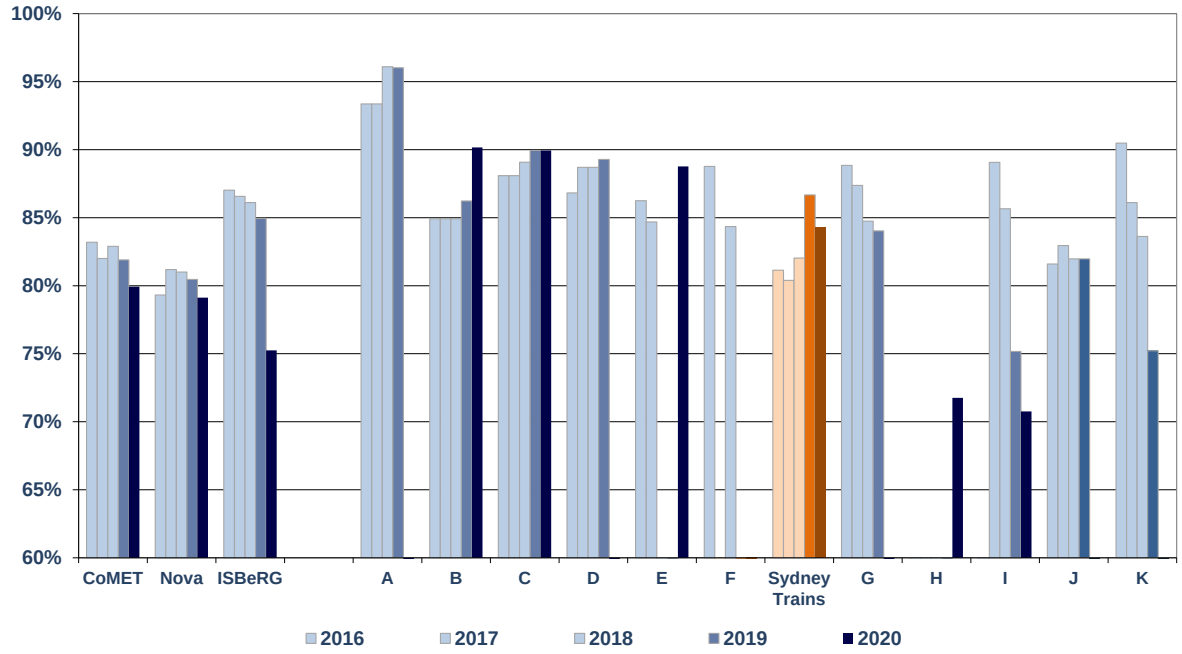
- This report was prepared independently for Sydney Trains by the Transport Strategy Centre at Imperial College London. The anonymised data and other information used was sourced from Sydney Trains and other members of the ISBeRG, COMET and Nova benchmarking groups with the KPIs agreed with Sydney Trains.
- Membership of international benchmarking groups allows Sydney Trains to compare its performance to international peers and, through sharing best practices, identify opportunities for improvement.
- Sydney Trains belongs to the International Suburban Railway Benchmarking Group (ISBeRG), which comprises 13 suburban railways. Typically, these railways link the suburbs to the CBD, with longer lines and larger networks than metros, but with fewer, longer, passenger journeys. Sydney Trains joined this group in 2011.
- Sydney Trains is part of the 'Community of Metros', consisting of:
  - 'COMET', a group of 20 of the world's largest metros. Its constituents typically have more than 500 million passenger journeys per annum.
  - 'Nova' is a group of 22 small to medium-sized metros, typically with fewer than 500 million passenger journeys per annum.
- Benchmarking between the members of the various groups is undertaken annually. This document provides a provisional update of selected charts from Sydney Trains' previously published report and shows results for the calendar years 2016 to 2020. To preserve confidentiality of other members' data, Sydney Trains' performance is compared to the:
  - averages of all ISBeRG, COMET and Nova Members
  - individual ISBeRG members, on an anonymised basis
- In some cases there are changes to previously published figures due to revision of data. Comparison to averages may disguise some significant 'highs' and 'lows' in performance: individual results within each group may vary significantly.
- Sydney Trains is a typical (ISBeRG) suburban railway. Compared to metros, such railways typically have predominantly one-way commuting passenger flows in peak periods, higher average distances between stations, and longer average passenger journeys lengths. Like most other ISBeRG members, Sydney Trains operates a complex network of interconnected lines, partly shared with longer distance passenger and freight trains. Sydney Trains has a larger network than nearly all of the COMET/Nova group members, but comparatively lower patronage.
- For these reasons, Sydney Trains' performance is generally more comparable with that of other ISBeRG members, hence greater prominence is given within this report to performance relative to these railways.
- ***It must be noted that the 2020 results reveal severe perturbations to members' performance due to covid, so the graphs must be considered in this context.***

Customer
Trains On Time as a proportion of Total Scheduled Trains



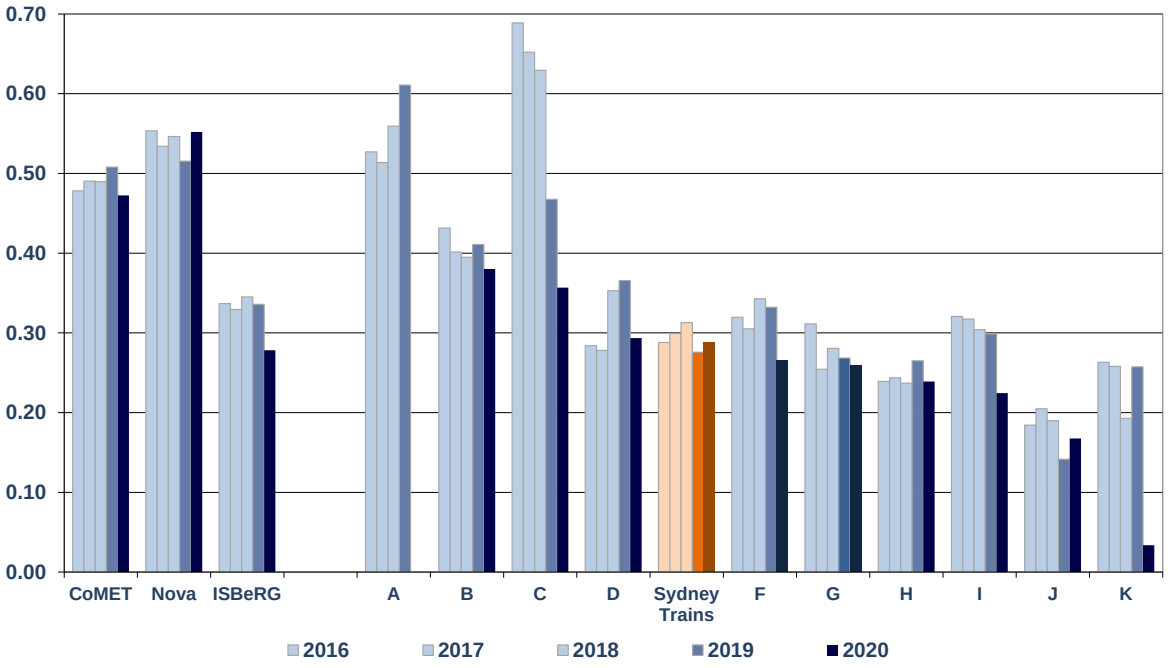
- Trains on time are defined as scheduled services that arrive at their destination within five minutes of the advertised time.
- On-time performance remains favourable relative to international suburban railway peers (4 out of 12). Punctuality is above the ISBeRG average, comparable to COMET, but slightly below the Nova average.
- The highest performing railways have achieved such levels of punctuality through a combination of reliability centred maintenance, a culture of continuous improvement, efficient operations and management and the age and design of their systems. In some cases, simpler networks and no shared track with other operators also contribute to the high performance.
- The significant deterioration in performance for Railway K is as a result of a number of challenges including ageing rolling stock, vandalism and trespassing. Several railways have a high proportion of passenger and staff related delays.
- Sydney Trains have seen an increase in punctuality due to fewer customer-related delays during the COVID-19 pandemic. Some other railways have also experienced improved punctuality during the pandemic.

Efficiency
Percentage of Cars Used in the Peak Period



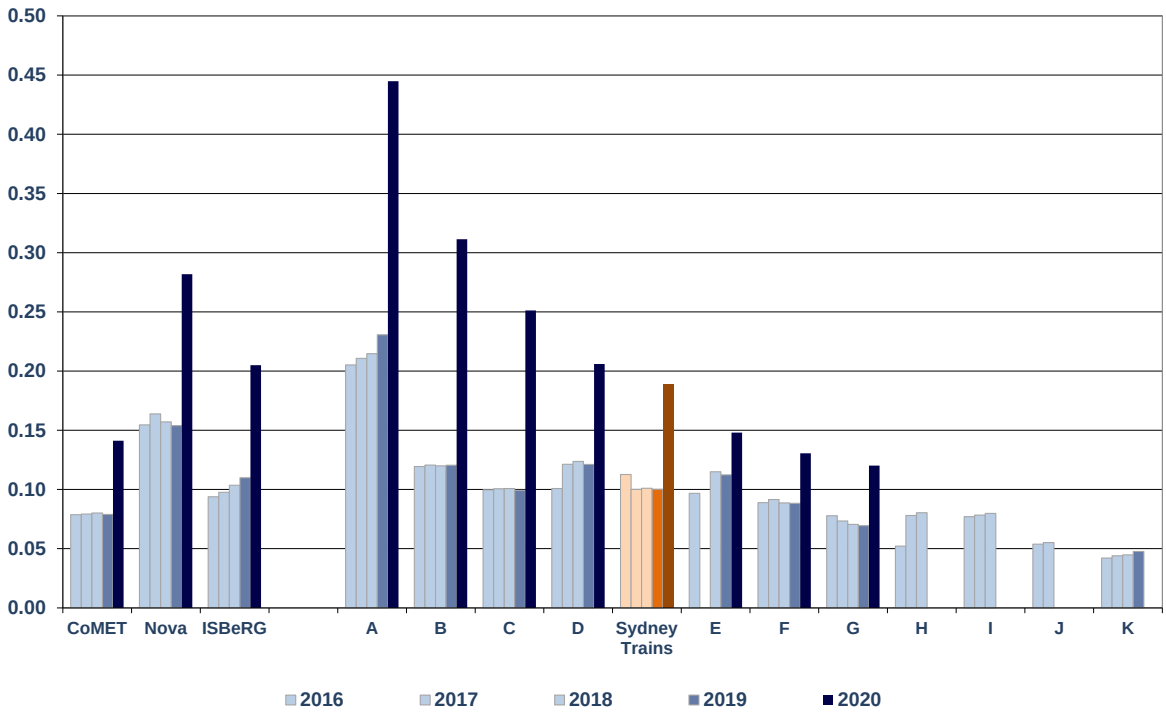
- The percentage of cars used in the peak hour is a key measure of rolling stock utilisation, as well as the performance of the rolling stock maintenance function. This KPI also reflects operational strategy regarding operators' use of spare trains, as well as investment strategy in terms of fleet size. This measure can be affected by the ability to maintain all trains outside of peak periods (for example, if night working is not permitted, a lower level of utilisation is usually attained).
- This KPI can be influenced in particular years by fleet changes, including the retirement and/or refurbishment of existing trains, or the procurement of trains (either for new lines and extensions or to increase service on existing lines).
- The challenge is to achieve an efficient level of utilisation within the context of operational requirements, service standards, patronage levels, demands of maintenance, overhaul and rebuild programs and extended procurement cycles.
- Sydney Trains are introducing a new fleet, so have significantly higher levels of vehicles available than required, which explains the 2019 to 2020 reduction.
- Although Sydney Trains maintained previous service levels in 2020, many other operators ran fewer trains to reflect the lower number of passengers travelling during COVID. Since fleets generally remained the same, this led to reductions in the proportion of cars used during the peak in 2020 compared to earlier years. The impact of this can be seen in the COMET, Nova and ISBeRG averages above, as well as for some individual ISBeRG railways (e.g. H, I and K).

Efficiency
Train Hours/Driver Hour



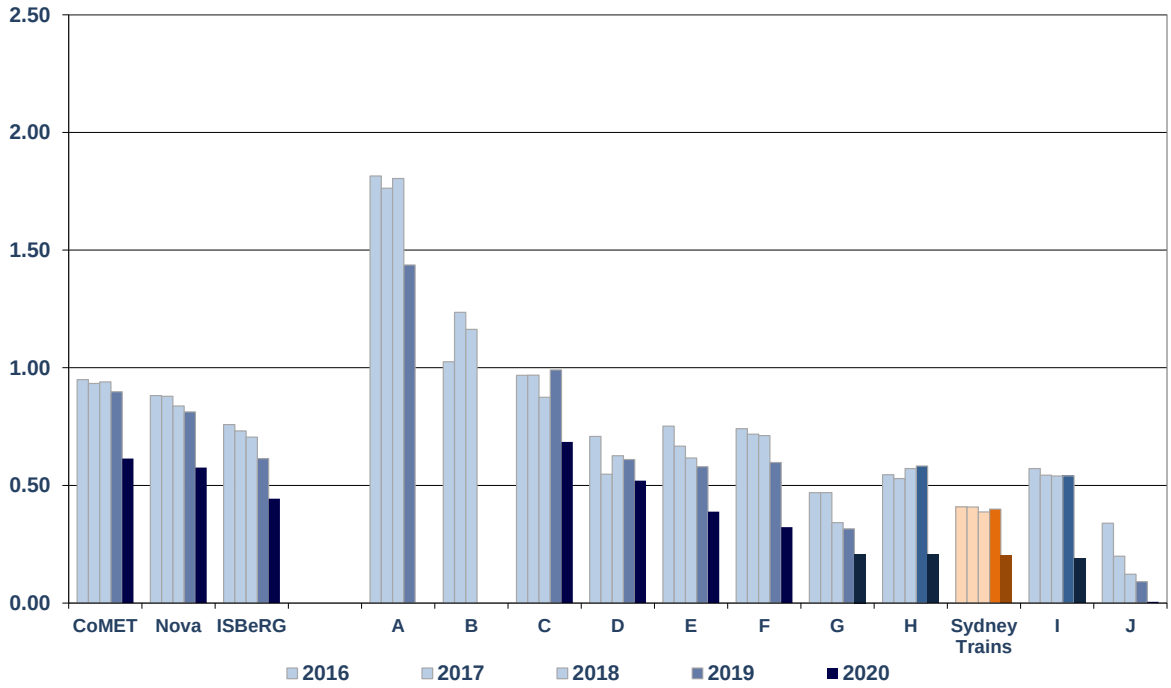
- This KPI is a measure of 'net' driver productivity, measuring the amount of time spent driving trains as a proportion of total hours worked by drivers.
- Sydney Trains has low driver productivity relative to COMET and Nova metros, but similar to the mean of ISBeRG railways (5th out of 11). Driver productivity is normally lower on suburban railways than on metros. Longer lines, more complex networks and less frequent trains make rosters less efficient.
- Lower driver productivity and two-person operation (driver and guard) are key cost drivers for Sydney Trains when compared to international peers, many of which have driver-only operation. Furthermore, their guards play a solely operational role, with no customer service or revenue protection responsibilities. (Note: data represents only drivers, meaning guards' hours are not included.)
- Some operators have successfully negotiated improved productivity and increased driver flexibility through measures such as: remote sign-on, split shifts, part time drivers, and variable shift lengths.
- Driver productivity fell on Sydney Trains in 2019 due to the need to: meet required driver numbers following increased service levels; test and deploy the new Sydney Growth Trains fleet; train drivers for rollout of Automatic Train Protection and Tangara Train Upgrade; and meet recruitment levels for NSW Trains (crew have yet to transfer to NSW Trains).
- Although Sydney Trains maintained previous service levels in 2020, many other operators ran fewer trains during COVID. Running fewer trains while still employing a similar number of drivers meant that driver productivity fell in several cases.

Efficiency
Total Energy Consumption (kilowatt hours) /Passenger km



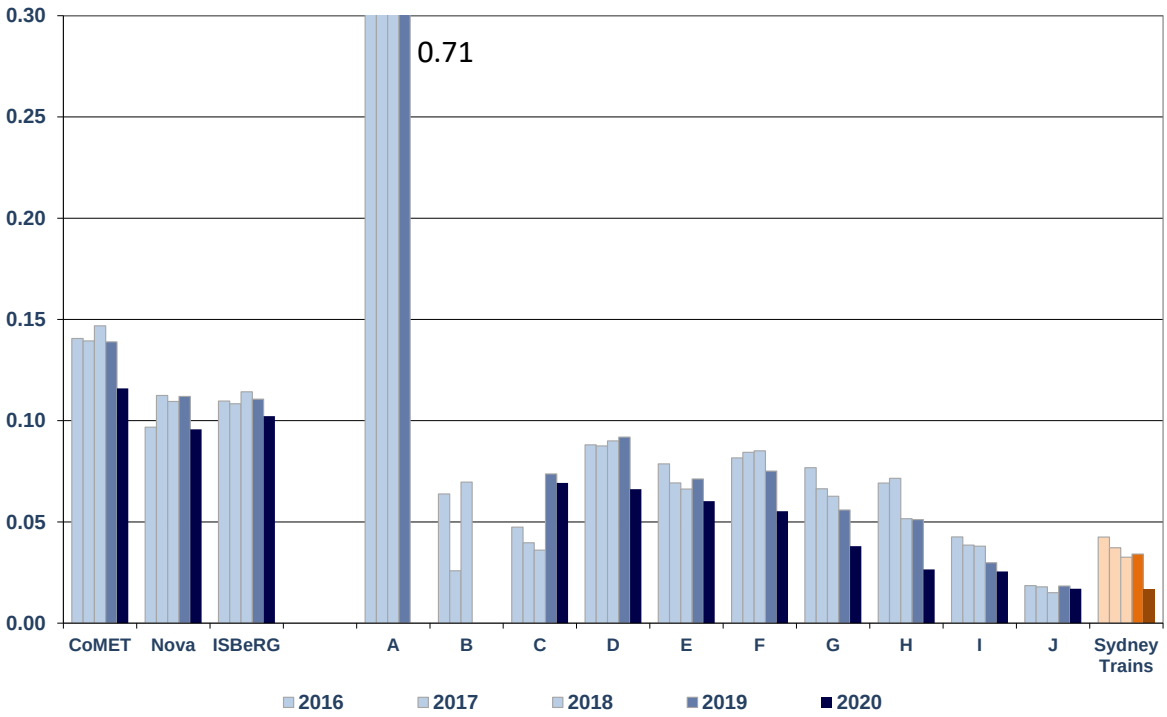
- Sydney Trains' total energy consumption per passenger kilometre is close to the ISBeRG average. Past improvements for this metric have been due to the introduction of new rolling stock and increasing passenger demand (more passengers relative to energy consumption).
- Compared to the metros, Sydney Trains uses significantly less energy per passenger km than the Nova average, but more than the average COMET metro. COMET energy consumption per passenger km is reduced through high passenger volumes.
- Since passenger demand fell significantly during the COVID-19 pandemic, and by a much greater extent than any reductions in service levels, average load factors dropped. Hence the average energy consumption per passenger km increased substantially on all operators in 2020 compared to earlier years.
- The pre-COVID reduction in energy consumption per passenger kilometre was also driven by passenger growth and population density, particularly in rapidly expanding Asian cities. The higher the passenger km, the more the marginal energy consumption will reduce. This also partially explains the growing disparity between the averages of COMET (metros that serve larger cities, with a greater proportion of Asian members), and Nova (metros that serve small and medium-sized cities).
- Many operators have reduced traction energy consumption through practices such as eco-driving (including better use of coasting) and regenerative braking for at least part of their fleet. Non-traction usage has been reduced through technologies such as LED lighting and escalator 'sleep' mode.

Financial
Fare Revenue/Operating Cost



- This KPI shows whether operators generate enough revenue from passengers (fares) to 'break even', without consideration of capital expenditure or any subsidies (including subsidies to customers in the form of concessionary fares and contract fees paid to the operator).
- Cost recovery is driven by passenger densities as well as fare and cost levels. i.e. higher population and urban densities typically lead to greater cost recovery levels.
- All operators experienced significant decreases in this KPI in 2020 as fare revenue fell due to the reductions in passenger demand during the pandemic (although most were at least partly compensated for this through increased contractual fees or other support from governments or transport authorities).
- As prior to COVID, Sydney Trains' operating cost recovery from fares remains significantly below ISBeRG, COMET, and Nova group averages (approximately half). This has been the case for each of the last five years.
- Sydney Trains' comparatively poor pre-COVID performance in an ISBeRG context is attributable to the relatively very low fares and to low *average* capacity utilisation. NSW Government policy requires Sydney Trains to provide extensive concession entitlements, and fares are generally low relative to distance travelled (page 8).

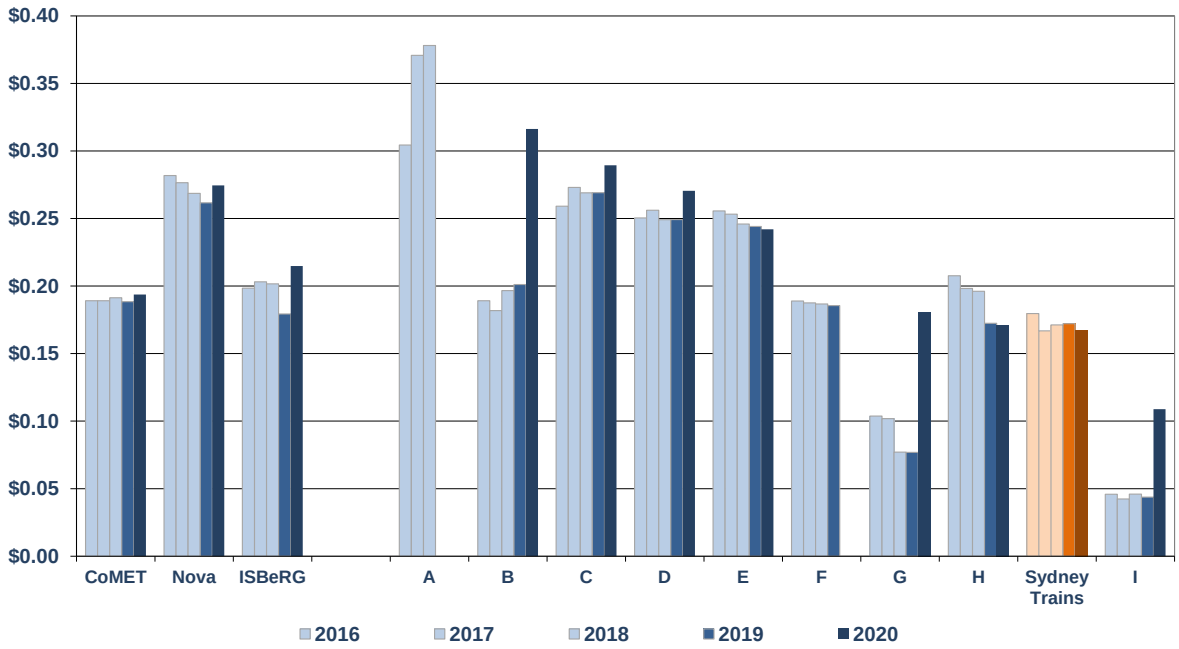
Financial
Non-Fare Revenue/Operating Cost



- This KPI shows the contribution secondary commercial revenue (from sources such as advertising, retail, property and telecommunications) makes to cost recovery.
- Most operators saw substantial falls in secondary commercial revenue during the pandemic. With fewer passengers travelling on the network, revenue from sources including advertising, station retail and car parking typically fell. However, the scale of the reduction was much less than the fall in fare revenue (as show previously).
- Sydney Trains receives significantly less secondary commercial revenue relative to operating cost than most of the other railways and metros. However, the reduction during the pandemic was also proportionately less than seen elsewhere.

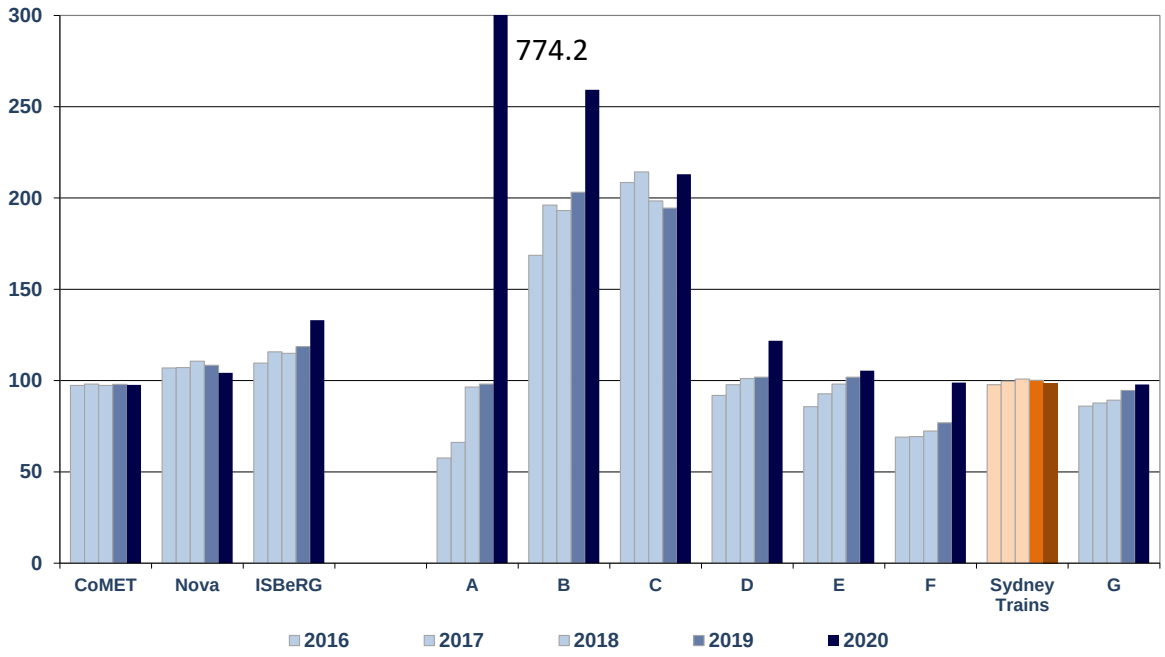
Note: Some ISBeRG members are not included in cost comparisons as they are not responsible for the cost of infrastructure maintenance (track, stations and other fixed installations) and hence do not have comparable cost structures. The four excluded members are Vy Oslo, S-Bahn Munich, DSB Copenhagen and London Overground.

Financial
Fare Revenue/Passenger km
(2020 AU Dollar PPP)



- The graph above shows the average fare revenue per passenger kilometre (converted into AU Dollar Purchasing Power Parity (PPP)). This measure reflects the fares paid by passengers. It does not include concessionary fare support operators may receive (e.g. from government) - as mentioned previously, Sydney Trains offers extensive concessionary fares.
- Sydney Trains' fare revenue per passenger kilometre is low compared to other operators but has been consistent over the last five years.
- While passenger demand fell during the pandemic, the average fare paid by passengers remained similar on most systems, meaning that the fare revenue per passenger km did not change substantially. In a few cases there was a slight increase as fewer passengers were using season tickets (e.g. monthly or annual passes) which are typically cheaper on a 'per km' basis.
- Railway G's increase was due to a revenue risk sharing adjustment and a revenue reset adjustment from the State Government.

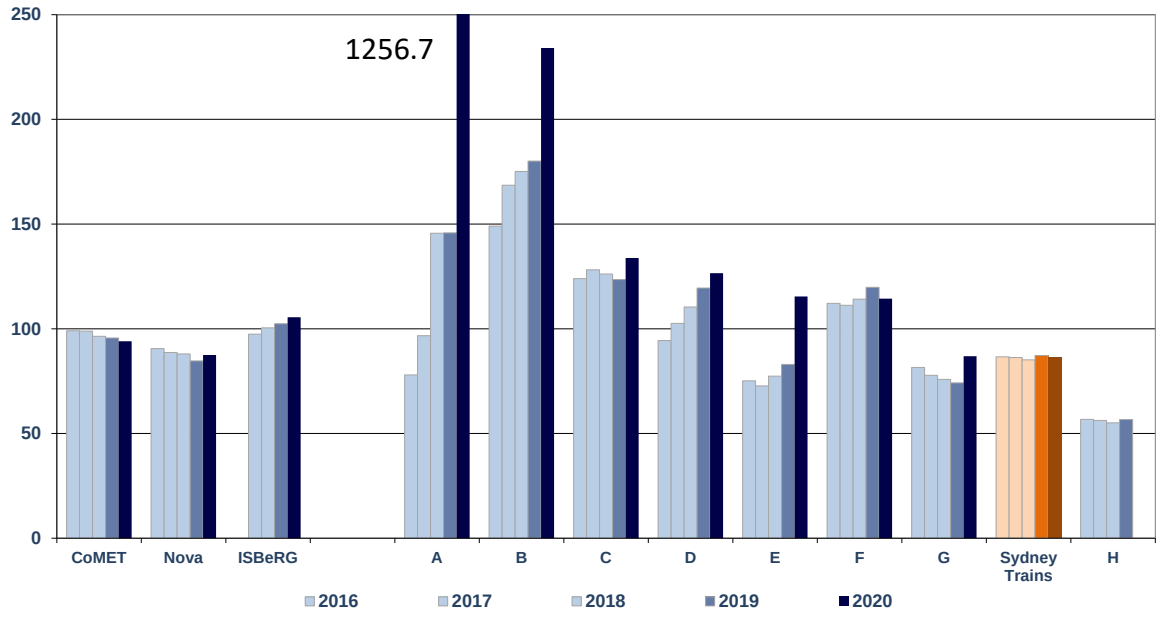
Financial
Total Operating Cost/Car km
(Indexed to 2016 mean)



- Prior to COVID, some ISBeRG railway were experiencing an upward trend in total operating cost per car km, whereas the average for metros was relatively stable.
- Since many railways reduced service levels in 2020 due to the pandemic, unit costs per car km often increased as many cost elements for railways are fixed in the short term.
- Sydney Train's cost per car km has remained relatively stable in recent years and, unlike many, unit costs did not rise in 2020 as service levels were maintained during COVID.
- Many railways and metros achieve lower unit operating costs by increasing the number of car kilometres operated – such as through longer trains and more frequent services. However, double deck trains in Sydney mean that costs are comparatively lower relative to the level of capacity provided.
- Some ISBeRG members have seen pronounced drops in aspects of their operating costs, which can be attributed to factors such as the wider adoption of driver-only operation of trains.
- Sydney Trains' total operating costs have historically been relatively high compared to COMET and Nova metros, and ISBeRG railways, though similar to other high-wage cities in the group.
- Railway B/C's significantly higher cost per car km were due to higher staffing levels.

Note: Some ISBeRG members are not included in cost comparisons as they are not responsible for the cost of infrastructure maintenance (track, stations and other fixed installations) and hence do not have comparable cost structures. The four excluded members are Vy Oslo, S-Bahn Munich, DSB Copenhagen, London Overground.
Railway A had a period where all services were suspended during 2020. This means that when normalised by (e.g.) train km, their unit costs are extremely high which then skews the ISBeRG average to create a misleading picture of the overall trend across ISBeRG railways. Therefore, Railway A is excluded from the ISBeRG averages.

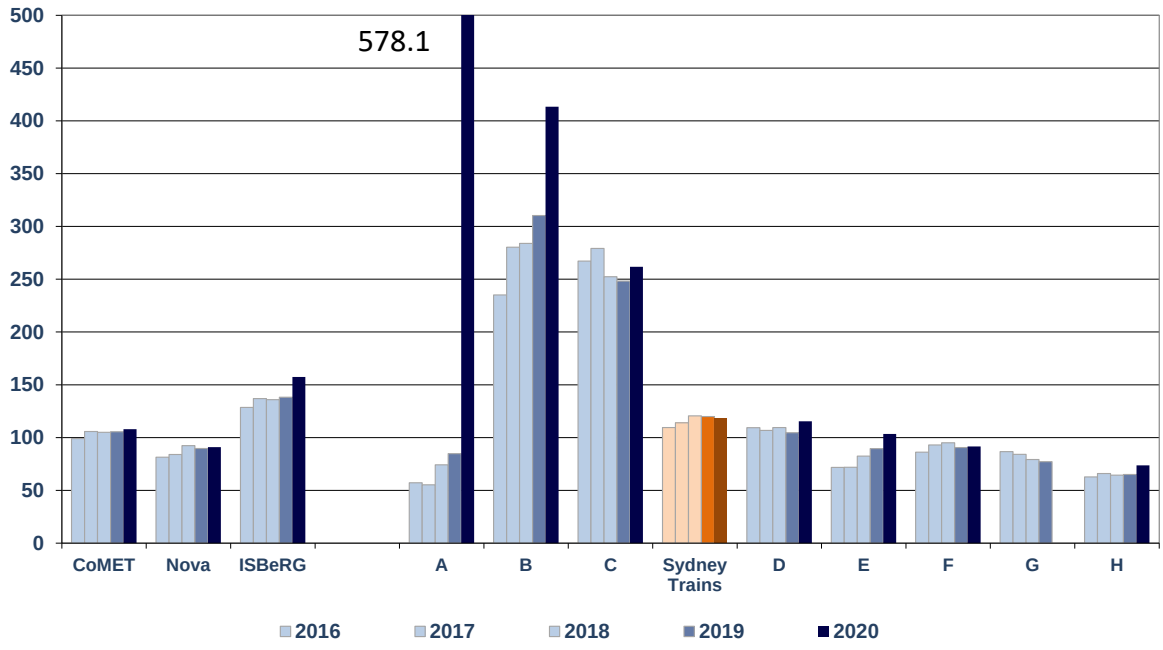
Financial
Service Operation Cost/Car km
(Indexed to 2016 mean)



- This KPI shows the costs incurred in operating the train service and stations. Cost components in this area include staff wages (for both train drivers and station staff) and materials and energy costs (both traction and non-traction electricity).
- Since many railways reduced service levels in 2020 due to the pandemic, unit costs per car km often increased as many cost elements for railways are typically fixed short-term.
- Sydney Train's cost per car km has remained relatively stable in recent years and, unlike many other railways, unit costs did not rise in 2020 as service levels were maintained during the pandemic.
- Sydney Trains' service costs are affected by high crewing costs (two-person crewing, as opposed to driver-only for most metros and around half of ISBeRG railways). However, they are slightly offset by the relatively low cost of energy. Double deck trains in Sydney also mean that costs are comparatively lower relative to the level of capacity provided.
- Railway A's costs increased greatly in 2018, due to significant service cancellations, which reduced the volume of car km operated while most costs fixed.
- Reduced revenue car km in 2020 due to the COVID-19 pandemic have also led to increases in this KPI.

Railway A had a period where all services were suspended during 2020. This means that when normalised by (e.g.) train km, their unit costs are extremely high which then skews the ISBeRG average to create a misleading picture of the overall trend across ISBeRG railways. Therefore, Railway A is excluded from the ISBeRG averages.

Financial
Maintenance Cost/Car km
(Indexed to 2016 mean)

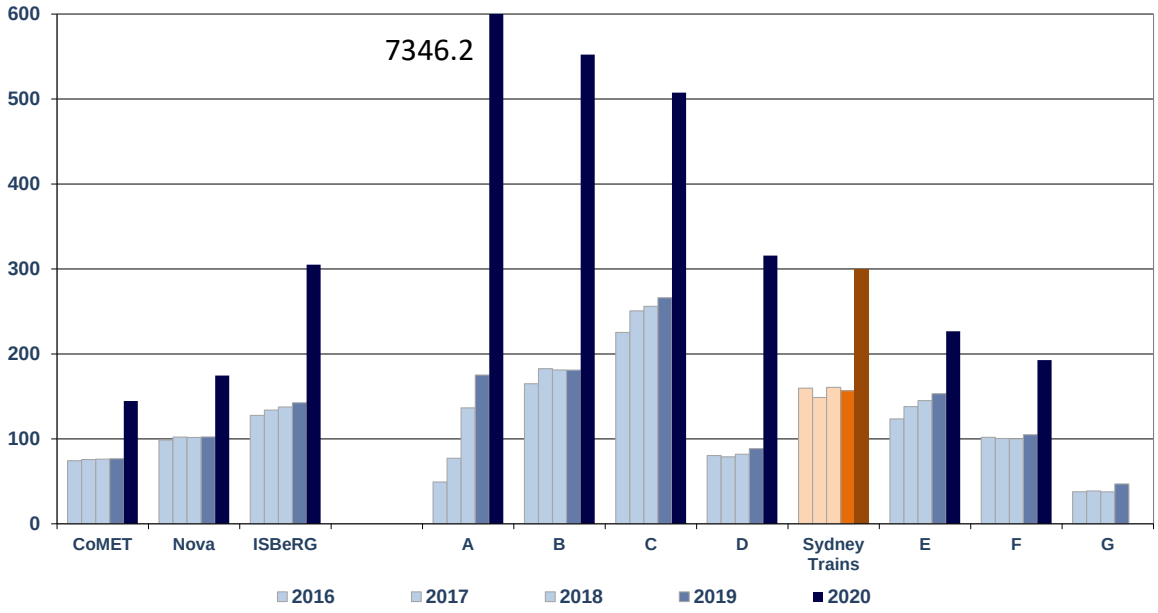


- This graph shows expenditure on maintenance, for rolling stock, infrastructure and stations, relative to car km operated. Sydney Trains' maintenance costs per car kilometre are high relative to many other ISBeRG railways and to the Nova averages. Although they are below the COMET and ISBeRG averages, this is due to ISBeRG railways B and C having very high maintenance costs.
- Infrastructure maintenance costs are high, partly due to the additional pressures placed upon the network by the NSW Trainlink and freight services that use it. Nonetheless, cost reductions are expected in the medium-term.
- Metros and railways that have realised reductions in maintenance costs have done so through the renegotiation of outsourced maintenance contracts, reliability centred maintenance and procurement of new trains.
- Railway B's very high maintenance costs are due to factors such as higher labour costs, as well as a commitment to long hours of operation across its network.

Note: Some ISBeRG members are not included in cost comparisons as they are not responsible for the cost of infrastructure maintenance (track, stations and other fixed installations) and hence do not have comparable cost structures. The four excluded members are Vy Oslo, S-Bahn Munich, DSB Copenhagen, London Overground.

Railway A had a period where all services were suspended during 2020. This means that when normalised by (e.g.) train km, their unit costs are extremely high which then skews the ISBeRG average to create a misleading picture of the overall trend across ISBeRG railways. Therefore, Railway A is excluded from the ISBeRG averages.

Financial
Total Operating Cost/Passenger km
(Indexed to 2016 mean)

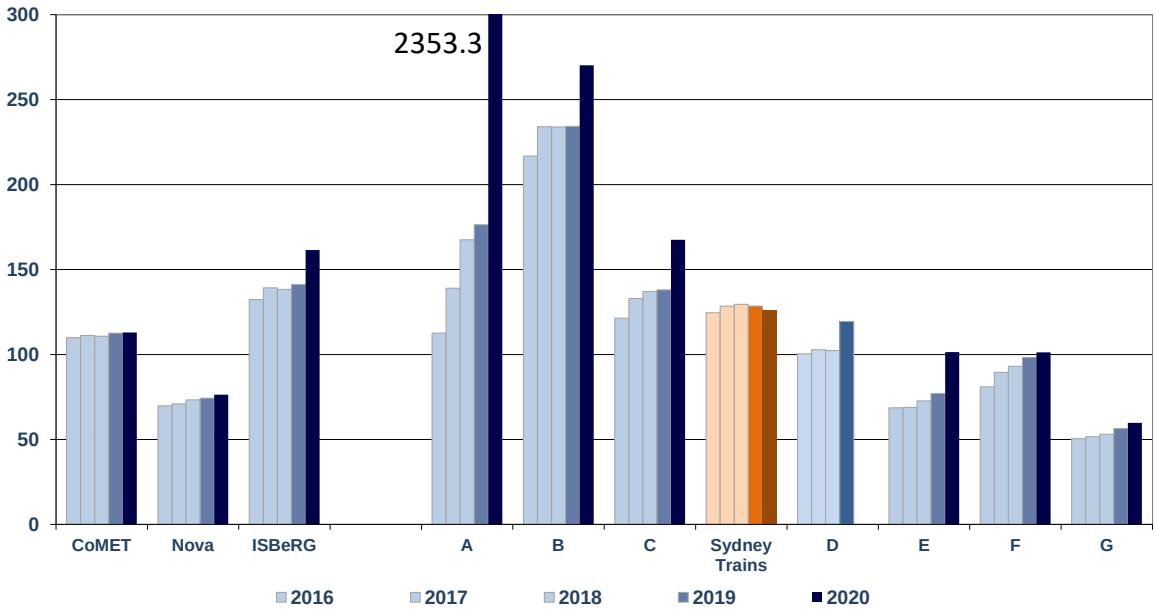


- The ISBeRG average for this measure is higher than COMET/Nova, because of lower average passenger density on suburban railways (low patronage in off-peak periods means that 'half-empty' trains must be moved long distances from the CBD to the network boundaries). In addition, different crowding standards exist between railways and metros: typically, a metro would plan for a higher number of standing passengers for the same floor area, reflecting the shorter journey lengths.
- All operators saw major increases in this KPI in 2020 as passenger demand fell significantly during the pandemic while there were limited actions metros and railways were able to take to reduce costs in the short term. For this reason, it is helpful to look at the cost trend per train km – this is shown on the following page.
- Sydney Trains' operating cost per passenger kilometre is much greater than the averages for the COMET and Nova groups.

Note: Some ISBeRG members are not included in cost comparisons as they are not responsible for the cost of infrastructure maintenance (track, stations and other fixed installations) and hence do not have comparable cost structures. The four excluded members are Vy Oslo, S-Bahn Munich, DSB Copenhagen, London Overground.

Railway A had a period where all services were suspended during 2020. This means that when normalised by (e.g.) train km, their unit costs are extremely high which then skews the ISBeRG average to create a misleading picture of the overall trend across ISBeRG railways. Therefore, Railway A is excluded from the ISBeRG averages.

Financial
Total Operating Cost/Train km
(Indexed to 2016 mean)

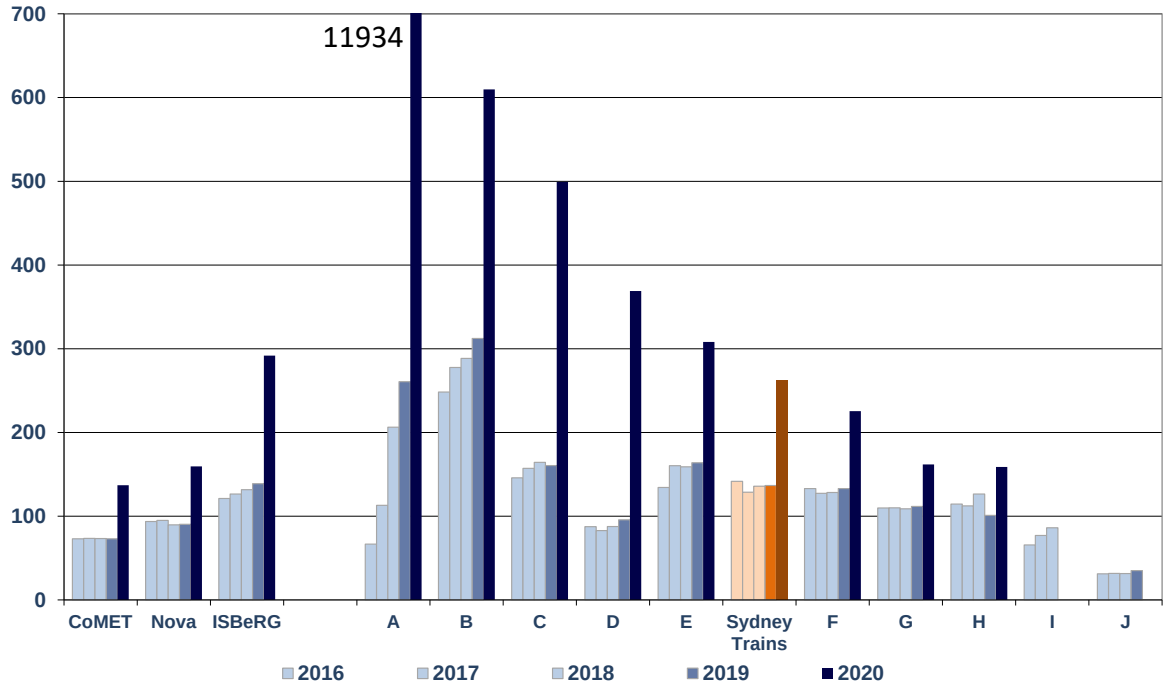


- The ISBeRG average for this measure is much higher than Nova also higher than COMET, partly because of typically lower frequency of services on suburban networks than metros.
- Sydney Trains operation cost per train kilometre is in line with the ISBeRG averages, but exceeds COMET and Nova.
- Sydney Train's cost per train km has remained relatively stable in recent years and, unlike many railways, unit costs did not rise in 2020 as service levels were maintained during the pandemic.

Note: Some ISBeRG members are not included in cost comparisons as they are not responsible for the cost of infrastructure maintenance (track, stations and other fixed installations) and hence do not have comparable cost structures. The four excluded members are Vy Oslo, S-Bahn Munich, DSB Copenhagen, London Overground.

Railway A had a period where all services were suspended during 2020. This means that when normalised by (e.g.) train km, their unit costs are extremely high which then skews the ISBeRG average to create a misleading picture of the overall trend across ISBeRG railways. Therefore, Railway A is excluded from the ISBeRG averages.

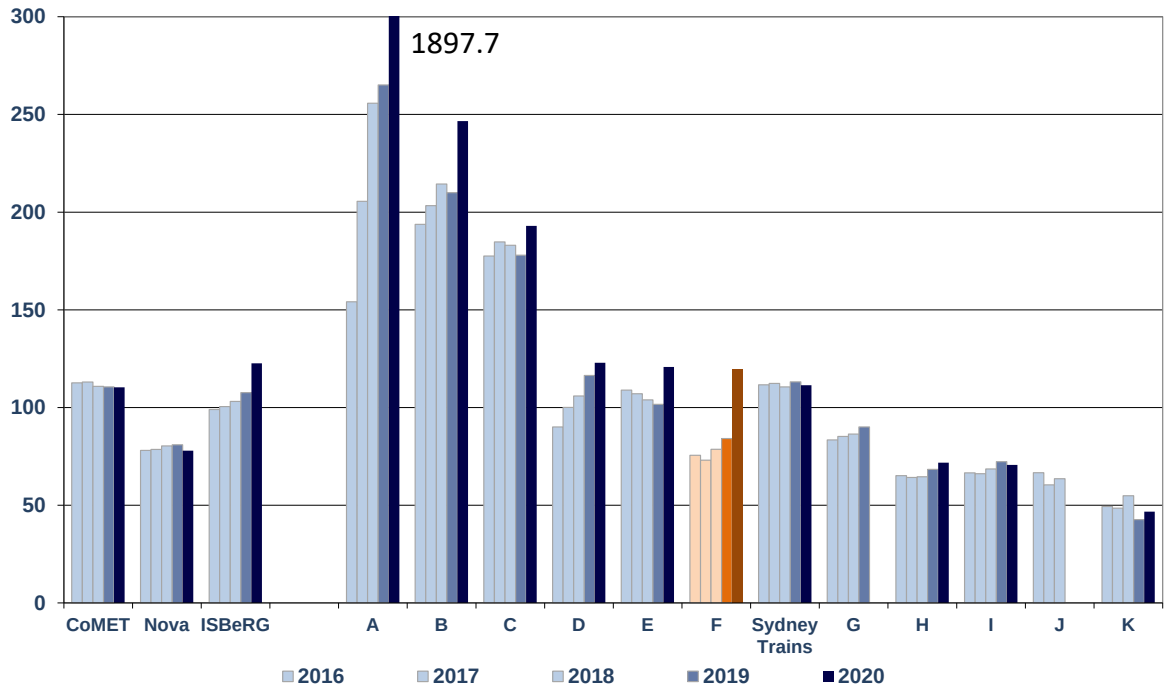
Financial
Service Operation Cost/Passenger km
(Indexed to 2016 mean)



- As per the total operating cost per passenger kilometre measure discussed on page 11, this measure is also heavily impacted by passenger density. Prior to COVID, Sydney Trains had a mid-ranking density, in terms of passenger km per route km, among the ISBeRG railways.
- All operators saw major increases in this KPI in 2020 as passenger demand fell significantly during the pandemic while there were limited actions metros and railways were able to take to reduce costs in the short term (in effect this meant that passenger density fell). For this reason, it is helpful to look at the cost trend per train km – this is shown on the following page.
- Sydney Trains' service operation cost per passenger kilometre is in line with the ISBeRG averages but exceeds COMET and Nova.
- Sydney Trains has previously improved its performance by maintaining service operation costs at a near-constant level, at the same time as attracting steadily increasing passenger journeys (and therefore higher passenger km).

Railway A had a period where all services were suspended during 2020. This means that when normalised by (e.g.) train km, their unit costs are extremely high which then skews the ISBeRG average to create a misleading picture of the overall trend across ISBeRG railways. Therefore, Railway A is excluded from the ISBeRG averages.

Financial
Service Operation Cost/Train km
(Indexed to 2016 mean)



- Many but not all operators saw major increases in this KPI in 2020 as train services were cut significantly during the pandemic while many fixed operational costs were still to be paid.
- Sydney Train's cost per train km has remained relatively stable in recent years and, unlike many railways, unit costs did not rise in 2020 as service levels were maintained during the pandemic.
- Sydney Trains' service operation cost per train kilometre is in line with the COMET and ISBeRG averages, but exceeds Nova. This is because *service* costs are a lower proportion of total operation costs in suburban railways.