The Performance of STM Bus Operations Compared to Other World Cities

2022 data summary

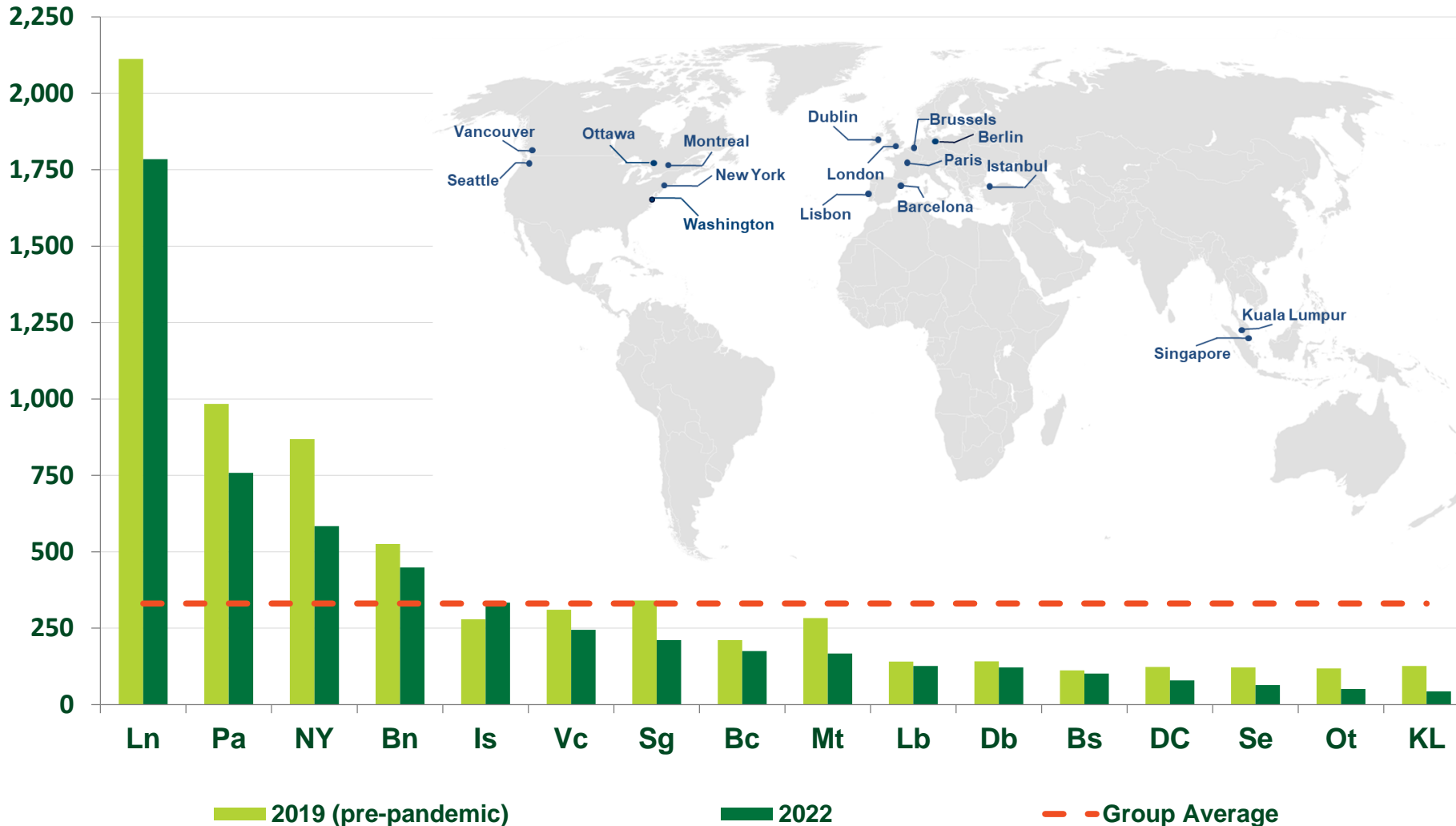International Bus Benchmarking Group

Imperial College London Projects

TSC > Transport Strategy Centre
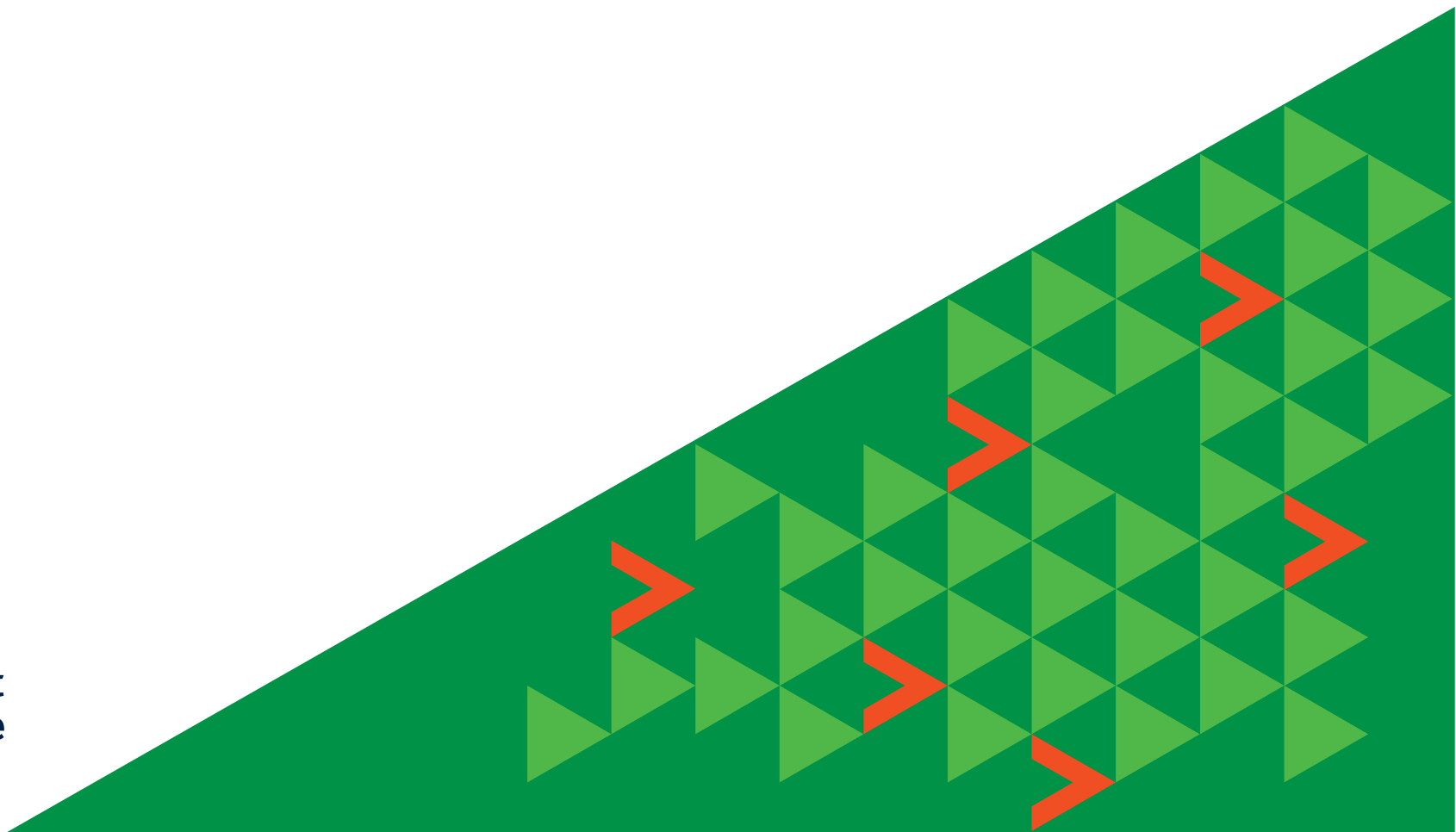
IBBG: Sixteen Bus Benchmarking Group Member Cities; Seven Operators in the IBBG for 20 Years, including STM

Million Annual Passenger Boardings

The IBBG is a group of 16 large public urban bus organisations, with fleets ranging from 750 to 8700 buses

IBBG organisations agree to share data, information, best practices and lessons learned in a confidential environment for the common purpose to help each other improve

STM is a founding member of this Group IBBG is facilitated by the TSC at Imperial College London

Legend: 2019 (pre-pandemic) | 2022 | Group Average

Cities (x-axis): Ln, Pa, NY, Bn, Is, Vc, Sg, Bc, Mt, Lb, Db, Bs, DC, Se, Ot, KL

Map labels: Vancouver, Seattle, Ottawa, Montreal, New York, Washington, Dublin, London, Lisbon, Brussels, Berlin, Paris, Barcelona, Istanbul, Kuala Lumpur, Singapore

IBBG — International Bus Benchmarking Group

KPI Structure: Balanced Scorecard Approach

This slide deck provides an analysis of STM bus operations relative to peers in the following areas:

▶ Context:
- Commercial speed
- Ridership recovery

▶ Productivity:
- Capacity utilisation
- Peak fleet utilisation
- Driver productivity

▶ Reliability:
- % Scheduled service delivered
- % On-time terminal departures
- Lost kms due to internal reasons
- Mean distance between failures

▶ Financial Efficiency:
- Operating cost per vehicle hour
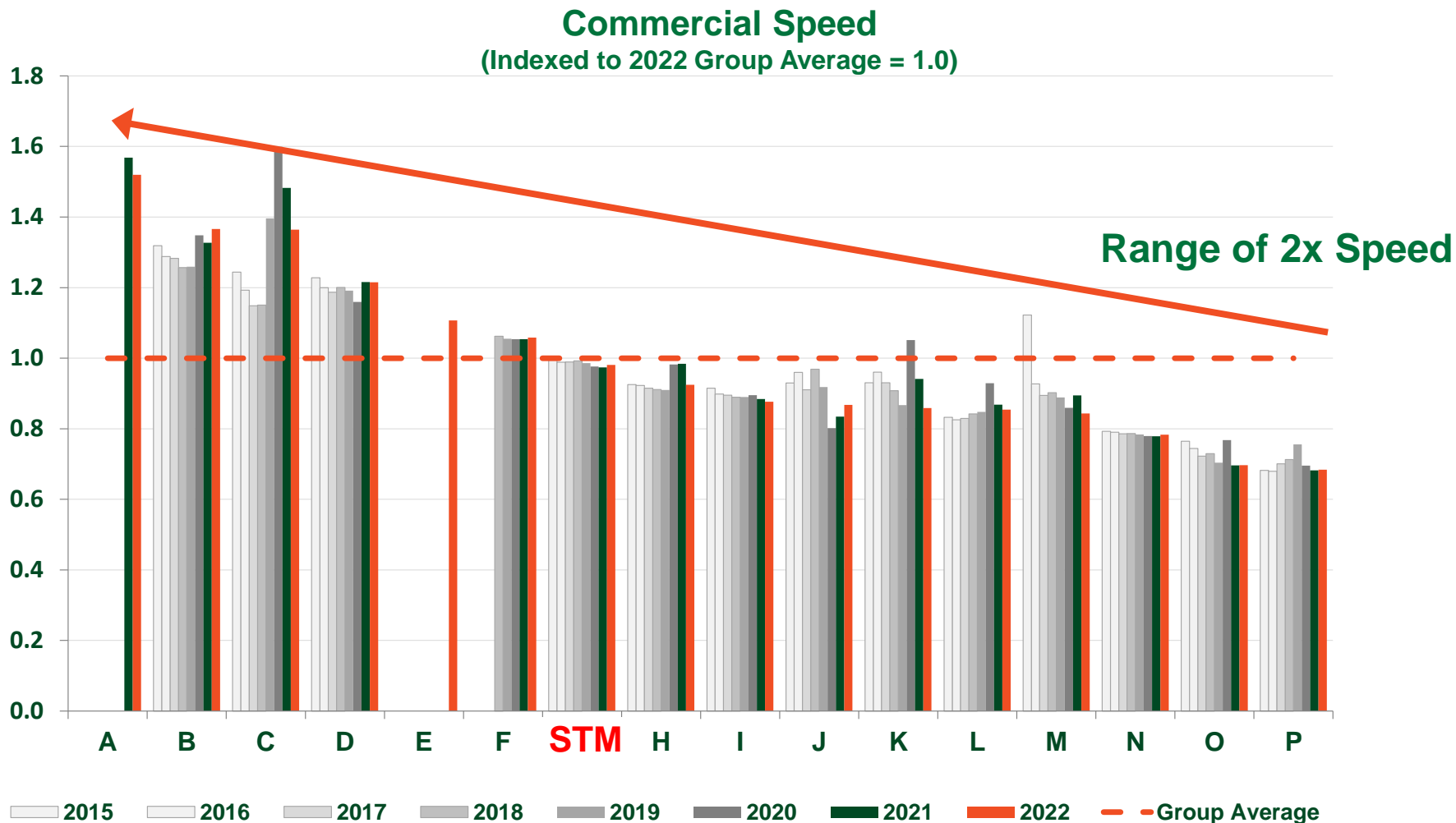- Service operations cost per revenue vehicle hour

Notes:

Organisations' performance data has been anonymised, ranked and indexed to a group average of =1 to comply with the IBBG confidentiality and membership agreements

With respect to trend data: Organisations' performance for 2020 and 2021 has been severely impacted by the pandemic. Due to local differences in timing of COVID-19 peak cases (and how these line up with reporting 'years'), and variety in adoption of pandemic measures and policy, 2020 and 2021 performance is hard to compare.

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Commercial Speed is a Key Driver of Performance
STM bus speeds are average, but have been declining

Commercial Speed
(Indexed to 2022 Group Average = 1.0)

Range of 2x Speed

Legend: 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Group Average

X-axis: A B C D E F STM H I J K L M N O P

Commercial speed is a key driver for the performance (efficiency, productivity and quality) of urban bus operators.
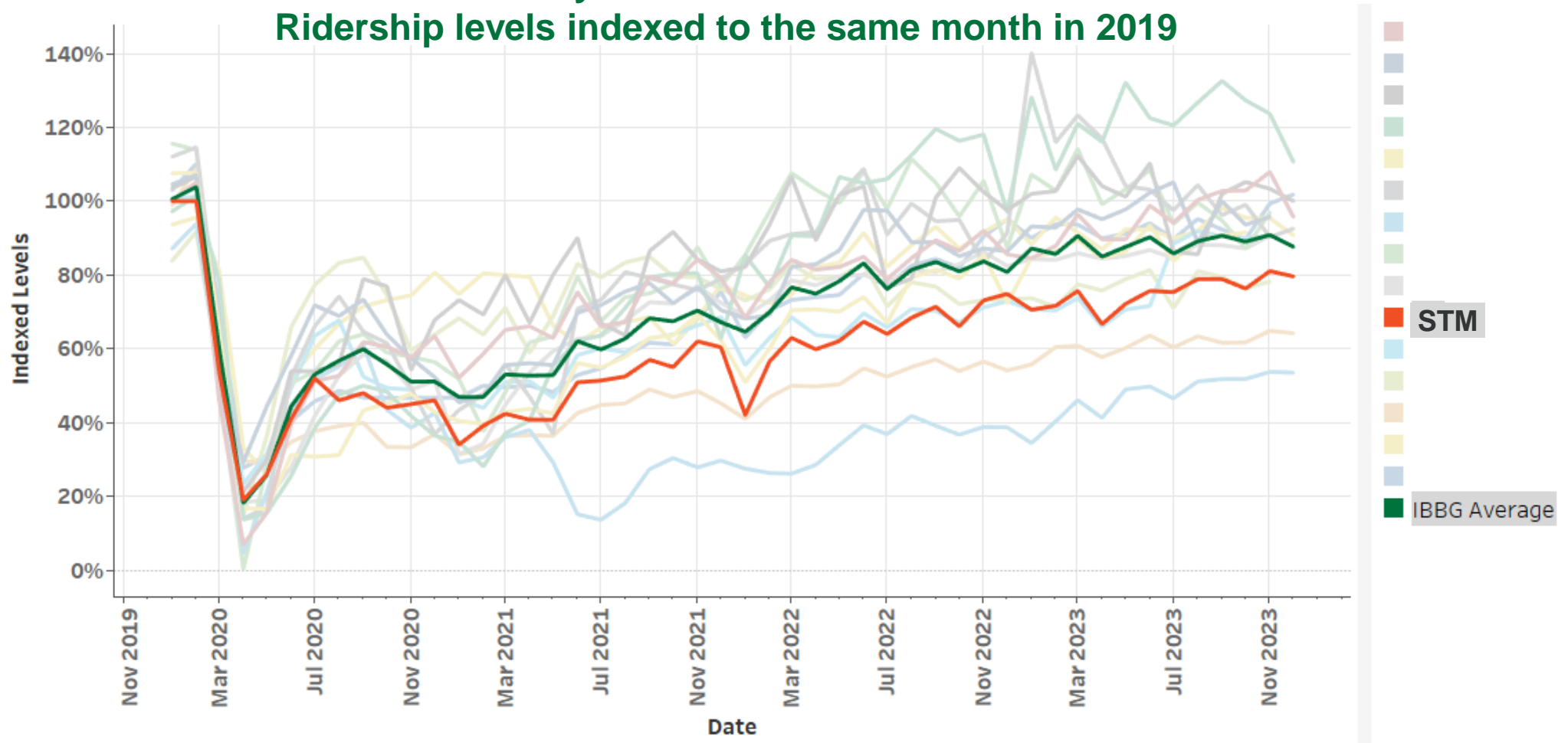
For every vehicle hour in operation, operator A, B and C would produce approximately twice the amount of vehicle kms and capacity kms than operator O and P.

STM's bus speeds are average within the IBBG, but just like in most cities have been declining. 2022 does see a small uplift.

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Impact of COVID-19 Pandemic on Bus Patronage
Period Jan 2020- Dec 2023: STM's ridership recovery (80%) is lower than the IBBG average (~90%)

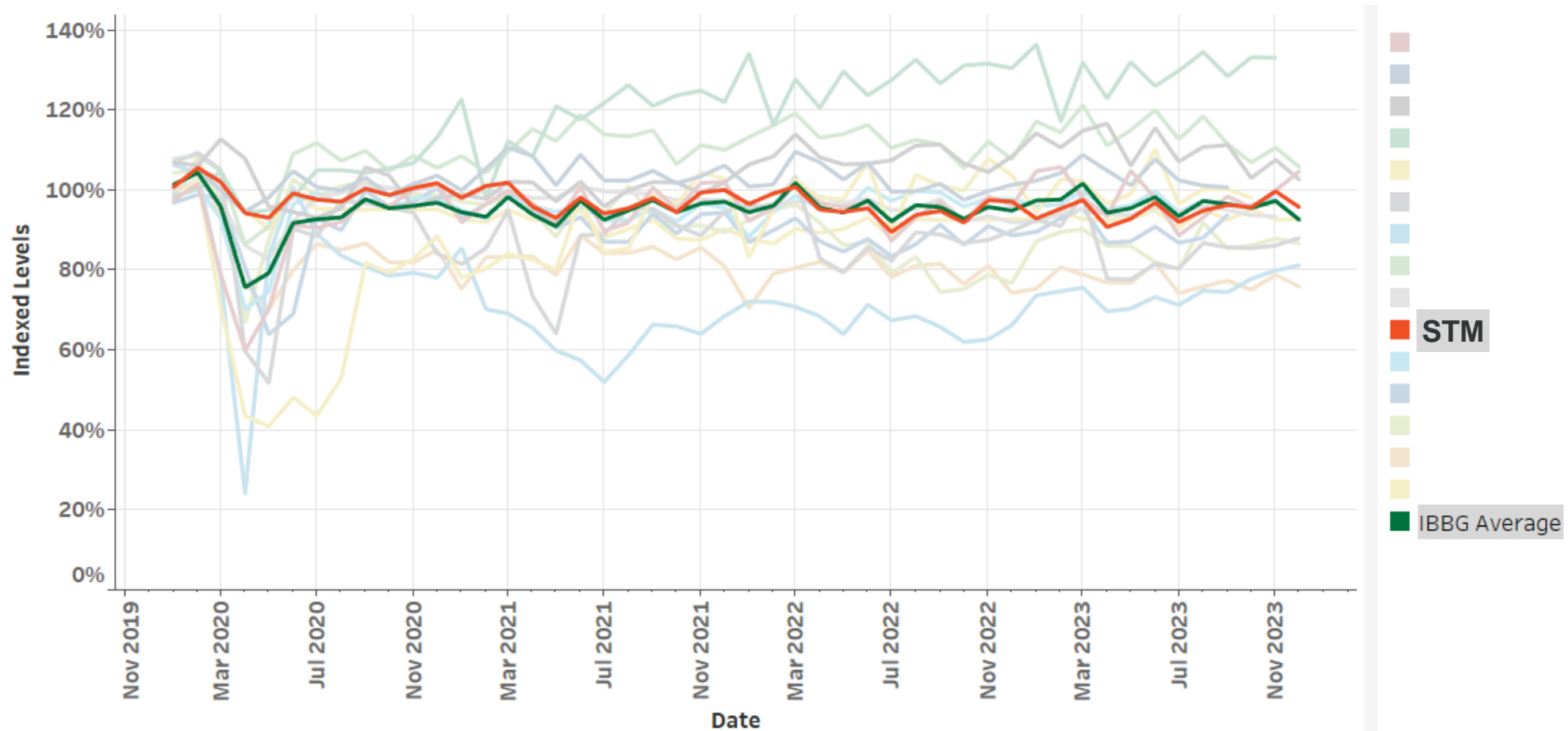**Demand Recovery:**
Ridership levels indexed to the same month in 2019

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Change in Bus Service During the COVID-19 Pandemic
Period Jan 2020- Dec 2023: STM has continued to provide high levels of service throughout the pandemic period

Supply Recovery:
Revenue vehicle kms indexed to the same month in 2019

The Performance of STM Bus Operations Compared to Other World Cities

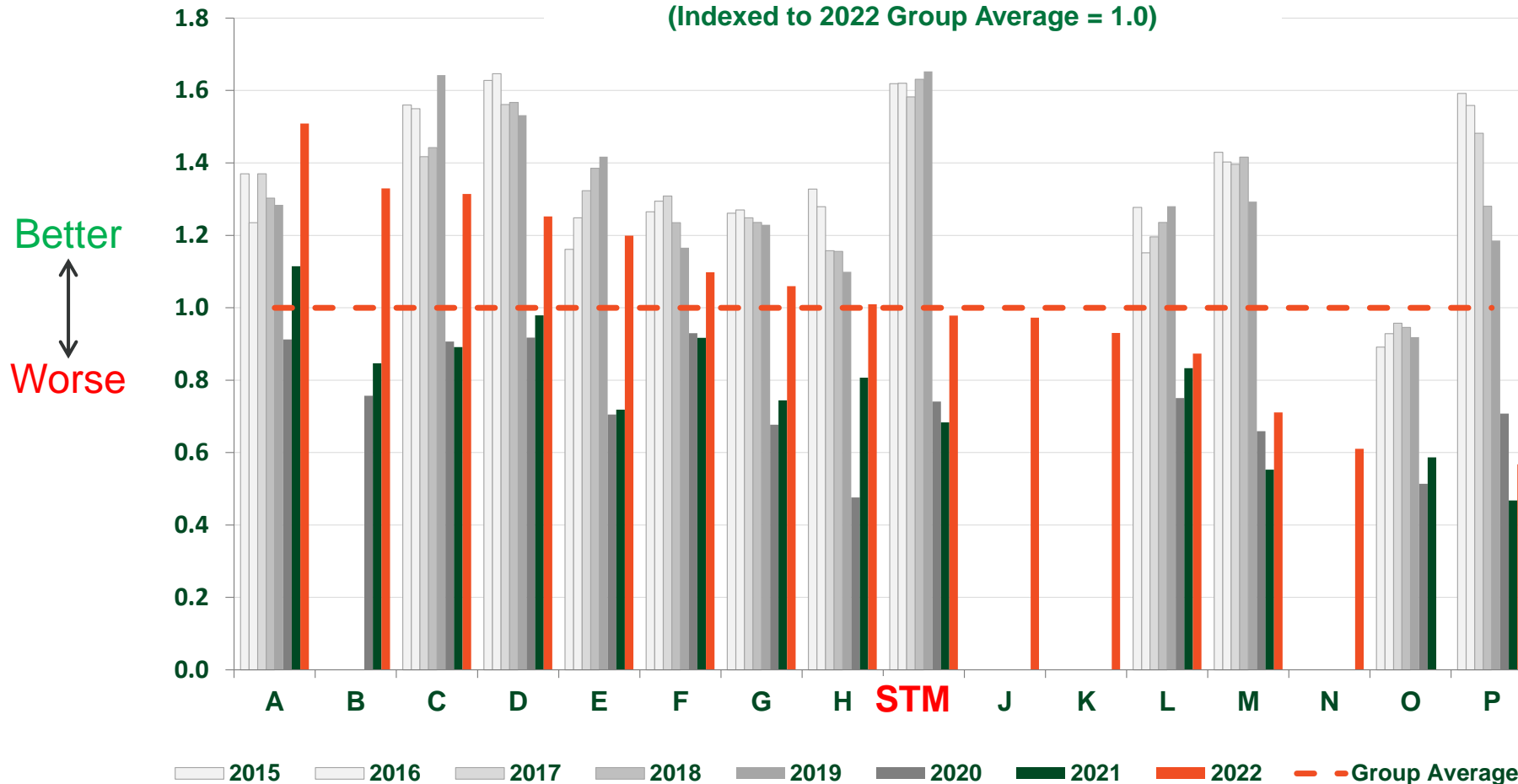**IBBG** International Bus Benchmarking Group

Vehicle Capacity Filled by Passengers
STM average performance in 2022, but traditionally (pre-Covid) amongst the top performers

Vehicle Planning Capacity Utilisation
(Indexed to 2022 Group Average = 1.0)

Better
Worse

Legend: 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Group Average

X-axis categories: A B C D E F G H STM J K L M N O P

Planning capacity includes seating capacity + 'planned' standee capacity

Ridership is recovering post-Covid, but with service levels near pre-covid levels, average planning capacity utilisation in the industry remains lower than before

STM has recovered back to IBBG average levels, but was traditionally a top performer

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Fleet Utilisation at Peak Time
STM used to be an average performer on this indicator, but there has been a negative trend since 2018

Peak Fleet Utilisation
(Indexed to 2022 Group Average = 1.0)
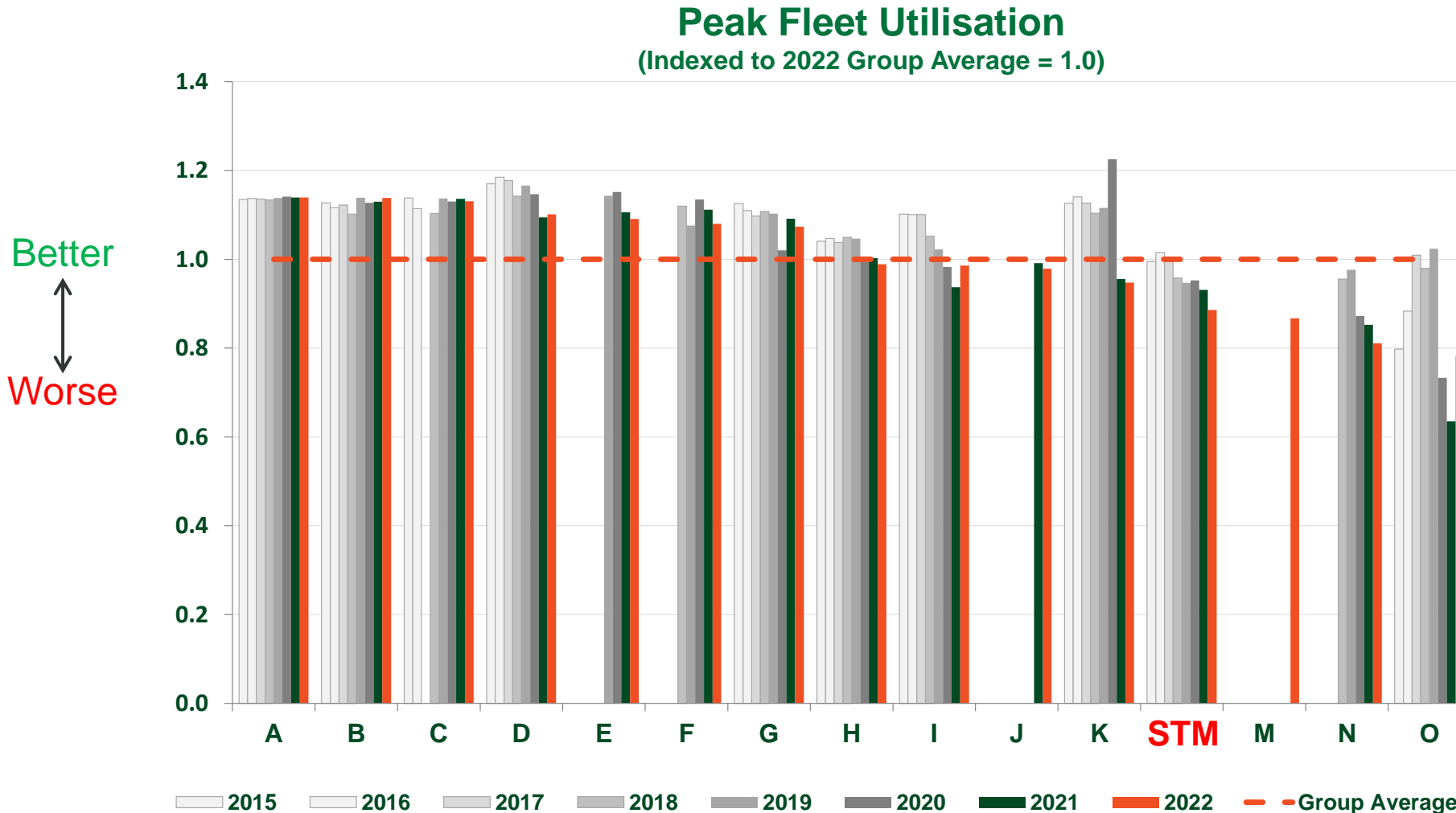
The graph shows the fleet in use during an average weekday peak service as a proportion of total fleet size

STM now has the 4th lowest performance in the IBBG, but during 2015-2017 was an average performer in this peer group

The next slide provides a breakdown of the reverse graph, e.g. fleet not in use during the peak time

Legend: 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, Group Average

Note: data available for 15 of the 16 members

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Fleet Not In Use at the Peak Time
STM has a high % of hot spares (2nd highest within the IBBG)

% Peak Fleet Not In Use – Categories 2022
(Indexed to 2022 Group Average = 1.0)

Worse

Better

Legend: ■ Hot Spare ■ Work Order / Maintenance

Note: data available for 15 of the 16 members
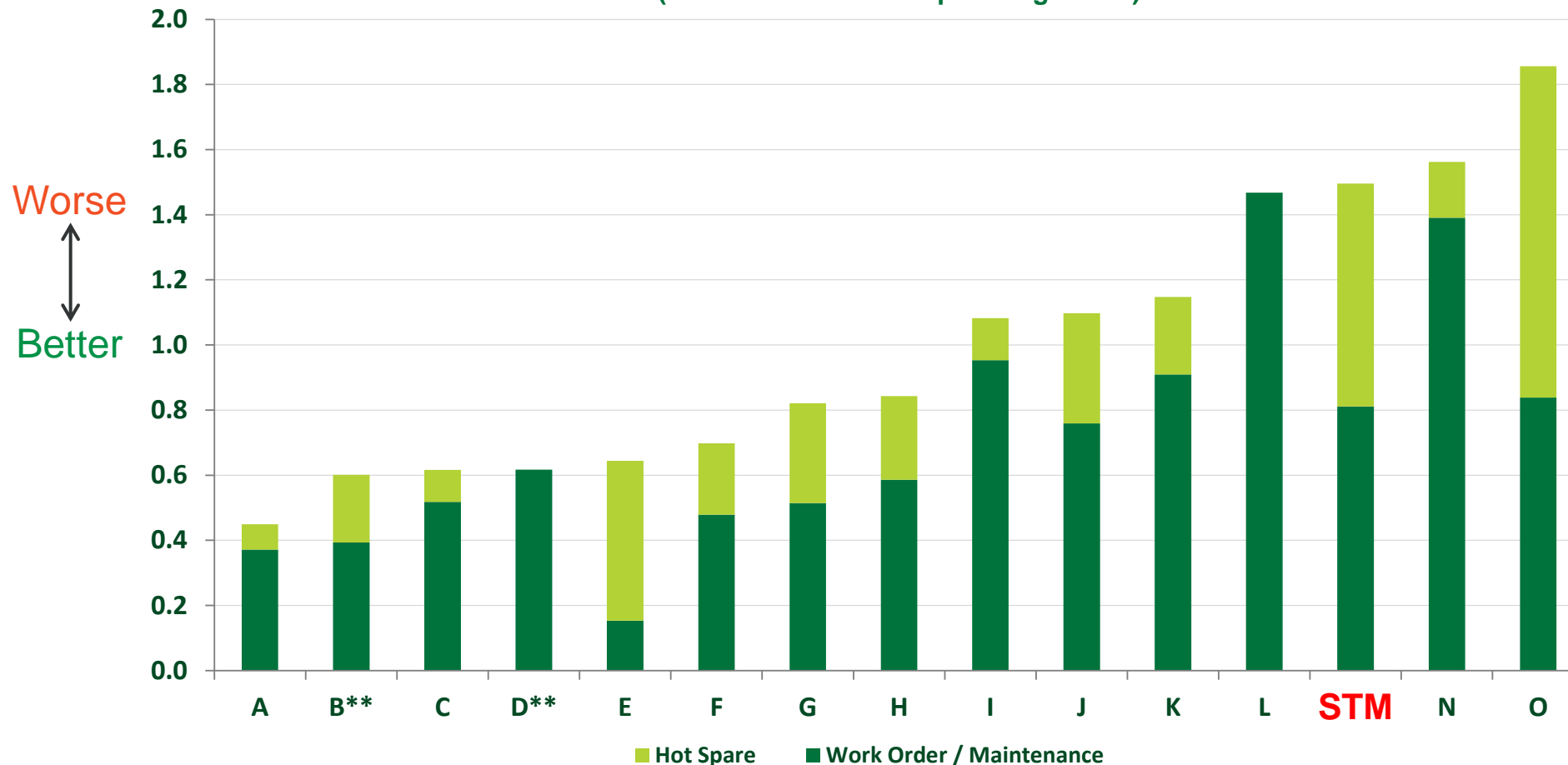
This graph provides a breakdown of the fleet not in use during the peak time in 2022

While STM has the overall 3rd highest % fleet not in use at the peak time, STM has the 6th highest % of fleet not in use at the peak time due to Maintenance/ Work order reasons

It can be observed that nearly half of STM's fleet not in use at the peak time is due to buses being kept as 'hot spares'.
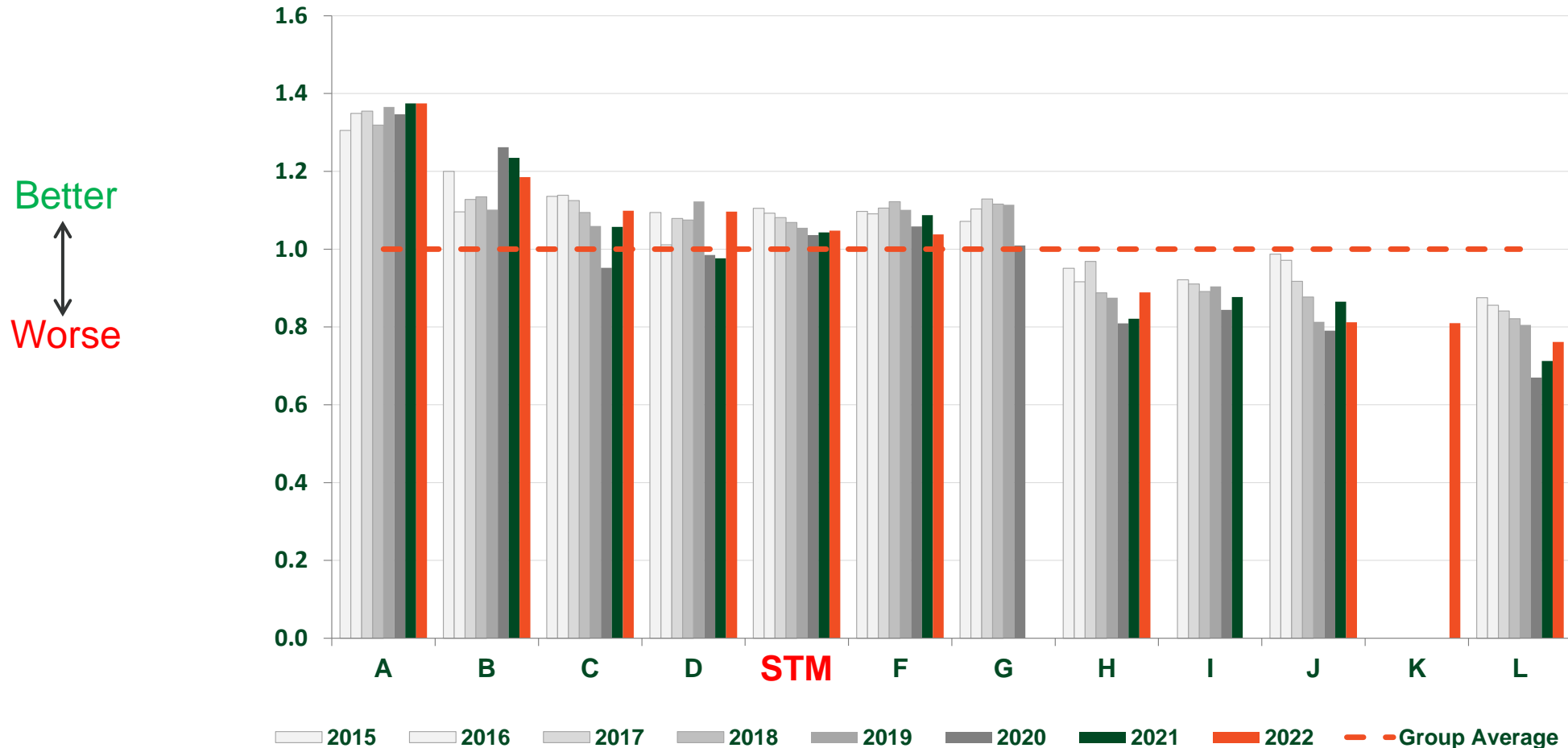
** 2019 data

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Driver Productivity
STM is an above average performer with regards to driver productivity
The negative trends had been reversed since 2020

Vehicle Hours per Paid Driver Hour
(Indexed to 2022 Group Average = 1.0)
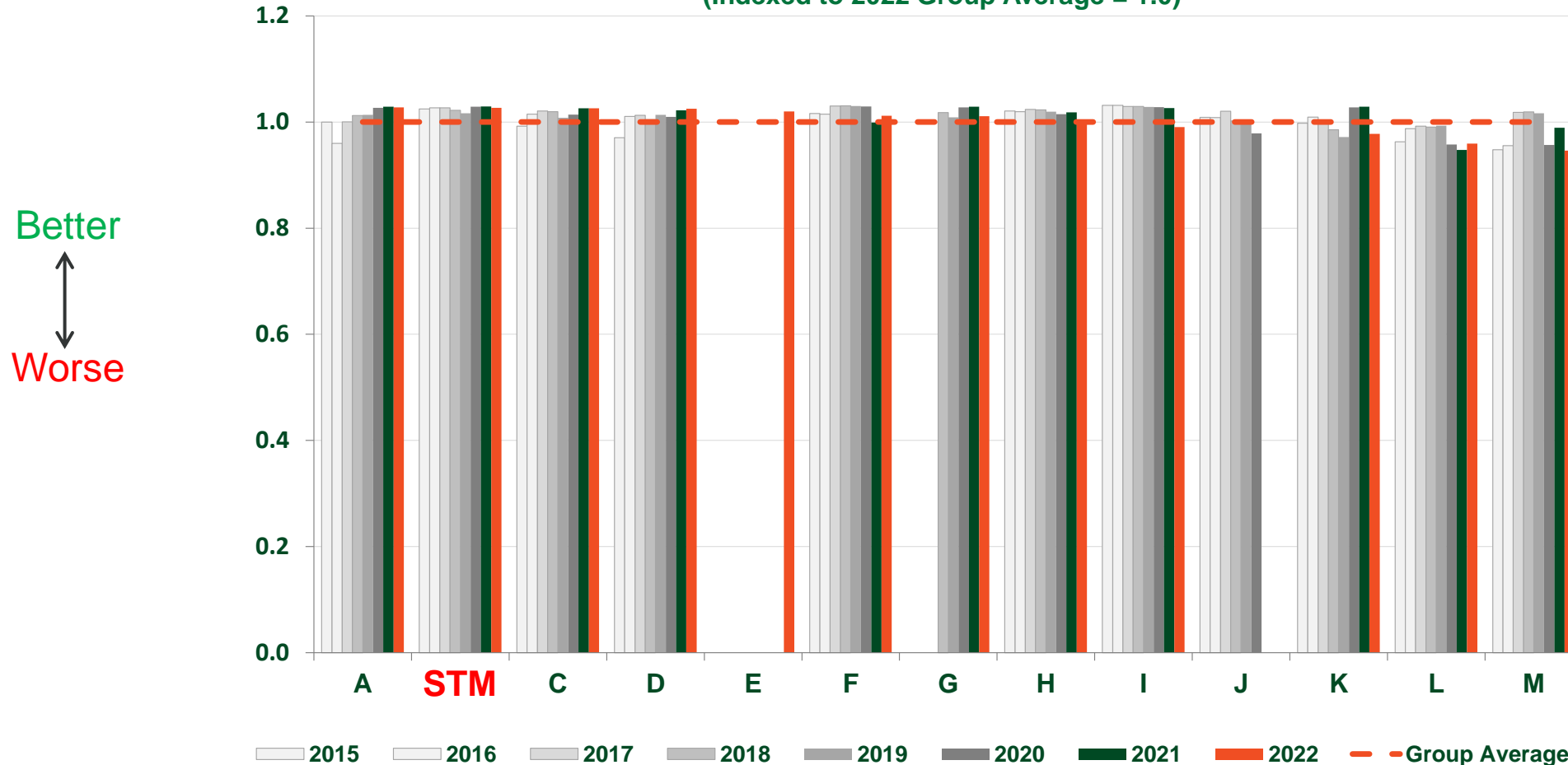
Better

Worse

A   B   C   D   **STM**   F   G   H   I   J   K   L

2015   2016   2017   2018   2019   2020   2021   2022   Group Average

Note: data available for 12 of the 16 members

BBG International Bus Benchmarking Group

% Scheduled Service Delivered
STM has consistently been a top 3 performer in the IBBG with regards to % of scheduled service delivered

Trips Operated as a Proportion of Scheduled Trips
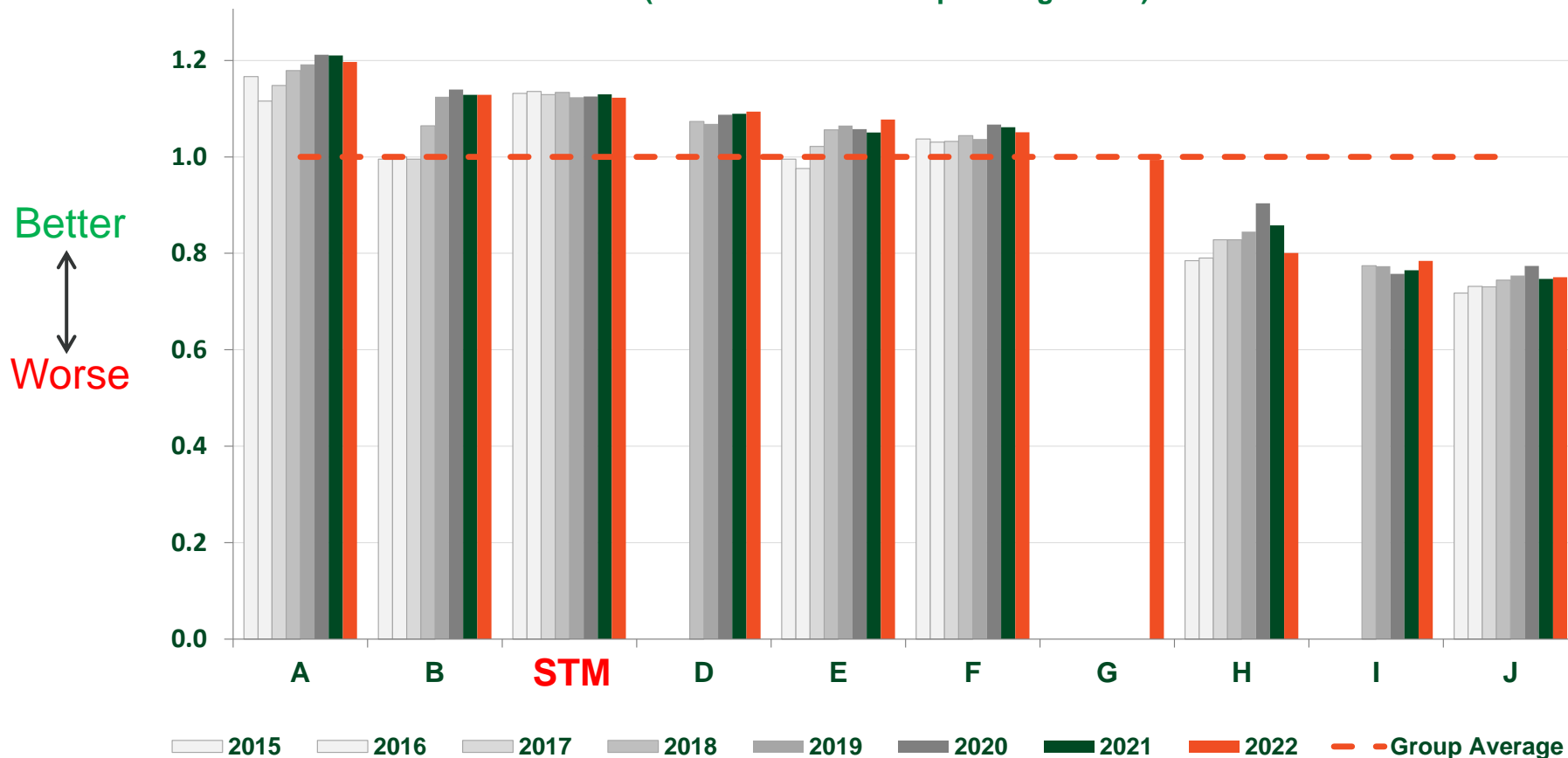(Indexed to 2022 Group Average = 1.0)

Better

Worse

Legend: 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Group Average

Note: data available for 13 of the 16 members

IBBG International Bus Benchmarking Group

% On-time Terminal Departures
STM has consistently been a top 3 performer in the IBBG with regards to % of on-time terminal departures

On-Time Terminal Departures as a Proportion of Scheduled Trips
(Indexed to 2022 Group Average = 1.0)

Better

Worse

A   B   **STM**   D   E   F   G   H   I   J

2015   2016   2017   2018   2019   2020   2021   2022   Group Average

Note: data available for 10 of the 16 members

Note: STM's definition of 'on-route' punctuality includes both high frequency service as well as low frequency service, where it is more common amongst IBBG operators to only measure punctuality for low frequency routes. Therefore, there is no comparable IBBG statistic for STM regarding 'on-route' punctuality.

However, this graph does represent comparable performance for 10 out of 16 IBBG operators for the % of terminal departures that are 'on-time'

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Lost Vehicle Km (Internal Reasons)
STM has been the best performer in the IBBG in 2021 and 2022

Lost Vehicle Km due to Internal Reasons per Scheduled Revenue Vehicle Km
(Indexed to 2022 Group Average = 1.0)

Worse / Better
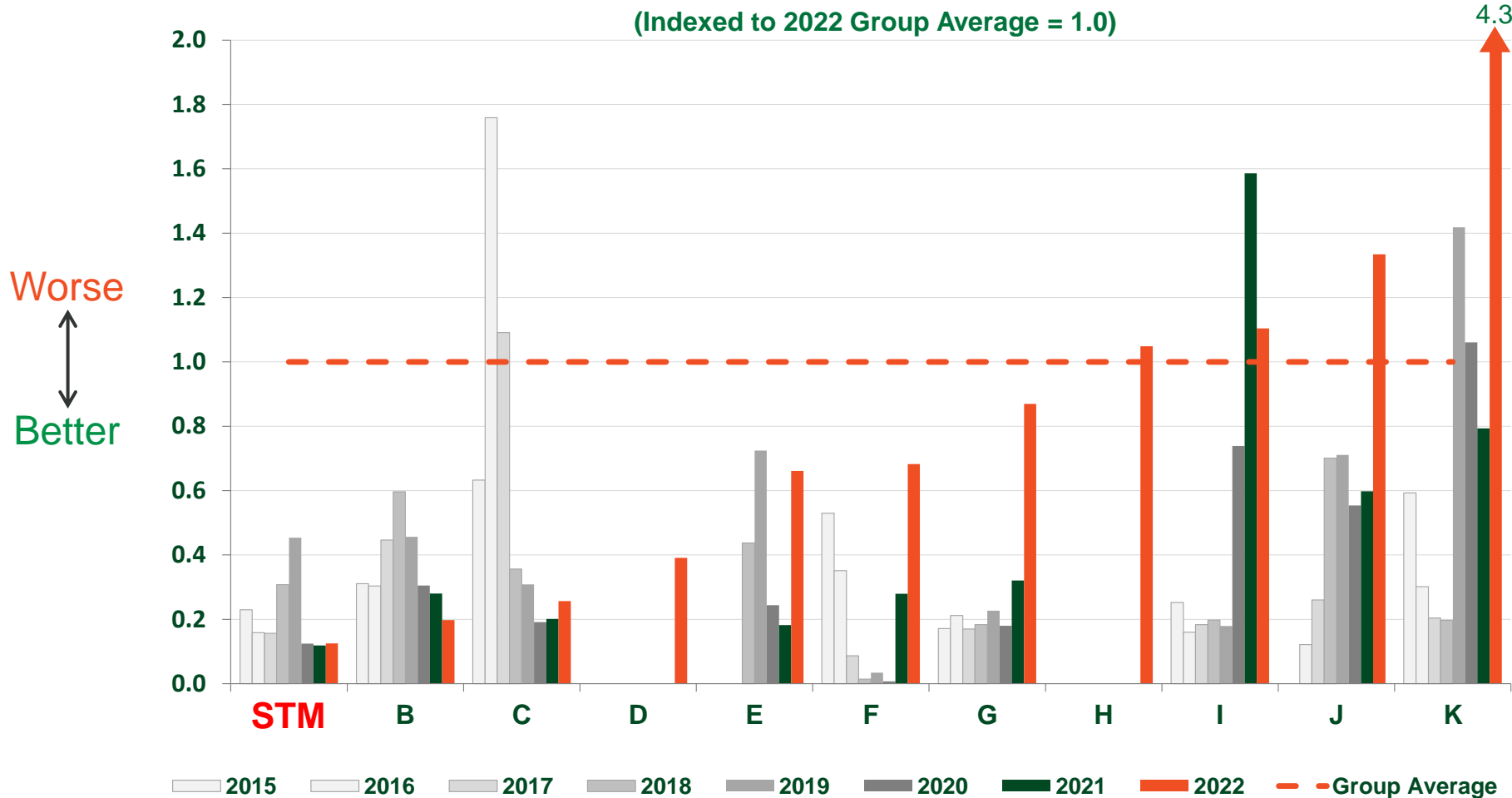
Note:
Lost vehicle kilometres due to internal reasons include factors such as:
- driver absenteeism, driver shortage, strikes
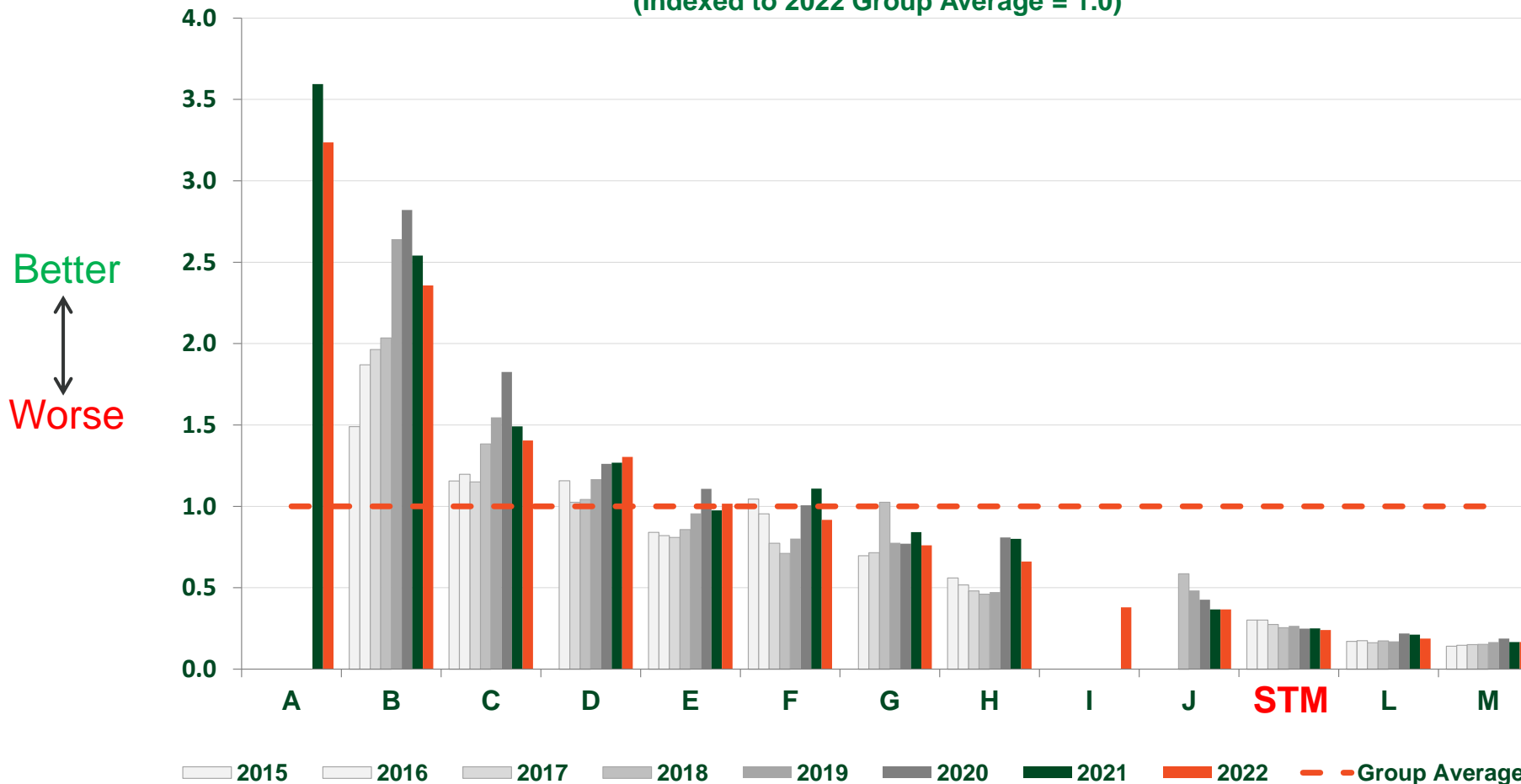- technical issues (breakdowns), bus not available
- service control decisions (short turning)

It excludes external factors such as higher levels of traffic, collisions, demonstrations, weather related issues etc.

Legend: 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | Group Average

Note: data available for 11 of the 16 members

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Mean Distance Between Failures (MDBF)
STM performs significantly below the IBBG average

Mean Distance Between Failures Resulting in Corrective Maintenance
(Indexed to 2022 Group Average = 1.0)

Better ↑ Worse ↓

Legend: 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, Group Average

Categories: A, B, C, D, E, F, G, H, I, J, **STM**, L, M

Note:
There are policy differences between IBBG operators when they 'correct' failures which are not major failures.
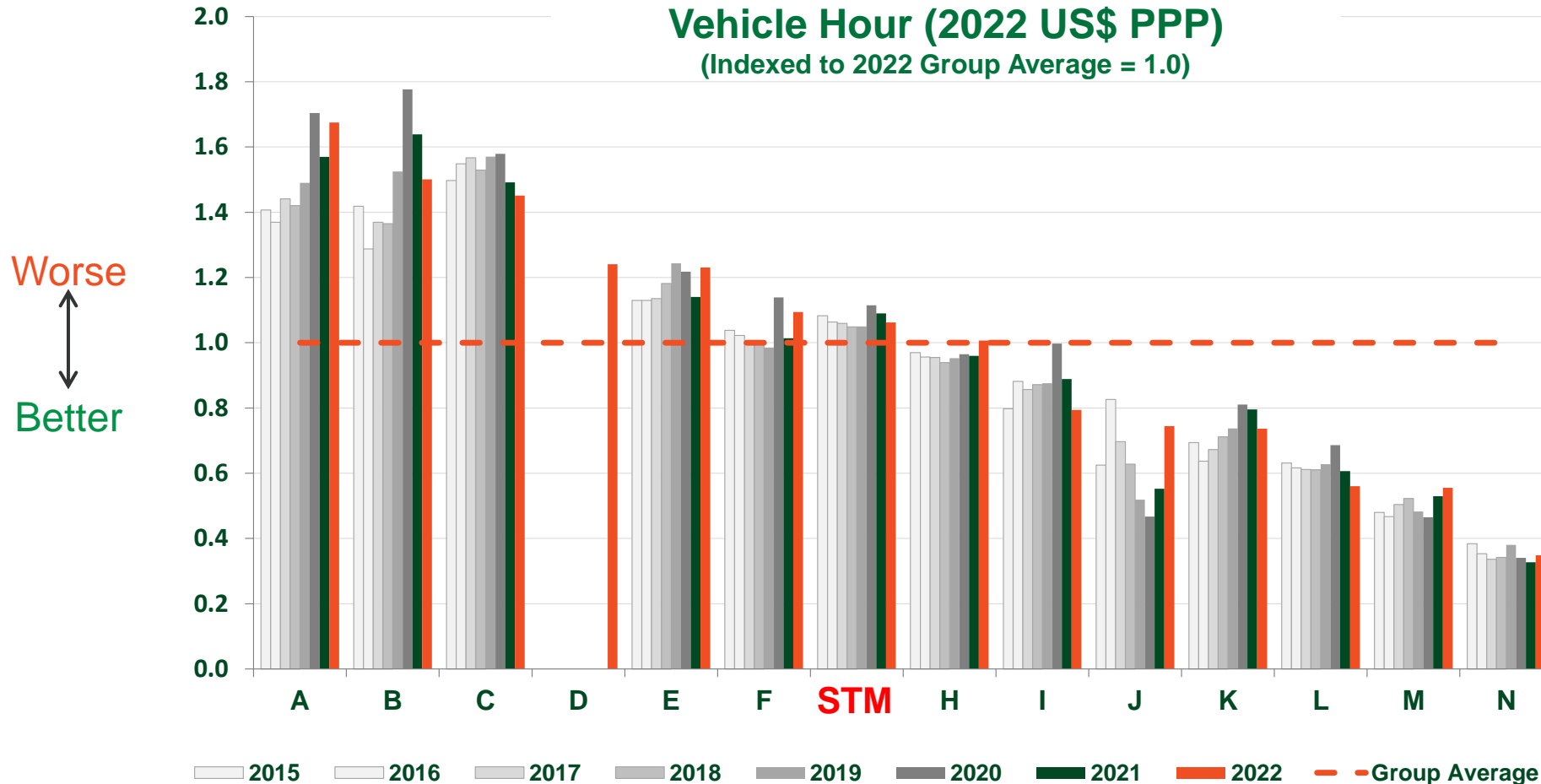
For example, a broken air-con system would in some cities mean an immediate withdrawal from service, while in other cities this issue will only be fixed when the bus is scheduled for maintenance next

Note: data available for 13 of the 16 members

International Bus Benchmarking Group

Financial Efficiency: Cost per Vehicle Hour
STM performs just above (=worse than) the IBBG average for total operating cost per total vehicle hour

Operating Costs per Actual Total Vehicle Hour (2022 US$ PPP)
(Indexed to 2022 Group Average = 1.0)

Worse ↑
Better ↓

Legend: 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, Group Average

X-axis categories: A, B, C, D, E, F, STM, H, I, J, K, L, M, N

Note:
Operating cost include service operations cost, maintenance cost and administration cost (relative performance of these three cost categories shown in the dashboard on page 17)

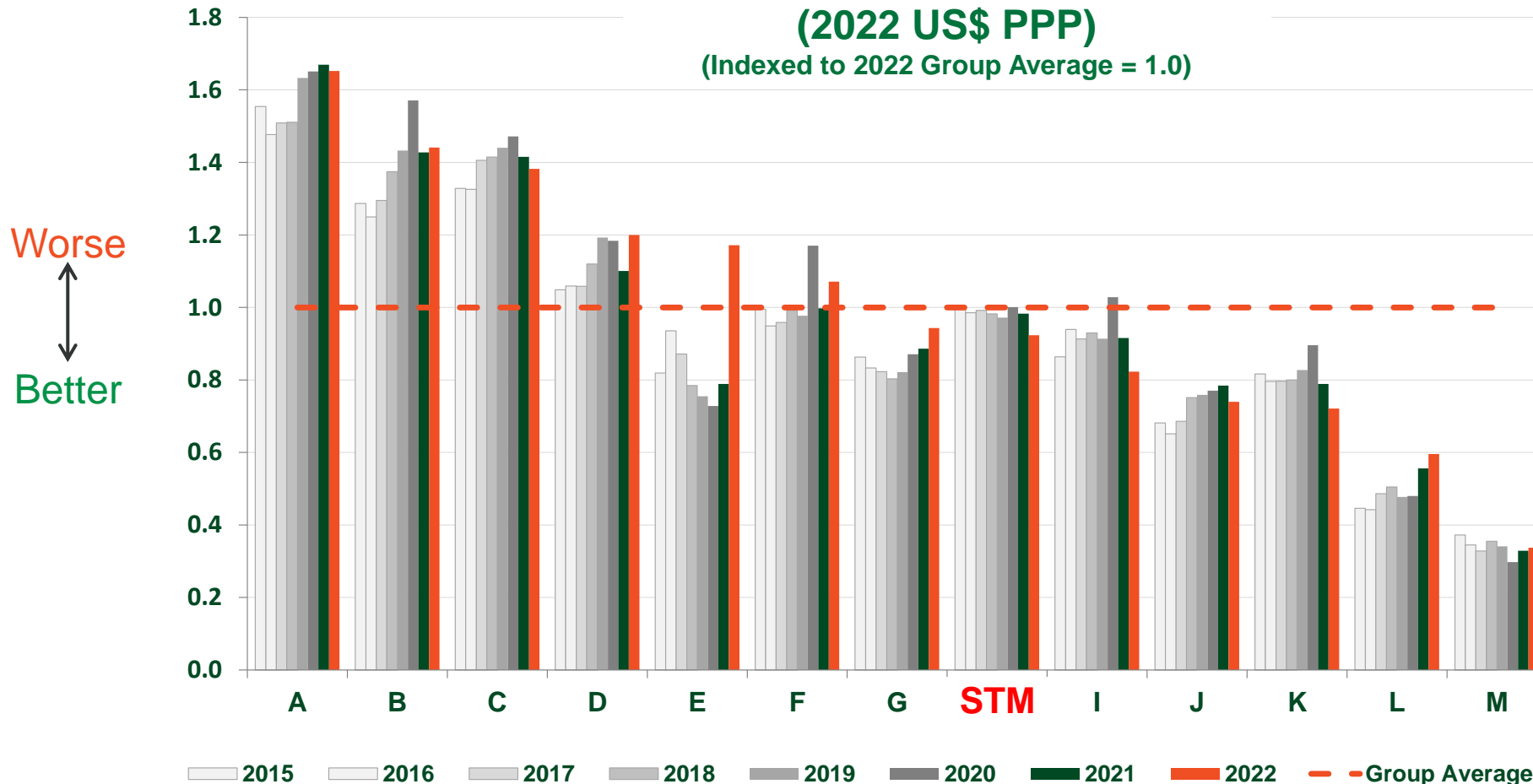Costs were converted into US$ PPP (Purchasing Power Party) to enable a fair comparison

Cost are best normalised by hour to be less impacted by the differences in commercial speed between operators

Note: data available for 14 of the 16 members

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Service Operating Cost Efficiency
STM performs just below (=better than) the IBBG average for service operations cost per revenue vehicle hour

Service Operations Costs per Actual Revenue Vehicle Hour
(2022 US$ PPP)
(Indexed to 2022 Group Average = 1.0)

Worse ↕ **Better**

Legend: 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | — Group Average

Note: data available for 13 of the 16 members

Note:
Service operations cost include driver cost, fuel, service control, and depot operations that are directly related to provision of service such as dispatch. Revenue vehicle hours exclude deadheading and interlining hours
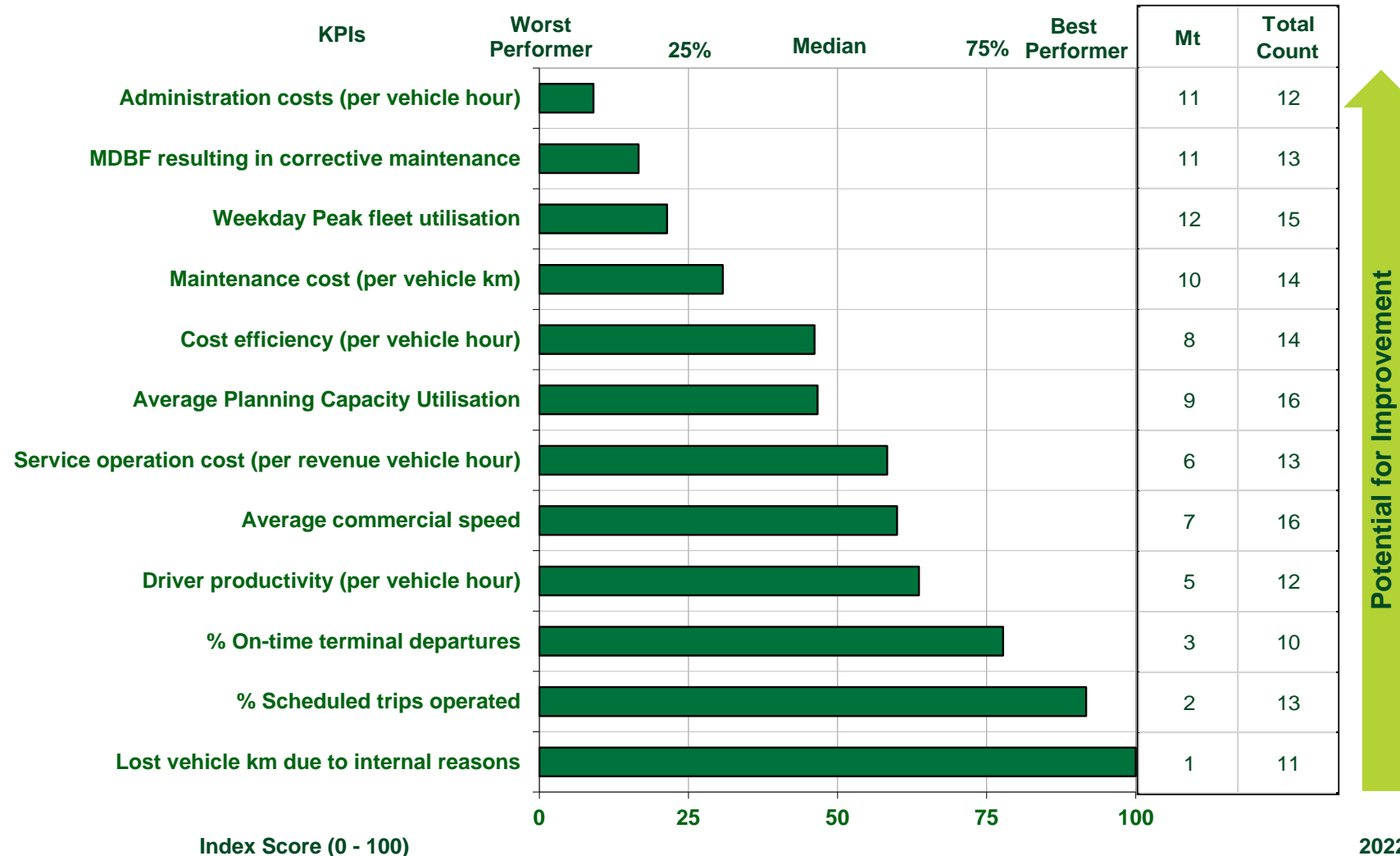
Costs were converted into US$ PPP (Purchasing Power Party) to enable a fair comparison

Cost are best normalised by hour to be less impacted by the differences in commercial speed between operators

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Performance Dashboard (absolute): How Does STM Bus Operations Rank Relative to Other Group Members on Several Dimensions in 2022?

► Relative performance of STM Bus Operations to other organisations in 2022

KPIs	Worst Performer	25%	Median	75%	Best Performer	Mt	Total Count
Administration costs (per vehicle hour)						11	12
MDBF resulting in corrective maintenance						11	13
Weekday Peak fleet utilisation						12	15
Maintenance cost (per vehicle km)						10	14
Cost efficiency (per vehicle hour)						8	14
Average Planning Capacity Utilisation						9	16
Service operation cost (per revenue vehicle hour)						6	13
Average commercial speed						7	16
Driver productivity (per vehicle hour)						5	12
% On-time terminal departures						3	10
% Scheduled trips operated						2	13
Lost vehicle km due to internal reasons						1	11

Index Score (0 - 100)

0   25   50   75   100

Potential for Improvement

2022

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Concluding Comments

► This slide deck represents a high level benchmarking overview of STM's bus operations relative to other world-class peers in the areas of Productivity, Reliability and Finance

► The KPIs shows that STM is an overall average performing organisation, with a mix of excellent, average and poor performance over different KPIs in these three areas.

► **Reliability**: Apart from 'vehicle reliability' as measured by MDBF, STM's reliability performance is **world-class and consistently within the top 3** of IBBG Agencies

► **Financial Efficiency**: STM performs around the world-class peer **average** with respect to total operating cost efficiency and service operating cost efficiency

► **Productivity**: This area has **mixed results** for STM, with poor performance regarding the % of peak fleet utilisation (possibly linked to the poor vehicle reliability performance), average performance of capacity utilisation and good driver productivity performance

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