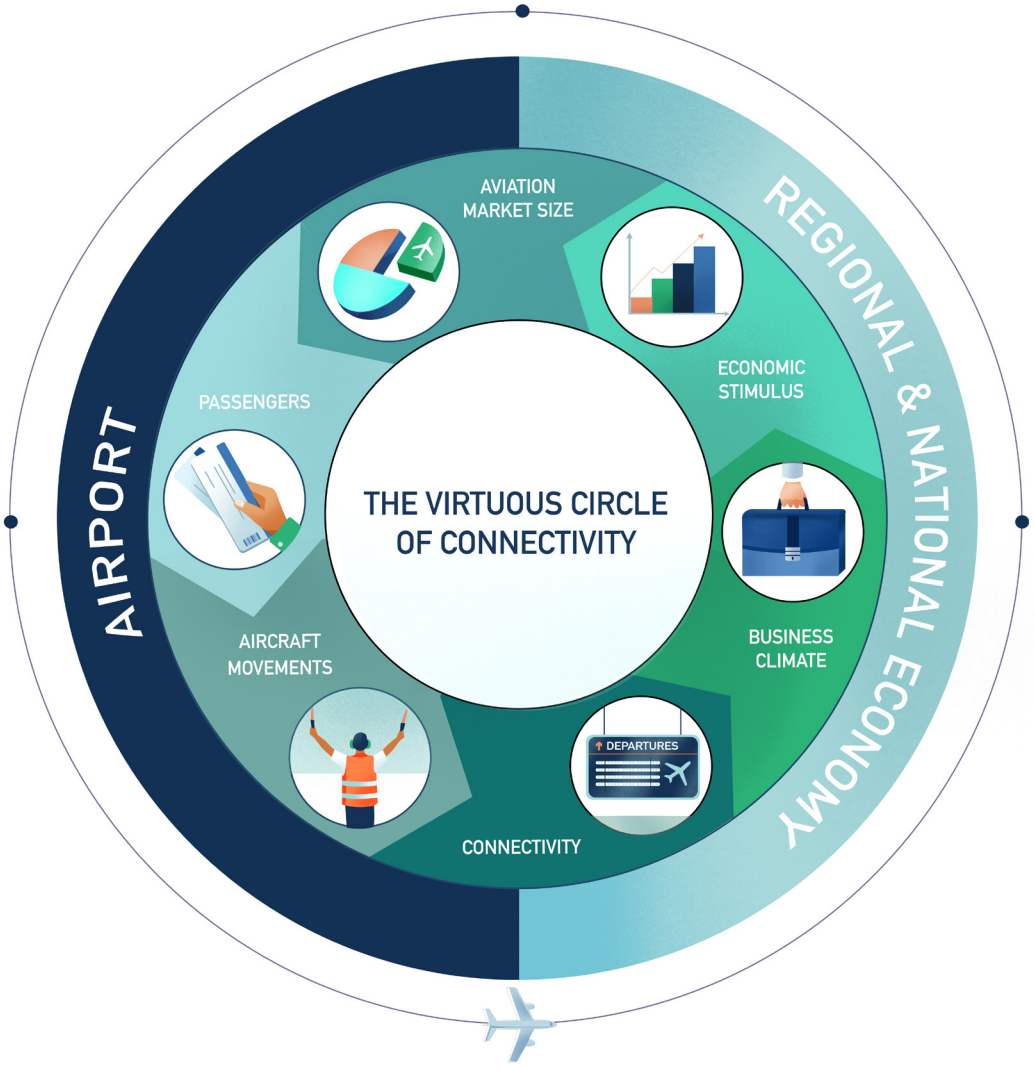
ACI EUROPE
AIRPORTS COUNCIL INTERNATIONAL

AIRPORT INDUSTRY CONNECTIVITY REPORT 2021


AIRPORT
REGIONAL & NATIONAL ECONOMY
AVIATION MARKET SIZE
ECONOMIC STIMULUS
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THE VIRTUOUS CIRCLE OF CONNECTIVITY
DEPARTURES

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INTRODUCTION

Restart, restore & reimagine air connectivity

Our 2020 Airport Industry Connectivity Report documented the unprecedented and systemic collapse in air connectivity triggered by the COVID-19 pandemic as Governments imposed severe lockdowns and tight travel restrictions.

This year's report shows how the recovery of air connectivity is now proceeding, as vaccination within Europe is widespread and epidemiological risks have considerably reduced. However, as we are learning to live with the virus and economies have re-opened, air connectivity is taking time to come back. Its recovery is far from uniform, with significant differences between the lead indexes of air connectivity - direct, indirect and hub connectivity, as well as between geographical markets and segments within the airport industry.

This largely results from the permanence of travel restrictions and bans on external markets and still not fully aligned travel regimes within Europe. Looking ahead, other factors are going to influence the speed and scope at which air connectivity will be further restored. There is no doubt that Governments' support to air connectivity and aviation in general - both short and longer-term - will be a defining factor. For now, the *'Building Back Better'* agenda tends to come with rather more punitive approaches than supporting ones. Debates over the future of short haul flying are a case in point. Yet, they ignore the fact that banning short haul flights would be of limited effectiveness in reducing global warming and that this would come with significant social and economic costs. Crucially, they also disregard the ambitious roadmap to Net Zero CO_2 emissions tabled by the European aviation sector[1]. Carbon is the enemy – not air connectivity.

There is no doubt that restoring air connectivity must go hand in hand with re-imagining air connectivity – so that it becomes more sustainable, and also more integrated with other transport modes and urban mobility. Just as there is also no escaping the fact that there is no valid alternative to most of the connectivity provided by Europe's airports and airlines. With every +10% in direct air connectivity yielding a +0.5% in GDP per capita, air connectivity must thus remain an essential part of the productive capacity of our society.

1. DESTINATION 2050 - www.destination2050.eu

PASSENGER PERSPECTIVE OF AIR CONNECTIVITY

The "Airport Connectivity Index" is created by SEO Amsterdam Economics using their proprietary NetScan model.

Air connectivity is best considered from the perspective of the air traveller. The one who wants to get from A to B. Or sometimes, from A to B to C. The following definitions describe them and together they provide a comprehensive picture of the air connectivity provided by an airport – and how it links its communities to the rest of the world.

DIRECT CONNECTIVITY

These are the direct air services available from the airport – measured not just in terms of destinations, but also factoring in the frequency of flights to the same destination (so for example, an airport with 5 daily flights to another airport, will register a higher score than one with only 4).

INDIRECT CONNECTIVITY

This measures the number of places people can fly to, through a connecting flight at hub airports, from a particular airport. For example, if you fly from Malaga, Spain to a hub airport such as Amsterdam Schiphol, that's a direct flight from to A to B. But the large number of available onward destinations you can fly from there expands the range of destinations available (or indirectly connected) from Malaga. Indirect connections are weighted according to their quality, based on connecting time and detour involved with the indirect routing. For example, a flight from Hamburg to Johannesburg via Frankfurt will register a higher score than an alternative routing via Doha, which is geographically a longer diversion from the direct flight path.

AIRPORT CONNECTIVITY

As the name suggests, this is the most comprehensive metric for airport connectivity – taking into account both direct and indirect connectivity from the airport in question. Airport connectivity is defined as the sum of direct and indirect connectivity – thus measuring the overall level to which an airport is connected to the rest of the world, either by direct flights or indirect connections via other airports.

HUB CONNECTIVITY

Hub connectivity is the key metric for any hub airport, big or small. It measures the number of connecting flights that can be facilitated by the hub airport in question – taking into account a minimum and maximum connecting time, and weighting the quality of the connections by the detour involved and connecting times.

ADJUSTMENT TO THE 2021 INDEX

Traditionally, the data used to calculate an individual airports' connectivity score is drawn from the schedules recorded with the data provider OAG for the 3rd week in June. The 3rd week in June represents an average week in the year, not distorted by holidays nor by the winter low-travel season.

In 2021, as in 2020, airline schedules and airport traffic have not followed historical patterns nor has traffic been stable throughout the year.

Rather, flight availability has been determined by government-imposed restrictions on travel, entry requirements for passengers including health checks, testing and quarantines. The net result has been that travellers have often been prevented or even discouraged from taking to the skies. And airlines have had to withdraw routes and ground aircraft, in order to adjust to much reduced demand levels and also reduce cost outflows. As a result, air connectivity has continued to be much depressed and volatile.

Therefore, this year's report looks at connectivity at different months within 2021 – allowing comparisons throughout the year, as well as a comparison with the connectivity level in 2019 and 2020.

EUROPEAN AIRPORT CONNECTIVITY

1.1

RUSSIAN, TURKISH & OTHER EASTERN/ SOUTHERN AIRPORTS LEADING THE RECOVERY

15 months after the World Health Organisation (WHO) declared COVID-19 a global pandemic on 11th of March 2020, air connectivity at European airports remained **-72%** below levels of 2019.

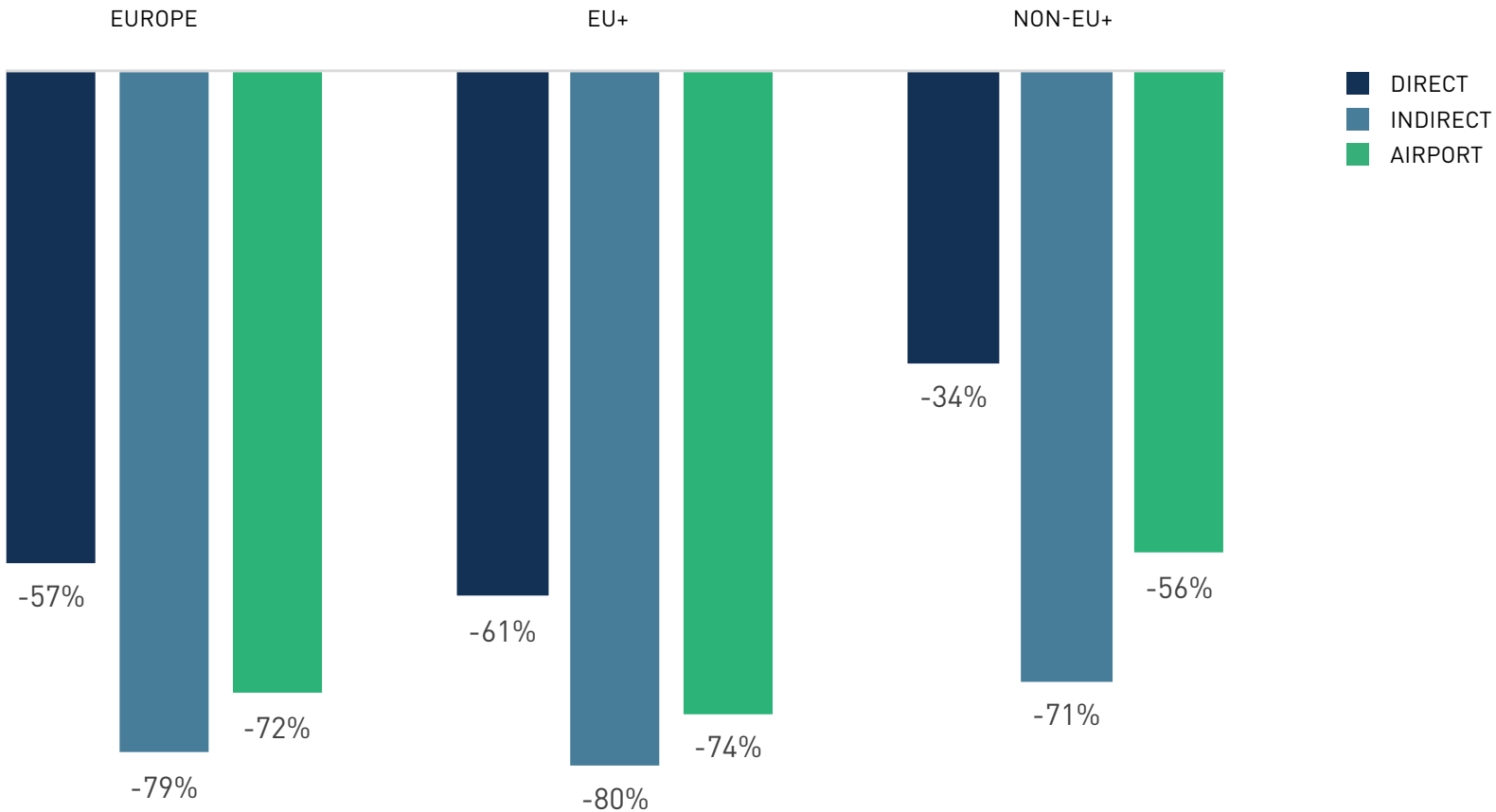
However, the figure hides significant divergences in the way air connectivity has evolved this year between the European Union and close nearby countries on the one hand and Russia, Turkey and other countries of Eastern and Southern Europe on the other hand.

While **EU+**[2] airport connectivity was still down by **-74%** in **June 2021** compared to 2019, **the rest of Europe** including the major markets of **Russia and Turkey** saw their composite airport connectivity levels 18 percentage points higher, at **-56%**. The performance gap resulted in part from different public health measures and social responses, as well as the fact that Russia and Turkey in particular both have large domestic travel markets which largely remained unconstrained by the kind of restrictions that kept limiting cross border travel.

Looking at **direct connectivity**, the performance gap is even more striking at **-61%** in the EU+ and **-34%** in the **rest of Europe**.

2. EU, EEA, Switzerland and the United Kingdom

CHART 1: **DIRECT, INDIRECT & AIRPORT CONNECTIVITY (EUROPEAN, EU+ AND REST OF EUROPEAN AIRPORTS – JUNE 2021 VS. JUNE 2019)**



1.2

2021 WITHIN YEAR AIR CONNECTIVITY DEVELOPMENTS

As of September, the European airport network had recovered **64%** of its **direct connectivit**y pre-pandemic (2019) level – having increased by 43 percentage points since January. The recovery gained pace as of June, largely as a result of better coordination and the easing of travel restrictions within the EU+ market as well as the facilitating role played by the EU Digital Covid Certificate.

However, **indirect connectivity** has continued to lag behind compared to direct connectivity with only **31%** of its pre-pandemic level recovered in September – with an increase of just 21 percentage points since January.

The performance gap between direct and indirect connectivity highlights the interconnected nature and network function of air transport. Each flight removed from the air transport network very often results in the loss of several onward flight connections. The underperformance of indirect connectivity reflects in particular the fact that travel outside Europe has remained very much limited - resulting in the continued loss of both air services between Europe and other regions of the world as well as intra-European air services feeding these intercontinental flights out of hub airports.

CHART 2: **DIRECT AND INDIRECT CONNECTIVITY FROM EUROPEAN AIRPORTS IN 2021 (JANUARY TO SEPTEMBER 2021 VS. 2019)**

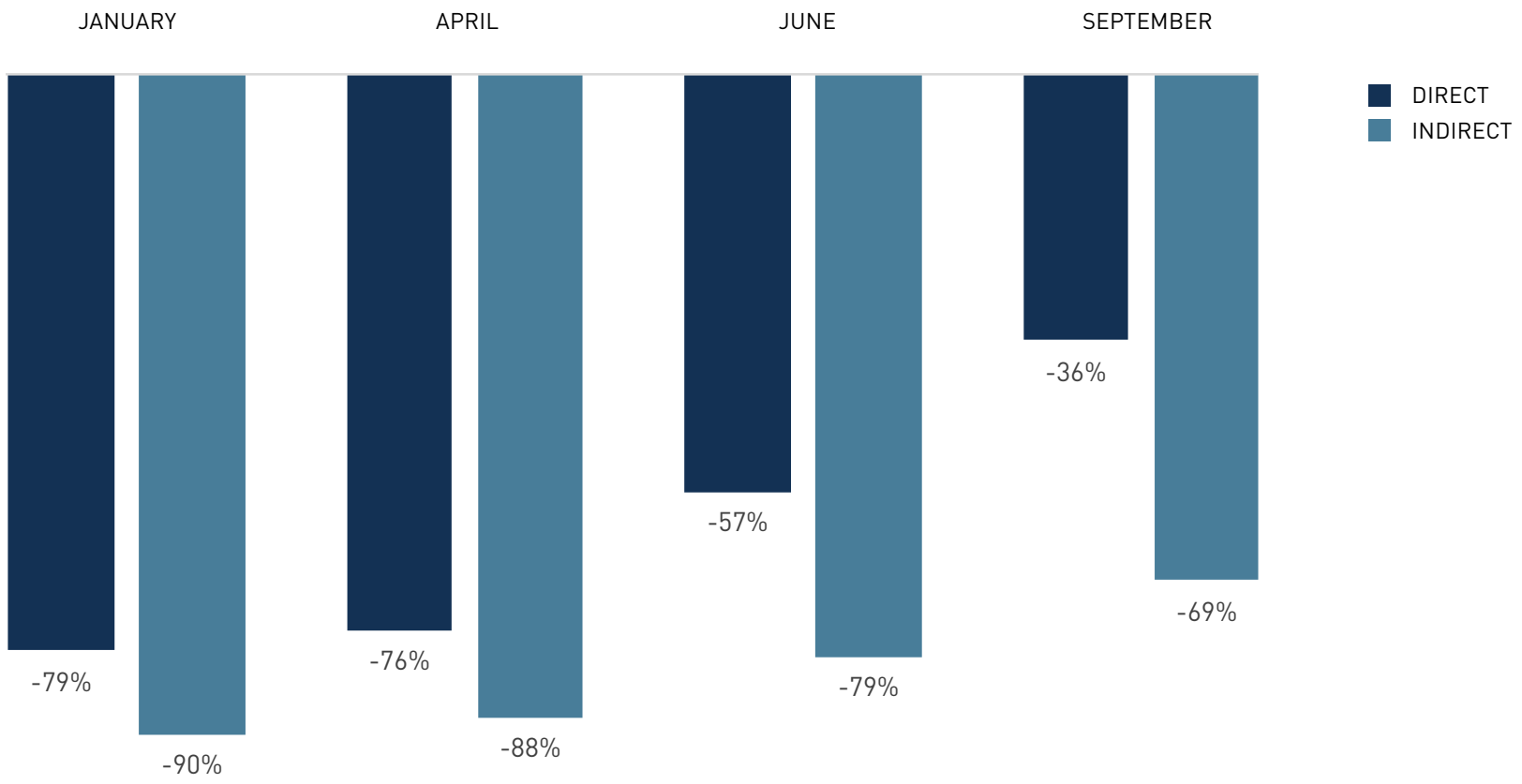
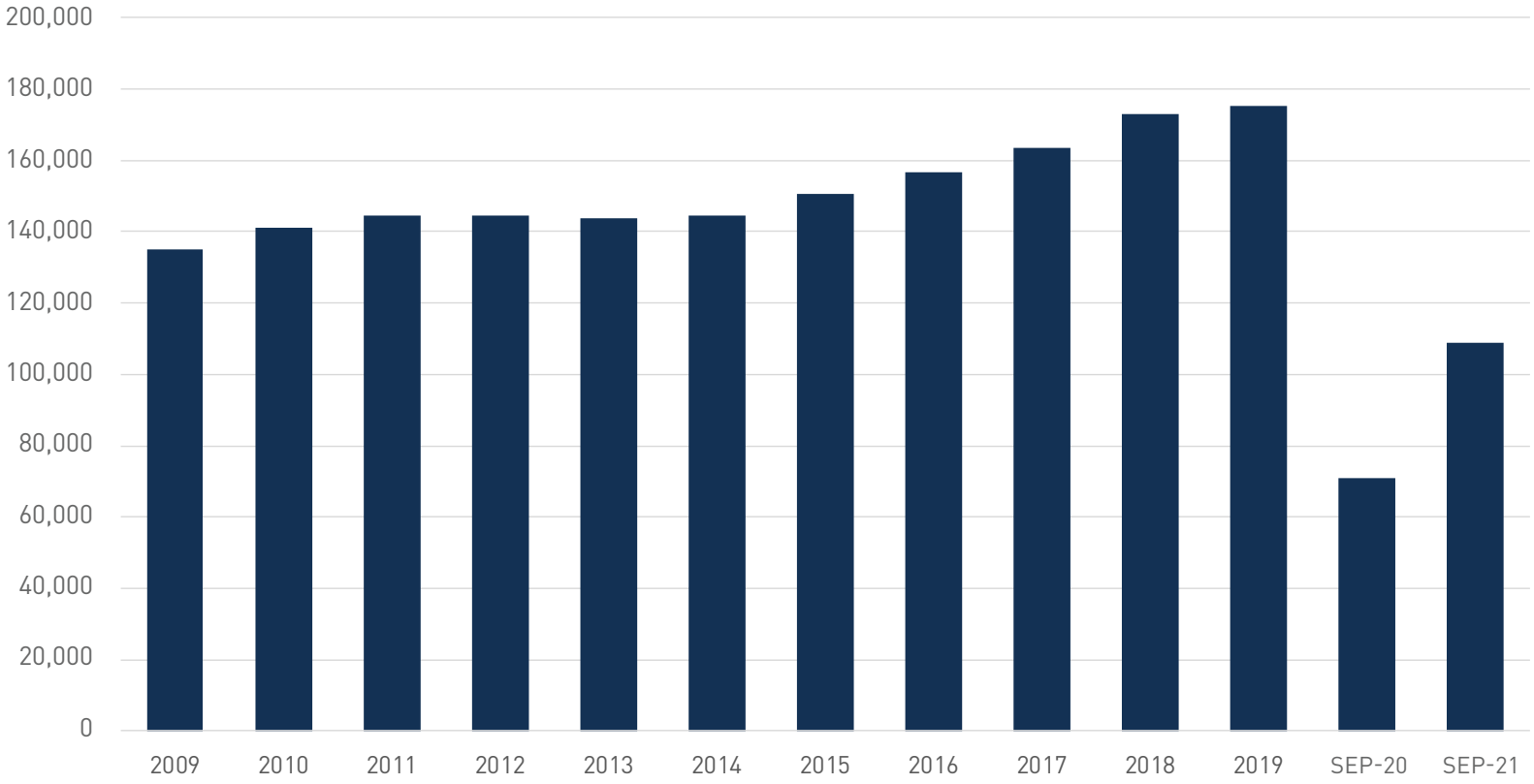


CHART 3: **ANNUAL EUROPEAN AIRPORT DIRECT CONNECTIVITY**



DIRECT CONNECTIVITY

2.1

TOP 20 RANKING

This year's top 20 ranking in terms of direct connectivity largely reflects the two-speed recovery between the EU+ market and the rest of Europe, led by Russian and Turkish airports. It also reflects differences in individual Governmental policies as regards travel restrictions within the EU+ market and the fact that leisure/VFR traffic has been a major driver of the recovery.

Amsterdam Schiphol holds the top spot (showing a remarkable resilience and having recovered ⅔ of its pre-pandemic direct connectivity level) followed by **Istanbul** (-29%), **Frankfurt** (-44%), **Paris CDG** (-47%) and **Moscow Sheremetyevo** (-32%).

Remarkably, **Istanbul Sabiha Gökçen** (-6%), **Moscow Domodedovo** (-11%), **Antalya** (-3%) and **St Petersburg** (-3%) have nearly recovered their pre-pandemic (2019) direct connectivity levels – while **Palma de Mallorca** (-27%) and **Athens** (-23%) benefited from their reliance on both international leisure and domestic traffic.

Conversely, other major airports lagged behind in rebuilding their direct connectivity: **Rome Fiumicino** (-55% - with the weakness of Alitalia being a major contributor), **London Heathrow** (-52% - clearly handicapped by the UK's overtly restrictive travel regime) and **Munich** (-51%).

Leaving the top 20 list compared to 2019 are **Zurich** which lost 7 places to 22nd, **Dublin** which fell 6 places to 26th, **Stockholm Arlanda** which lost 13 places to 31st, and **London-Gatwick** which fell by 23 places to 34th.

CHART 4: **DIRECT CONNECTIVITY – TOP 20 AIRPORTS IN EUROPE IN 2021 (SEPTEMBER 2021 VS. 2019 & RANKING 2021, 2020 & 2019)**

2019	2020	2021	CODE		
2	1	1	AMS	3,243	-33%
5	5	2	IST	3,158	-29%
1	4	3	FRA	2,840	-44%
3	2	4	CDG	2,543	-47%
8	6	5	SVO	2,534	-32%
7	12	6	MAD	2,255	-43%
4	8	7	LHR	2,243	-52%
9	17	8	BCN	2,151	-38%
21	7	9	SAW	2,141	-6%
6	9	10	MUC	1,983	-51%
14	20	11	PMI	1,920	-27%
26	3	12	DME	1,835	-11%
19	11	13	ATH	1,830	-23%
32	18	14	AYT	1,662	- 3%
12	15	15	VIE	1,635	-41%
34	13	16	LED	1,531	-3%
16	14	17	OSL	1,480	-41%
17	10	18	ORY	1,476	-39%
10	19	19	FCO	1,475	-55%
13	22	20	CPH	1,437	-45%

TABLE 1: **ACI WORLD AIRPORT TRAFFIC FORECAST TO 2040 - TOP 10 FASTEST GROWING COUNTRIES (over 100 million passengers in 2019)**

RANK	COUNTRY	2019-2040 COMPOUND ANNUAL GROWTH RATE (CAGR) %
1	Indonesia	6.6
2	India	6.5
3	Vietnam	6.0
4	Saudi Arabia (Kingdom of)	5.6
5	United Arab Emirates	5.1
6	China (People's Republic of)	4.8
7	Mexico	4.6
8	Turkey	4.6
9	Malaysia	4.4
10	Thailand	4.3
11	Korea (Republic of)	4.0
12	Brazil	3.9
13	Russian Federation	3.5
14	Australia	3.2
15	Canada	2.9

Altogether in 2021, 5 of the top 15 airports come from Turkey and Russia. While the airports that lost their rankings are likely to regain ground in the short-term, longer run growth will favour the position of airports in emerging markets.

From that perspective, the top 20 direct connectivity ranking may offer a hint of the longer-term future. According to ACI's World Airport Traffic Forecast[3], Russia and Turkey will be amongst the top 15 fastest growing countries in the upcoming period to 2040, though not a single other European country appears in this list.

3. https://store.aci.aero/product-category/economics-statistics/annual-world-airport-traffic-forecasts-watf

2.2

SMALLER AIRPORTS RECOVERING FASTER

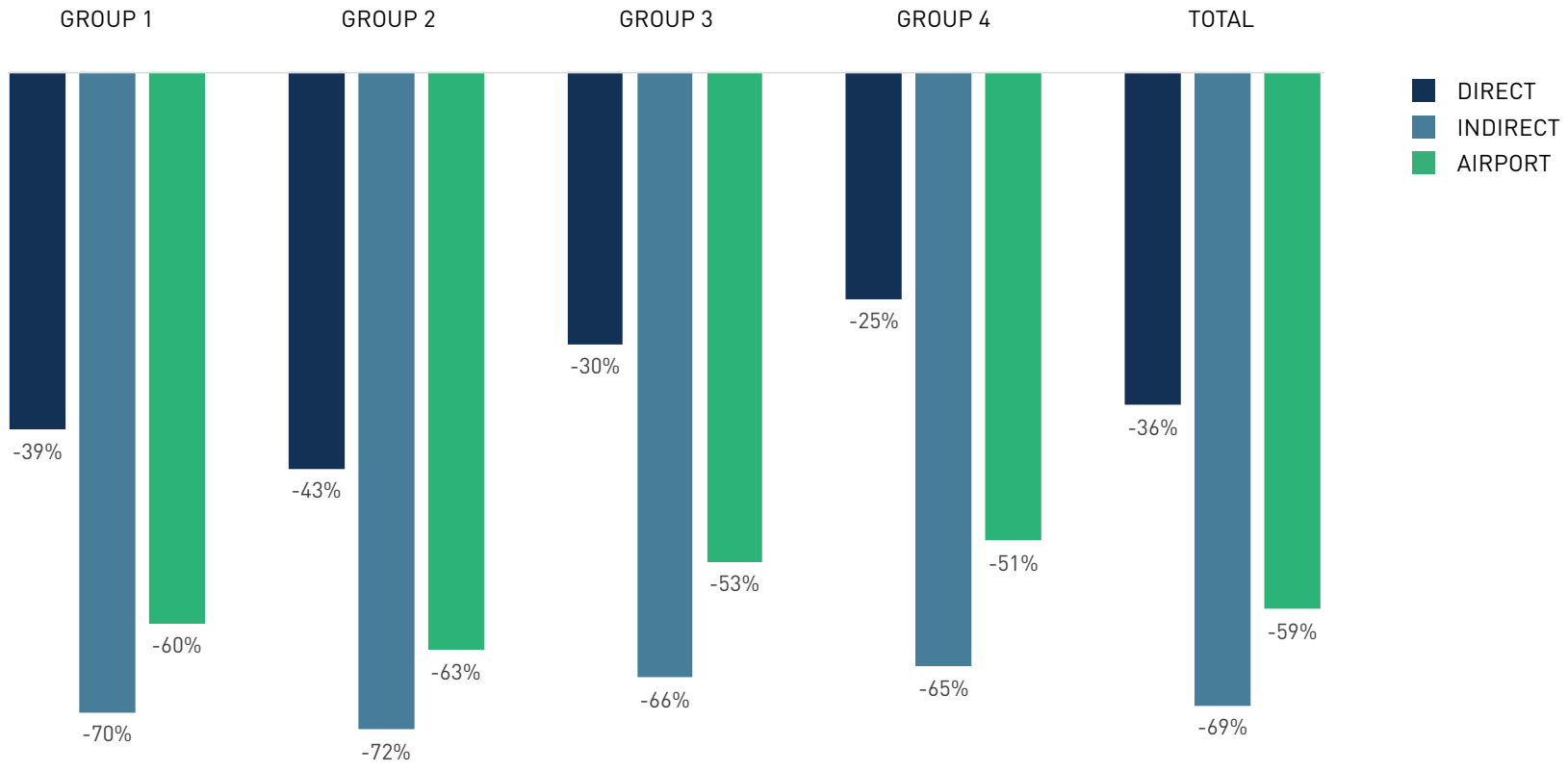
Chart 5 below reveals that as of September 2021, smaller airports (Group 4 category[4] - airports that welcomed less than 5 million passengers during 2019), had recovered ¾ of their direct connectivity and nearly half of their total connectivity compared to their pre-pandemic (2019) levels.

The relatively stronger performance of smaller airports reflects the patterns of the air transport recovery over the past months: predominantly driven by intra-European and domestic leisure traffic as well as Low Cost Carriers (LCCs). As smaller and regional airports have a greater reliance on intra-European and domestic traffic and also a greater dependence on LCCs, their air connectivity levels tended to recover more quickly. The fact that these airports have a smaller base of flights to recover also contributed to their performance relative to larger airports.

Conversely, the larger airports ("Group 1" - airports that welcomed more than 25 million passengers in 2019) tend to have a significant level of intercontinental traffic. They include hub airports which rely on feeder traffic from Full Service Carriers. These airports have thus clearly been at a disadvantage - with a lower recovery in both direct connectivity and total connectivity.

4. All categories:
Majors: Top 5 busiest airports in Europe
Group 1: Airports welcoming over 25 million passengers per year
Group 2: Airports welcoming between 10 and 25 million passengers per year
Group 3: Airports welcoming between 5 and 10 million passengers per year
Group 4: Airports welcoming below 5 million passengers per year

CHART 5: **DIRECT, INDIRECT & AIRPORT CONNECTIVITY (EUROPEAN AIRPORTS – SEPTEMBER 2021 VS. SEPTEMBER 2019)**



CONNECTIVITY TO OTHER WORLD REGIONS

3.1

DIRECT CONNECTIVITY TO ASIA PACIFIC REMAINS THE HARDEST HIT

Europe's air connectivity to other regions of the world has remained very much depressed in 2021 and has not recovered to the same extent as air connectivity within Europe.

While **direct connectivity within Europe** was down by **-35%** in September 2021 against the 2019 benchmark, only direct connectivity to **Africa** had achieved a similar performance.

Direct connectivity to **Asia Pacific** remains the hardest hit at **-66%** (most of the region remained effectively closed to non-essential travel from Europe as of September), followed by **North America** still at **-57%**. Over the Summer months, the transatlantic market essentially remained a one-way market with many European countries open to vaccinated US visitors but the US being closed to European travellers. The recent announcement of the US Government re-opening to all cross border vaccinated travellers as of November should see direct connectivity from Europe to North America recovering further to levels equivalent to those of the intra-European market and Africa towards the end of the year.

Meanwhile, direct connectivity to the **Middle East** and **Latin America** has shown a better performance than North America.

CHART 6: **DIRECT CONNECTIVITY FROM EUROPEAN AIRPORTS – INTRA EUROPE**

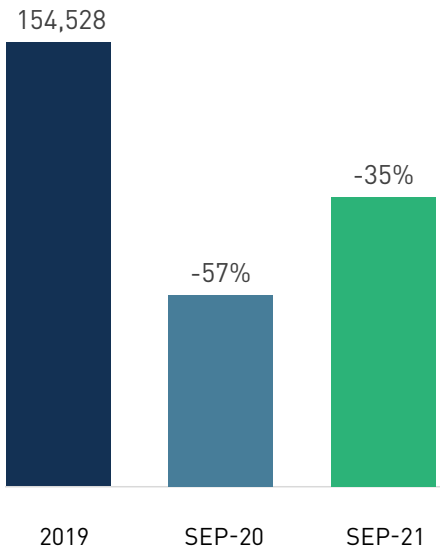
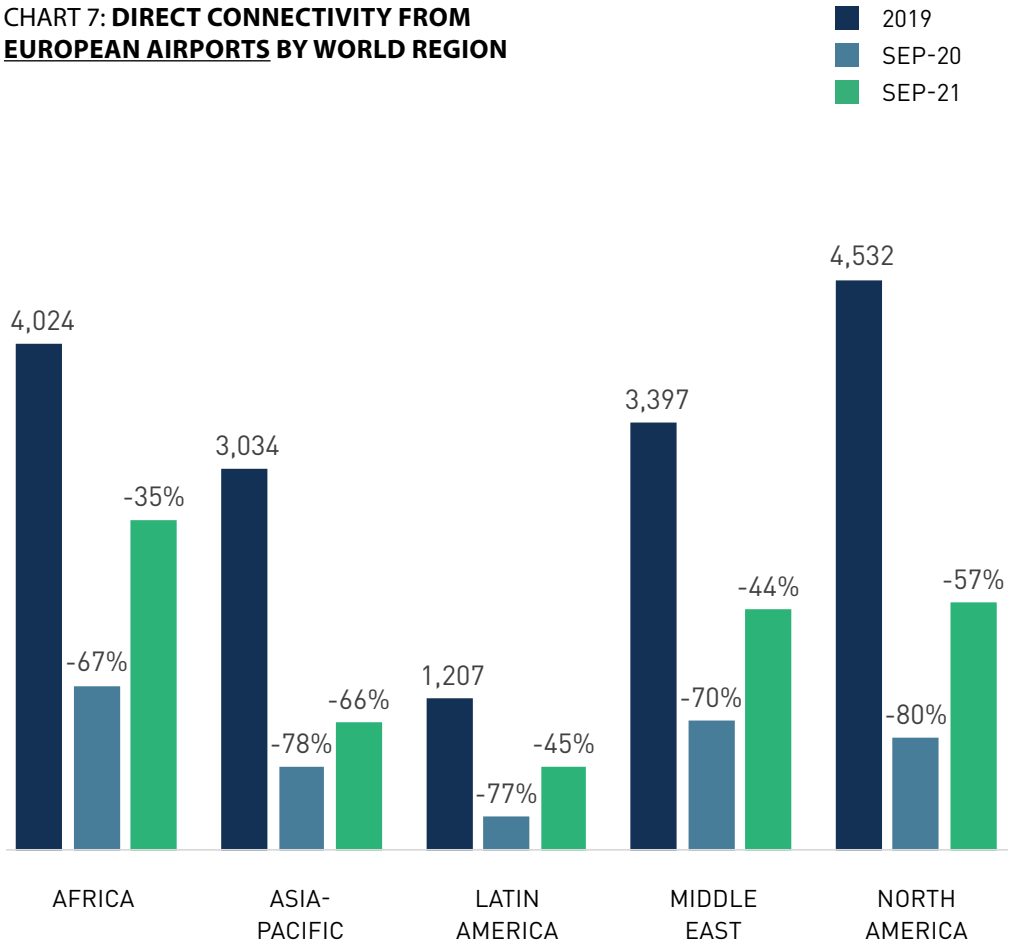


CHART 7: **DIRECT CONNECTIVITY FROM EUROPEAN AIRPORTS BY WORLD REGION**



HUB CONNECTIVITY

4.1

SLOW HUB CONNECTIVITY RECOVERY

Hub airports bring the virtues of air transport networks. For an airport that has a wave of 10 flights leaving at 9am, one additional flight arriving at 8am increases its hub connectivity score by 10, reflective of the onward connecting options for passengers on that additional arriving flight.

The drastic reduction in air services since the pandemic means that each flight arriving at a hub airport now has much fewer connection options. The absence of real recovery for most intercontinental markets from Europe has continued to penalise hub connectivity in 2021.

This can be seen from the fact that while **direct connectivity** at European airports is gaining ground and had recovered **64%** of its pre-pandemic (2019) level by September, **hub connectivity** had only recovered **33%** of its pre-pandemic (2019) level – with progress this year being slow.

CHART 8: **DIRECT & HUB CONNECTIVITY IN EUROPE (APRIL 2020 & SEPTEMBER 2021 VS. 2019)**

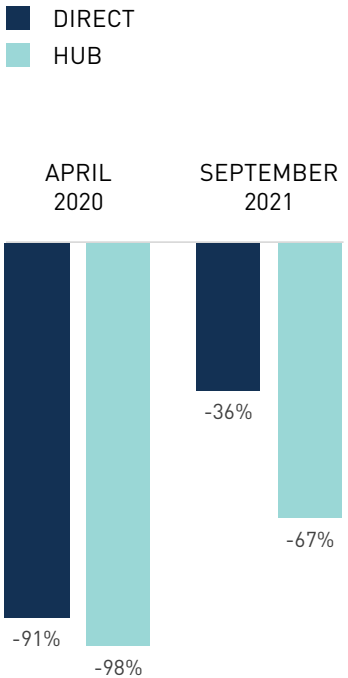


CHART 9: **DIRECT & HUB CONNECTIVITY IN EU+ & NON-EU+ (SEPTEMBER 2021 VS 2019)**

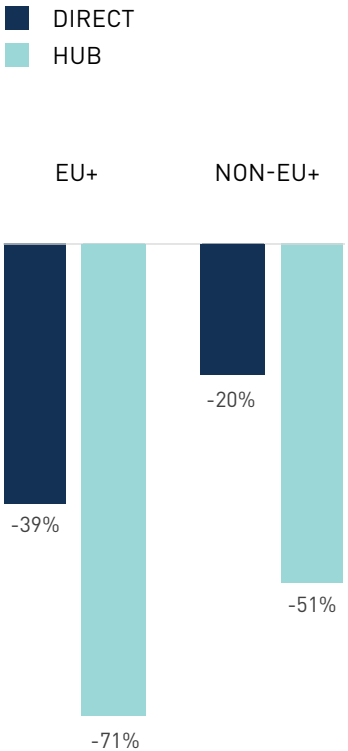
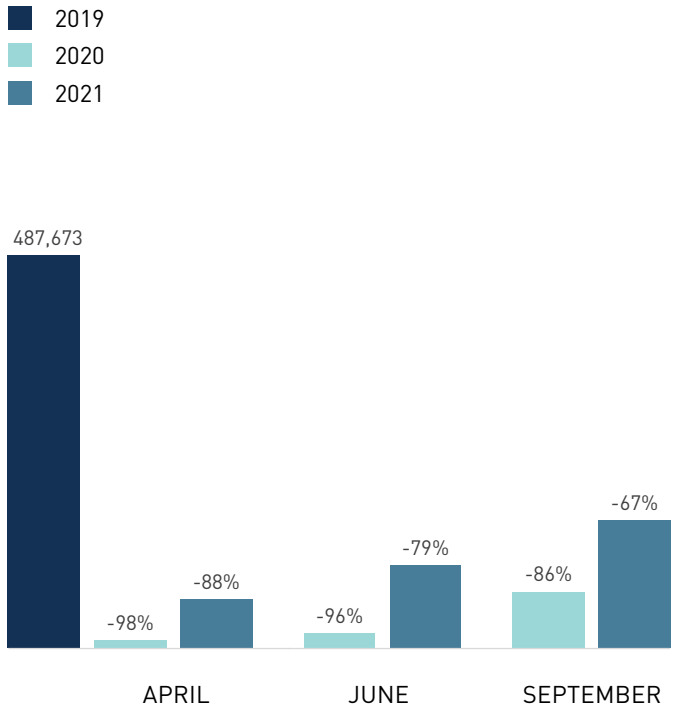


CHART 10: **HUB CONNECTIVITY IN EUROPE IN 2021 (APRIL TO SEPTEMBER)**



4.2

GLOBAL HUB CONNECTIVITY PERFORMANCE

As was the case last year, the global airport ranking in hub connectivity continues to be heavily distorted by the pandemic and the de-facto closure of most intercontinental markets.

North American airports still account for half of the top 20 global hubs. They have generally recovered a significant part of their pre-pandemic (2019) hub connectivity levels - notably **Denver** (90% of its hub connectivity recovered), **Phoenix** (72%), **Dallas Forth Worth** (69%) and **Houston** (67%). This reflects their reliance on a vast and largely unconstrained domestic market, which cushioned them from the harsh consequences of cross-border travel restrictions compared to airports in other world regions.

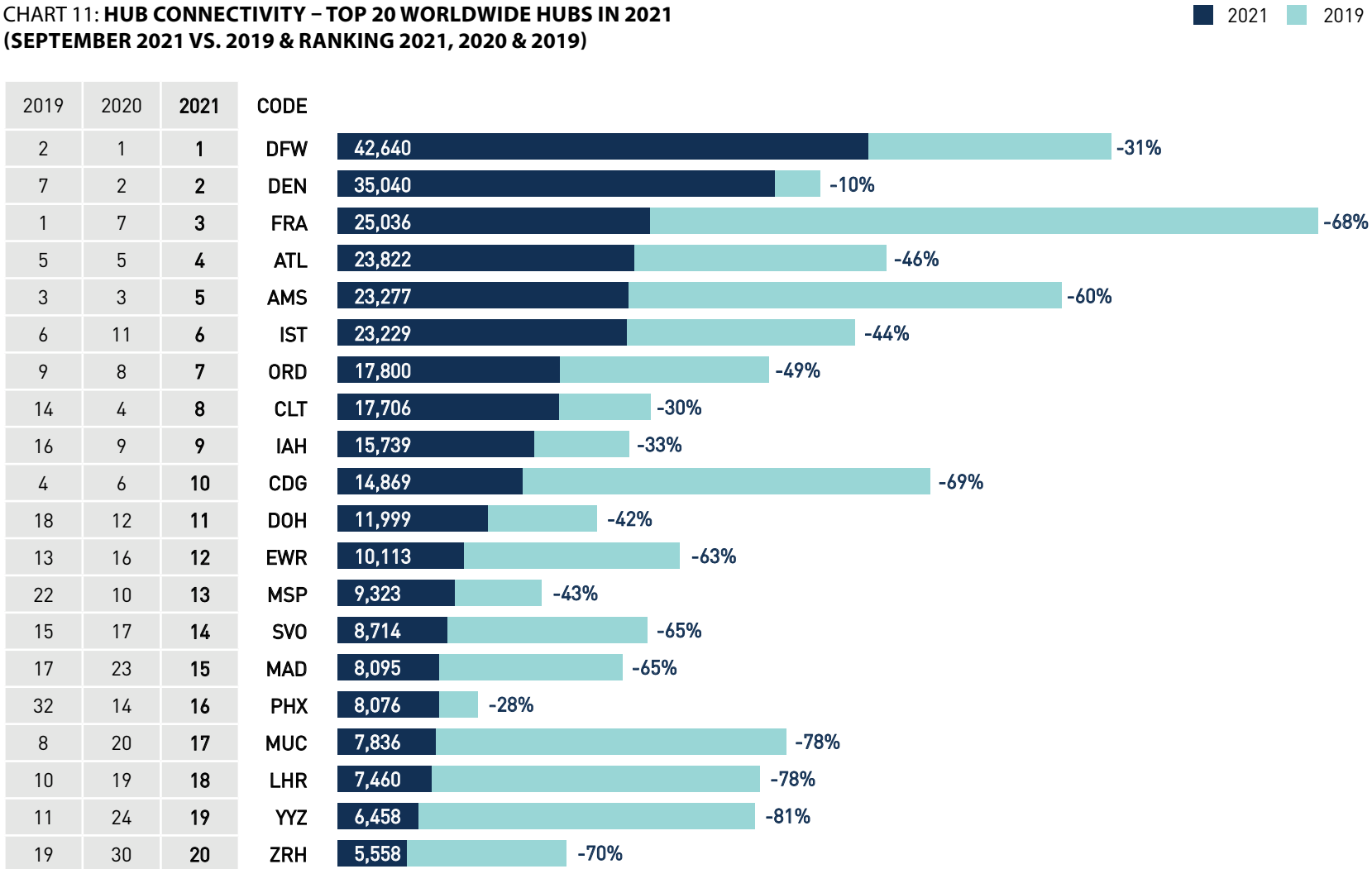
Conversely, **European airports** still have a long way to go to recover their pre-pandemic hub connectivity levels - although some have made encouraging progress over the past year.

Frankfurt, which used to top the global ranking for hub connectivity in 2019 has moved up from the 7th to the 3rd position since last year, with 32% of its hub connectivity recovered so far. **Istanbul** and **Amsterdam Schiphol** have recovered respectively 56% and 40% of their pre-pandemic (2019) hub connectivity levels – the best performance amongst European hubs. Also, **Madrid** and **Zurich** have re-joined the top 20 global hub connectivity league after dropping of it in 2020.

Progress has been slower for **Paris-CDG** which has further dropped in the ranking compared to last year and is now in the 10th position, with 31% of its pre-pandemic (2019) hub connectivity recovered. **London-Heathrow** and **Munich** remain in the 18th and 17th position respectively, having recovered only 22% of their pre-pandemic (2019) hub connectivity levels – the lowest amongst European hubs.

Doha is the only Middle Eastern airport included in the top 20 global league this year, with 58% of its pre-pandemic (2019) hub connectivity recovered. No Asian airport features in the 2021 global hub connectivity league.

CHART 11: **HUB CONNECTIVITY – TOP 20 WORLDWIDE HUBS IN 2021 (SEPTEMBER 2021 VS. 2019 & RANKING 2021, 2020 & 2019)**



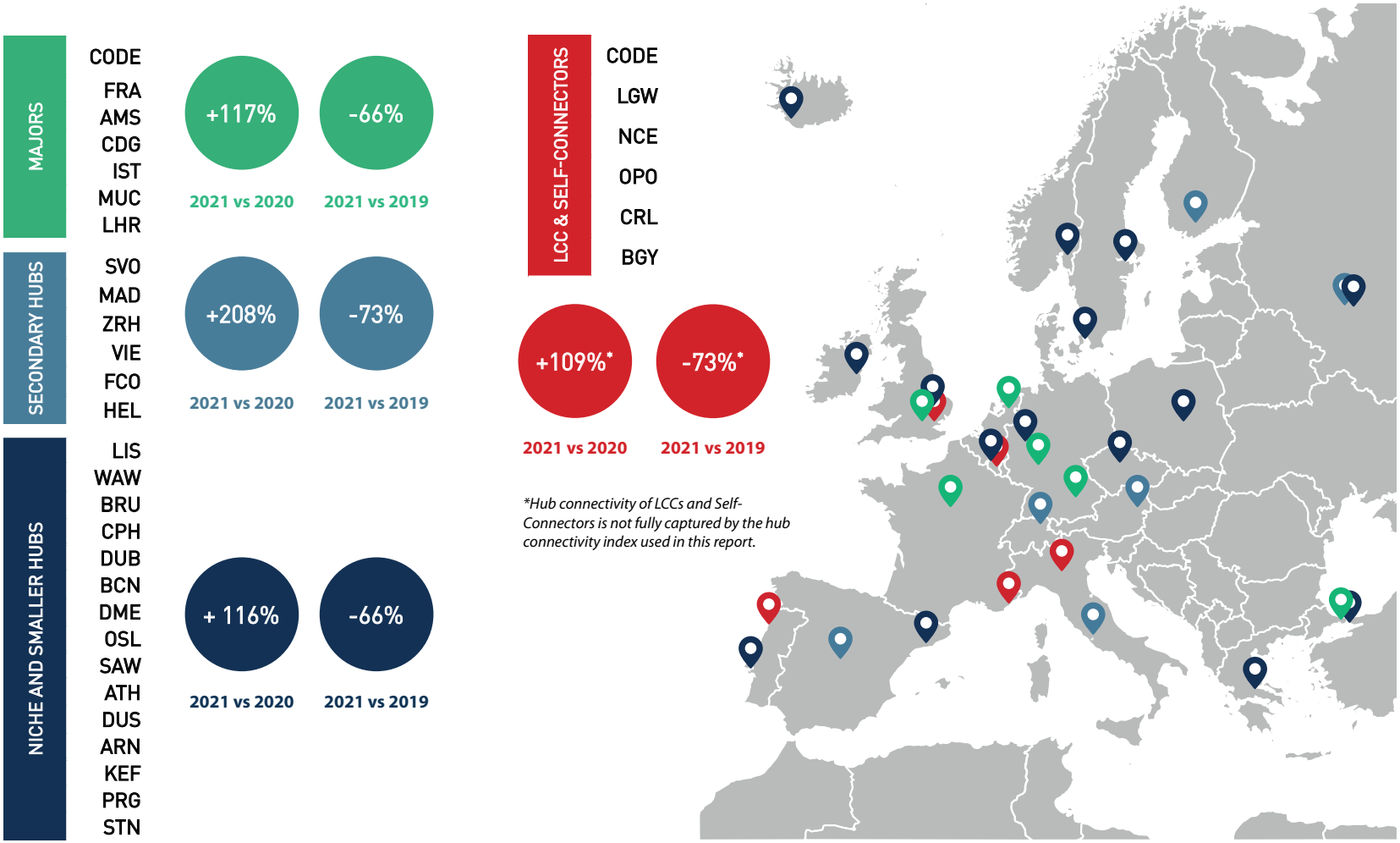
2019	2020	2021	CODE		
2	1	1	DFW	42,640	-31%
7	2	2	DEN	35,040	-10%
1	7	3	FRA	25,036	-68%
5	5	4	ATL	23,822	-46%
3	3	5	AMS	23,277	-60%
6	11	6	IST	23,229	-44%
9	8	7	ORD	17,800	-49%
14	4	8	CLT	17,706	-30%
16	9	9	IAH	15,739	-33%
4	6	10	CDG	14,869	-69%
18	12	11	DOH	11,999	-42%
13	16	12	EWR	10,113	-63%
22	10	13	MSP	9,323	-43%
15	17	14	SVO	8,714	-65%
17	23	15	MAD	8,095	-65%
32	14	16	PHX	8,076	-28%
8	20	17	MUC	7,836	-78%
10	19	18	LHR	7,460	-78%
11	24	19	YYZ	6,458	-81%
19	30	20	ZRH	5,558	-70%

4.3

EUROPEAN HUB CONNECTIVITY PERFORMANCE

Amongst European hubs, **secondary hubs** and **LCC hubs** with self-connections have continued to underperform compared to **major hubs** and **niche hubs**. This is indicative of the extent to which airlines operating multi-hub networks have tended to retrench and consolidate operations at their primary hubs. It also reflects the fact that secondary hubs were in some cases serving overflow traffic from capacity/slot constrained primary hubs.

CHART 12: **HUB CONNECTIVITY – TOP 20 WORLDWIDE HUBS RANKING (DECREASE BY GROUP SEPTEMBER 2021 VS. SEPTEMBER 2019)**



The above classification of airports is based on connectivity performance in 2019.

4.4

HUB SERVICES IN THE SPOTLIGHT

Providing the platform for connecting from one flight to another is complex and works best when provided in large scale.

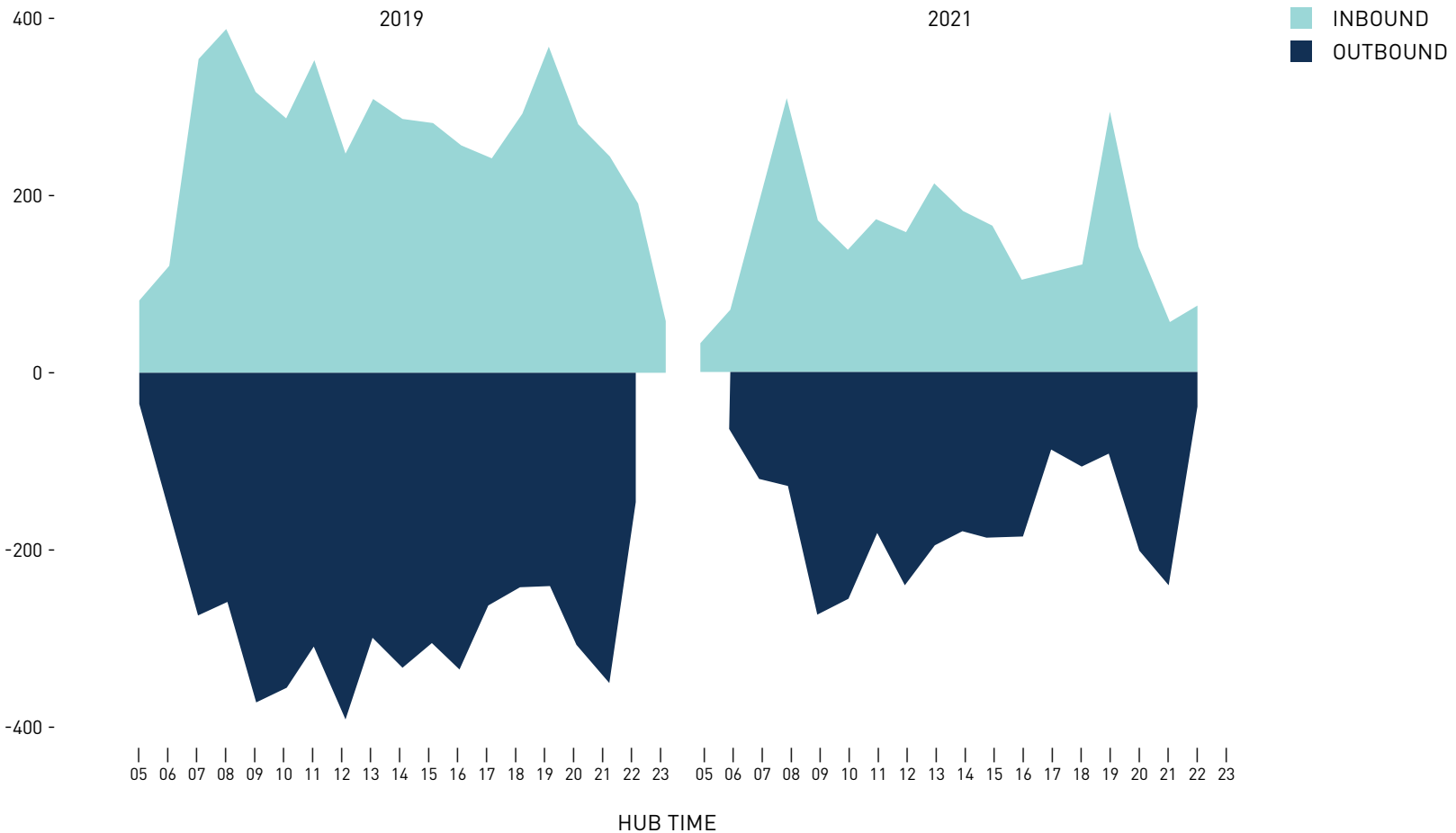
A hub airport operates around the peak hour of operations - that is the 60-minute block of time during which there are the most arrivals and successive departures. Of course, there must be enough gates with jet bridges or remote stands and buses to move the large passenger volumes at those peaks in and out of terminal building. This involves the deployment of staff and services that are not turned on and off at the flick of a switch but have to remain operational throughout the day.

The drastic reduction by airlines in the number of flights and connections resulting from the pandemic was not constant throughout the day, but rather involved the removal of peaks and waves of aircraft operations.

The chart for the average EU hub below reveals **a reduction from 5 or 6 peaks a day, to only 3 peaks this year** compared to pre-pandemic (2019) operations. For a traveller arriving at a European hub[5], this has resulted in **an average loss of around 220 potential connecting flights** within the maximum and minimum connecting times identified in the NetScan model.

5. Chart 13 presents peaks in activity at an average EU hub (Majors based in the EU)

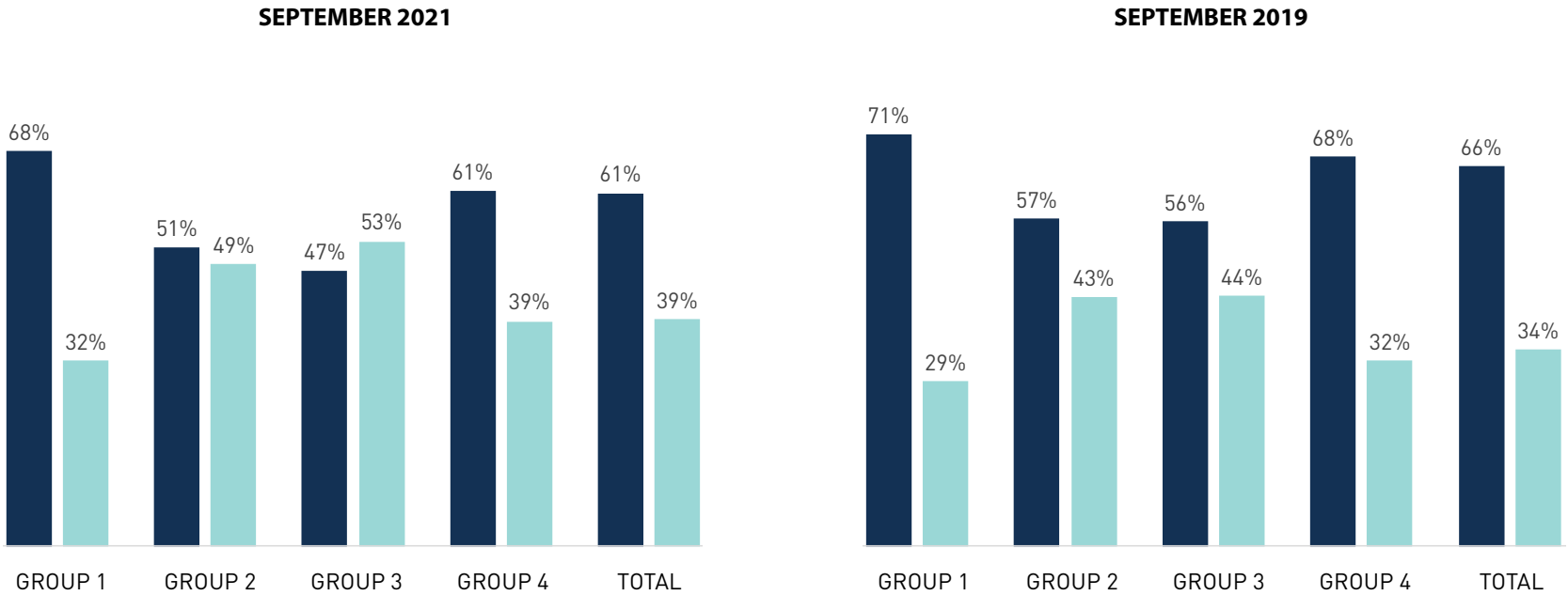
CHART 13: **AVERAGE EU HUB WAVE STRUCTURE (2021 VS. 2019)**



CONNECTIVITY RECOVERY & AIRLINE BUSINESS MODEL

Low-cost carriers (LCCs) have responded more rapidly to the re-start of travel, with their market share of direct connectivity increasing from 34% to **39%** between September 2019 and September 2021. Over the same period, the market share of **Full Service and Other Carriers (FSOC)** decreased from 66% to **61%**.

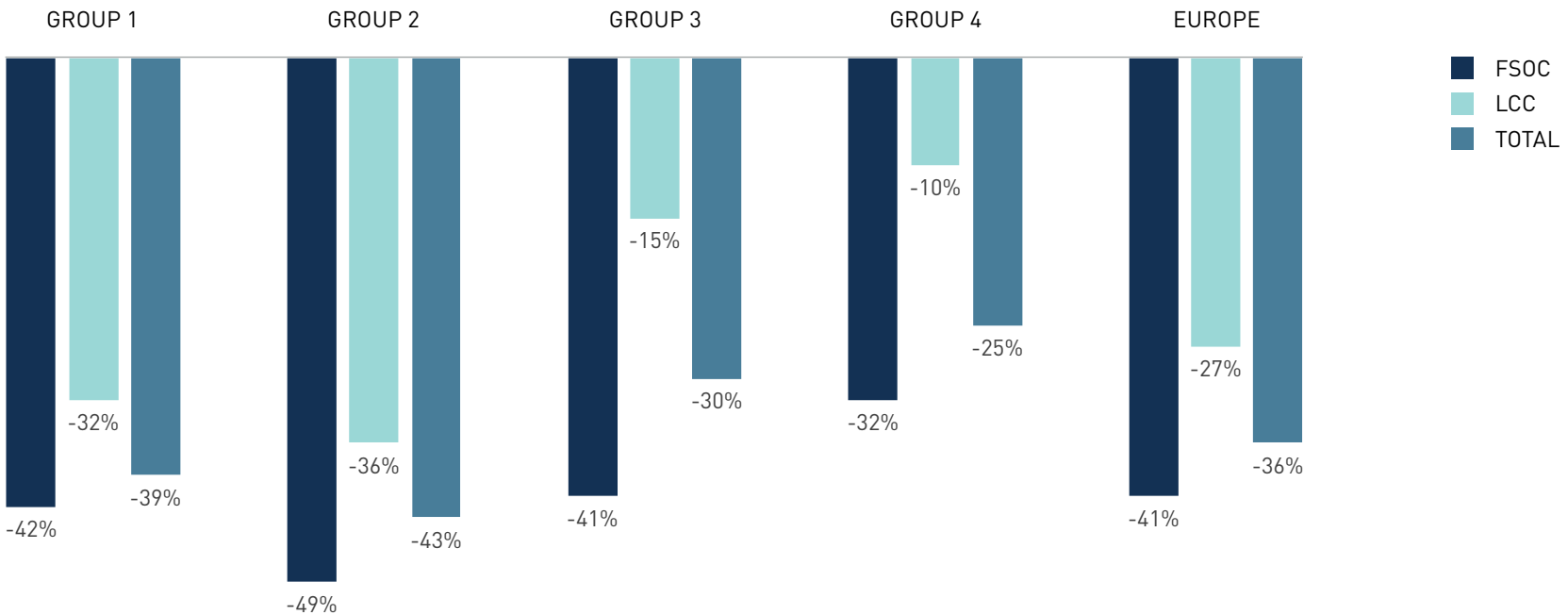
CHART 14: **DIRECT CONNECTIVITY AT EUROPEAN AIRPORTS – LCCs & FSOCs MARKET SHARES**



The performance across the different segments of the airport industry shows that LCCs have especially restored their direct connectivity levels at airports of less than 15 million passengers per annum and less than 5 million passengers per annum (Groups 3 and 4) compared to FSOCs.

The increasing market share of LCCs will be felt by airports in the aeronautical business, as these footloose pan-European carriers bargain with airports and flexibly open and close routes in response to the most interesting offers from airports on level of airport charges and incentive packages.

CHART 15: **DIRECT CONNECTIVITY LEVELS OF LCCs & FSOCs AT EUROPEAN AIRPORTS (SEPTEMBER 2021 VS. SEPTEMBER 2019)**



APPENDICES

The 2021 appendixes for airport and country connectivity are available on ACI EUROPE's website.

Want to know more about YOUR airport's connectivity performance?

Additional appendices detailing individual airport data on air connectivity are available to download.
Simply scan the QR code below:

Or download the file from: **https://www.aci-europe.org/air-connectivity.html**

AIRPORTS COUNCIL INTERNATIONAL

For the 8th year running, ACI EUROPE releases its annual European Airport Industry Connectivity Report – a comprehensive report on airport connectivity measured in many dimensions. This Report describes the impact of the COVID-19 pandemic on the direct, indirect and total airport connectivity as well as hub connectivity in comparison to previous years, based on SEO's NetScan connectivity methodology.

ACI EUROPE is the European region of Airports Council International (ACI), the only worldwide professional association of airport operators.

ACI EUROPE represents over 500 airports in 55 European countries. Our members facilitate over 90% of commercial air traffic in Europe: In response to the Climate Emergency, in June 2019 our members committed to achieve Net Zero carbon emissions for operations under their control by 2050, without offsetting.

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EVERY FLIGHT BEGINS AT THE AIRPORT.

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