



الهيئة العامة للطيران المدني
General Authority of Civil Aviation

matarat
Holding

Abha Airport

Airport Master Plan

September 2022

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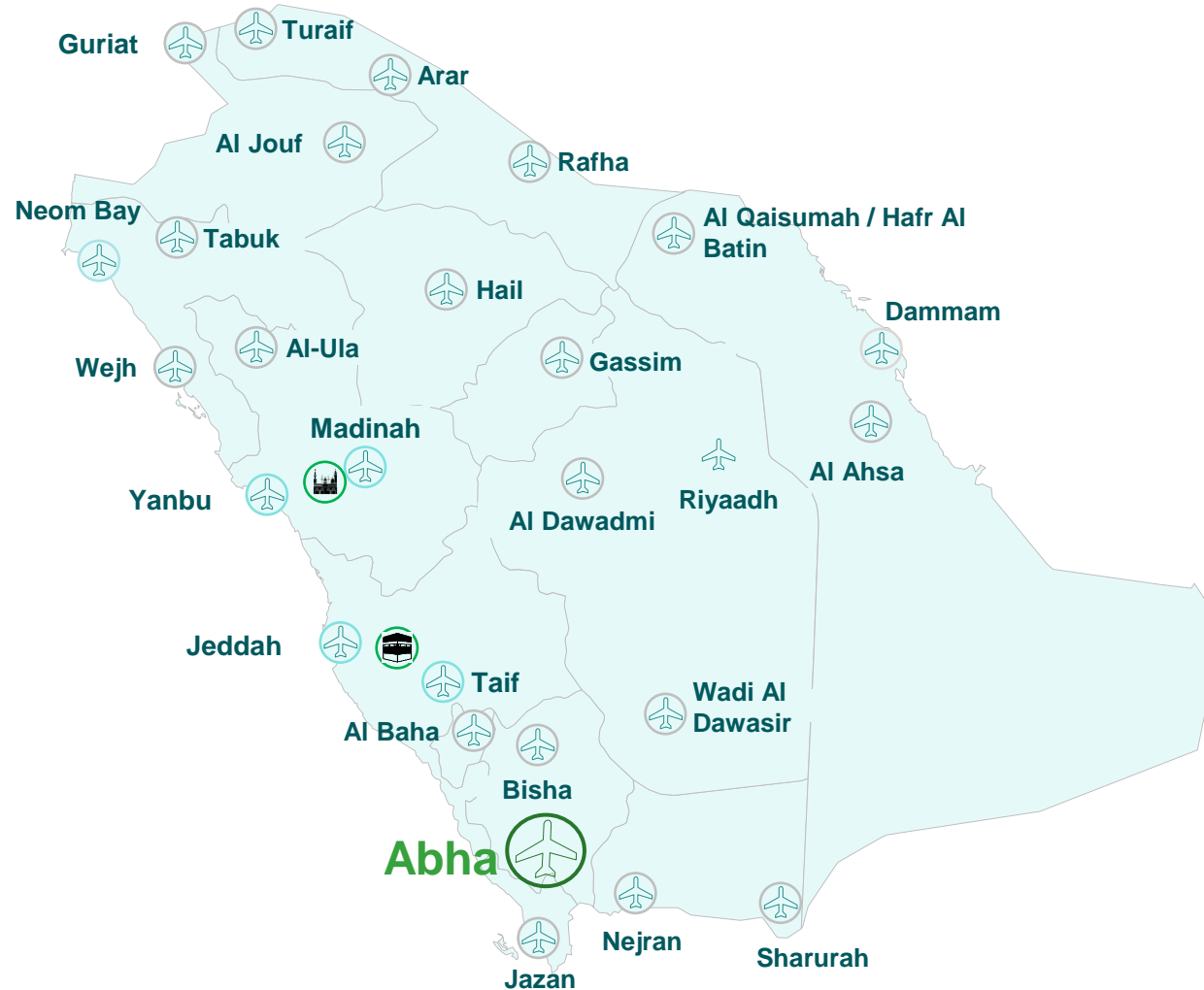
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Introduction

Introduction



Saudi Arabia airports classified into 2 types: International and Domestic



- Saudi Arabia has 28 airports currently classified as the following:
 - 4 main international airports (**JED, RUH, DMM, MED**)
 - 24 domestic airport (with some international)
- The international airports account for around **84%** of the total PAX volume in 2019.
- Domestic airports (with some international operations) account for **16%** of total passengers in 2019.

Introduction

Why Abha Airport



- Abha airport considered as **fifth largest Saudi airport** in terms of passengers volume (**4.4 Mpax in 2019**)
- Asser region is a promising destination for tourism attraction where ASDA is developing their ambitious tourism strategy to reach **8.6 million visitors by 2030**.
- Abha airport is under developing its master plan to cover all anticipating future demand until 2050.
- This presentation will give a high level insights on the ongoing Abha airport's master plan and gain experience and knowledge from the experts in today seminar.

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Market Assessment

Global outlook

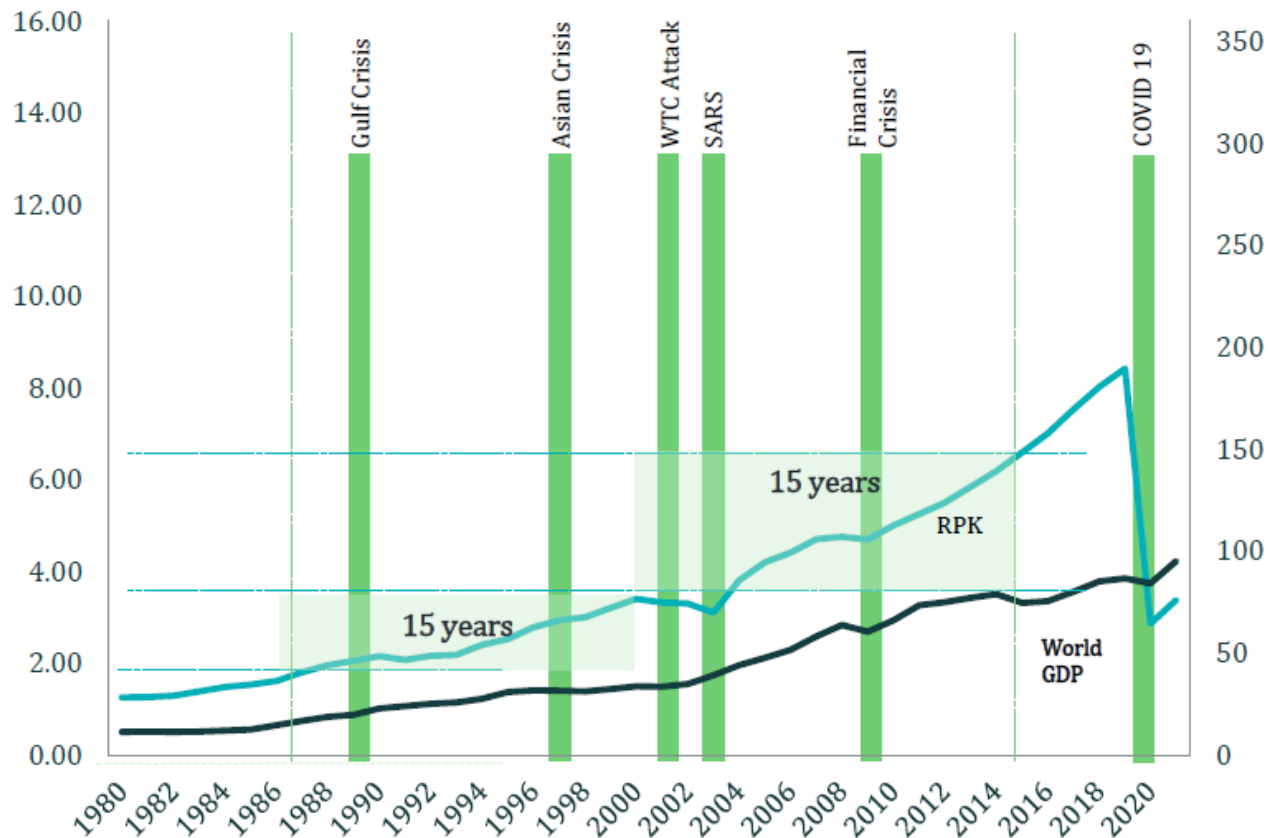


Global air transport demand has historically doubled every 15 years, but growth has been disrupted by the ongoing COVID 19 pandemic

Global GDP and air transport demand evolution (USD Trillion and RPK ^[1], 1980 2021)

RPK (Trillion)

GDP (Trillion)



- Development of the global commercial aviation is **highly correlated with economic growth** of its traffic generators: origins and destinations (O/D).
- The **aviation sector has shown resilience** towards major global crises, recovering faster than GDP after both the SARS outbreak (2003) and the Global Financial Crisis (2009)
- Air transport **demand** has **almost doubled every 15 years**
 - a trend which is being disrupted by the global travel restrictions due to the pandemic
- However, the pandemic has led to a **66% decline in global RPK**, while global GDP dropped by 2.8%

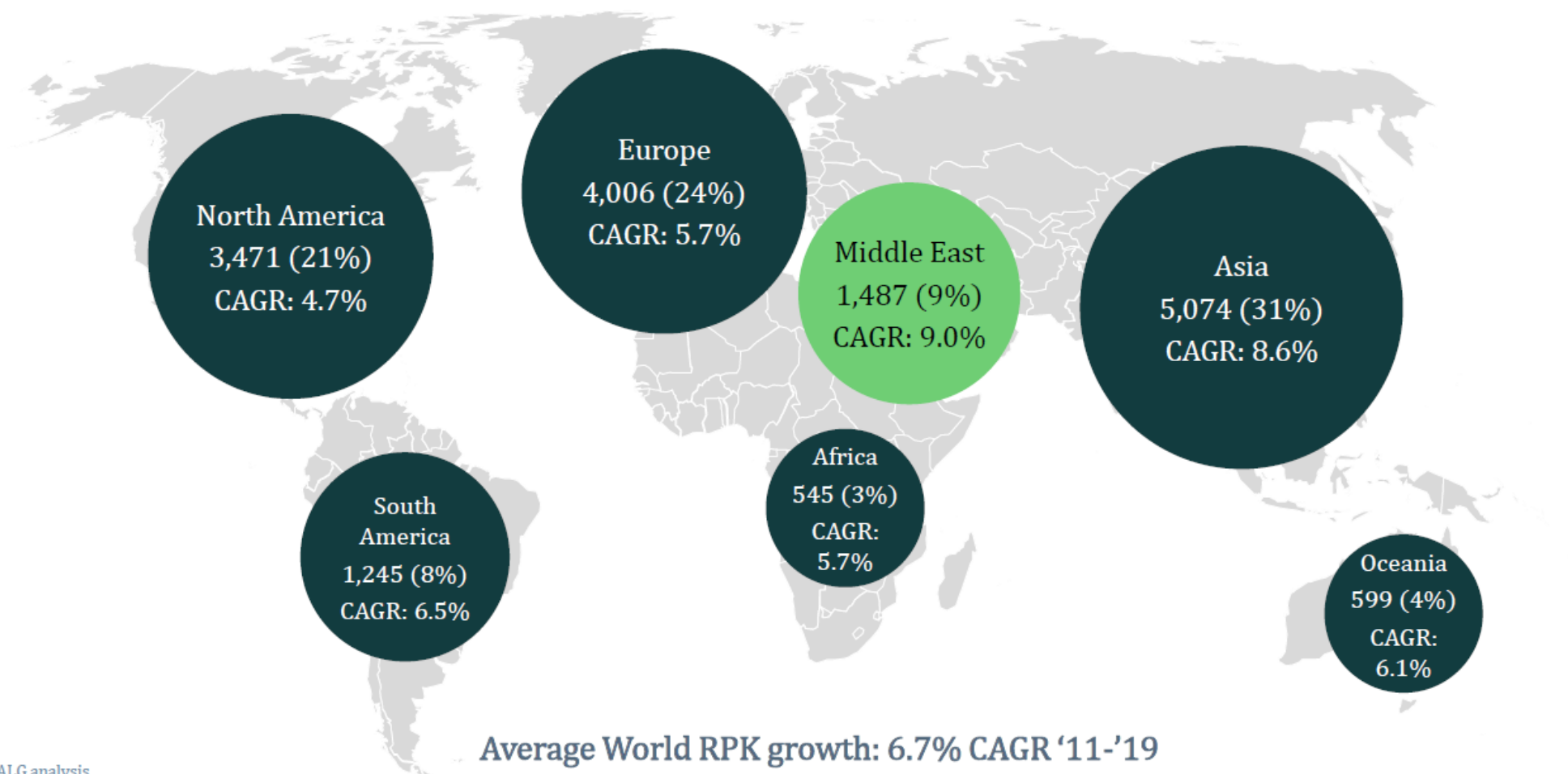
[1] RPK= Revenue Passenger Kilometer
Source: Airbus GMF 2020, ICAO preliminary RPK data for 2017, IMF, Oxford Economics; Team analysis

Global outlook



MENA region accounted for 9% of the global pre-covid aviation market, and was the fastest growing market during the past decade

RPK per region in 2019 and growth (Billion RPK, market share, CAGR 2011-19)






Source: OAG, ALG analysis

Middle East market



Three business models co-exist in the market: traditional flag carriers, network carriers and Low Cost Carriers (LCC)

Middle East airline business models

	Network carriers	Flag/full service carriers	Low cost carriers
Description	<ul style="list-style-type: none"> Hub & Spoke strategy supported by a wide network Significant share of long-haul destinations High-quality on board services Costumer class sorting Leverage on loyalty programs offerings 	<ul style="list-style-type: none"> Main national carrier Regional short-haul flights Long-haul route to main global destinations Operated from a main national gateway High-quality on board services 	<ul style="list-style-type: none"> Point to point strategy Regional short-haul flights Single aircraft model Direct sales, one booking class Limited on board services
Examples			
Strategic Outlook	<ul style="list-style-type: none"> Emirates and Qatar grow organically enforcing their network Etihad grows mainly through acquisitions 	<ul style="list-style-type: none"> No dominant player in the Gulf region Market regulation (protectionism) and constrained slot allocation are key success factors 	<ul style="list-style-type: none"> High growth, higher profit sector Increasing convergence between pure LCC and classic network models

[1] SaudiGulf is modern airline resembling flag carriers more than pure LCC, with a strategy focused in offering high service levels at market price

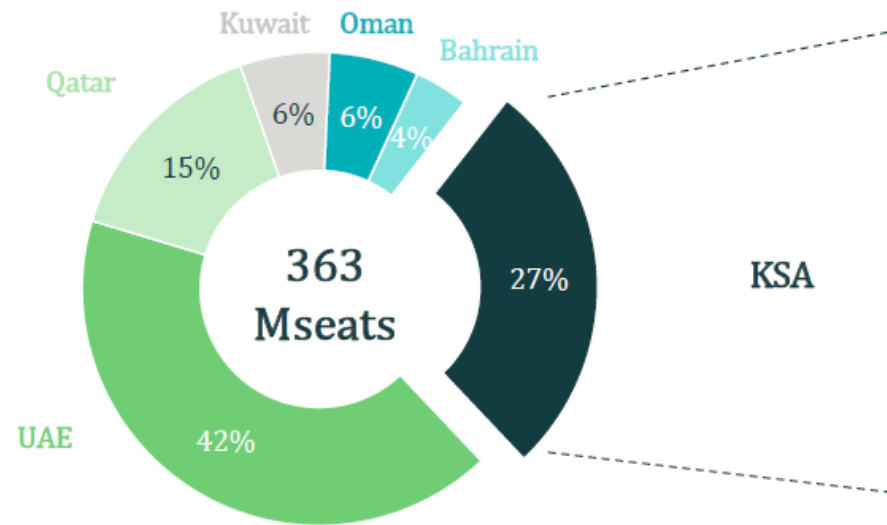
[2] Nesma operates as an FSC on international flights, offering both business and economy class, while domestic flights are operated with all-economy aircraft with F&B offered for purchase on-board

KSA Market

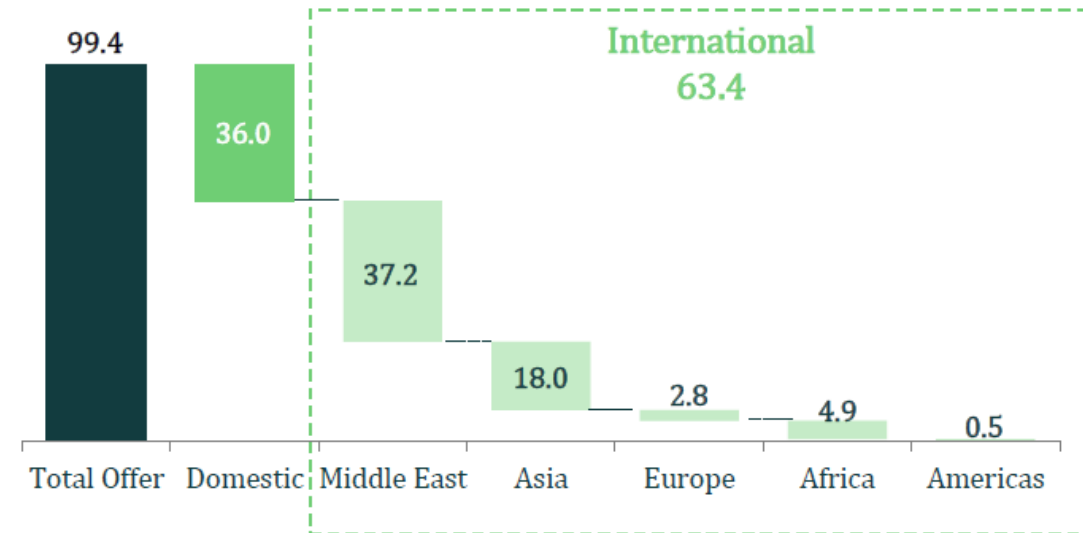


Saudi Arabia's seat offering in 2019 accounted for 27% of the GCC's capacity, mainly focused on domestic and intra regional traffic

GCC air traffic by country (Mseats, 2019)



Seats capacity by region in KSA (Mseats, 2019)



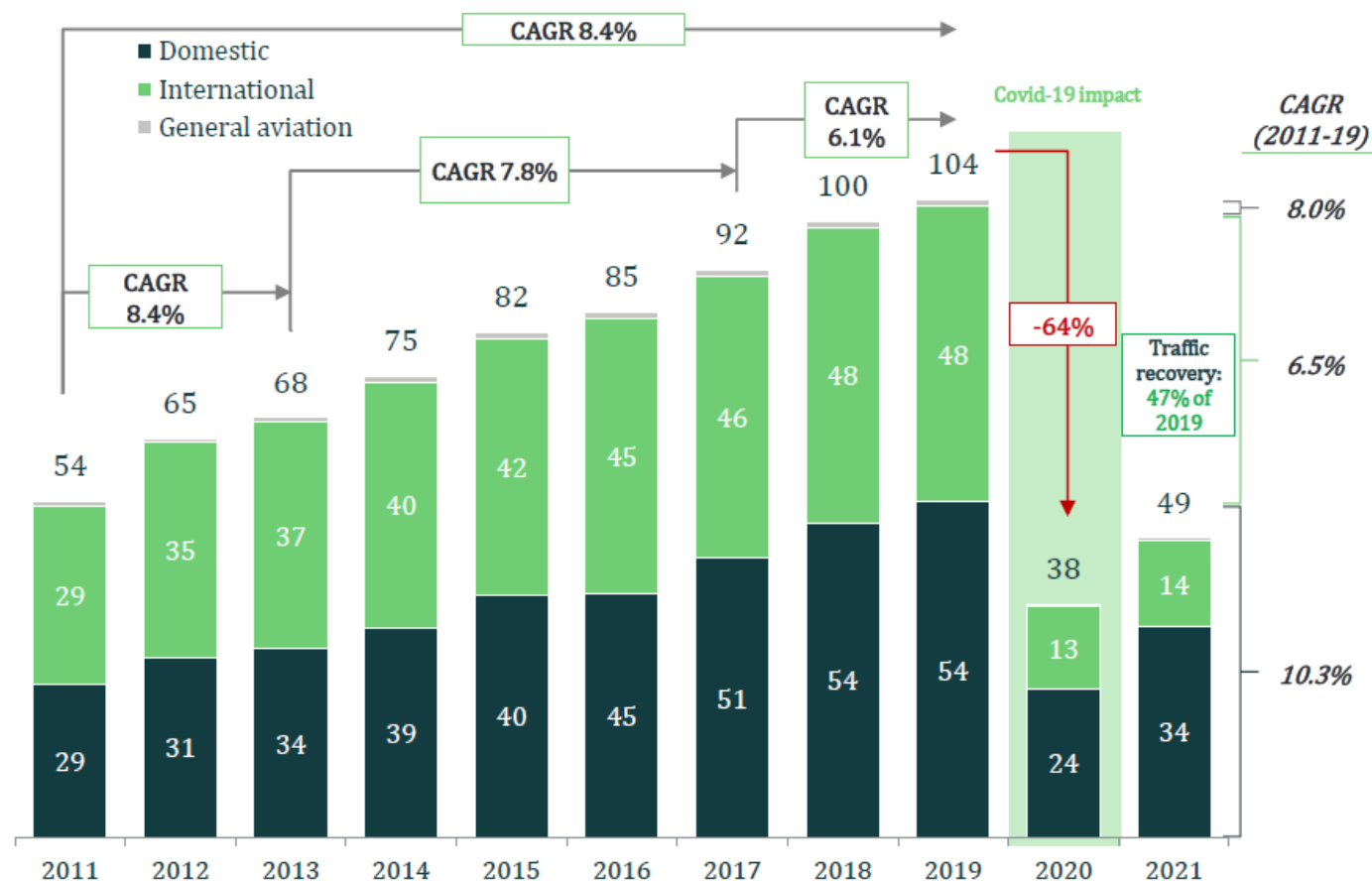
- Saudi Arabia is the **second largest market in the region** after the UAE, with 27% of air transport seat offering within the Gulf Cooperation Council (GCC), being
- The KSA market is dominated by **domestic and intra-regional traffic**, each accounting for around a third of the total offering. The rest of the capacity is mainly deployed on the Asian mid haul market, fueled by the large expat community and close economic ties with the Indian Sub-Continent and South East Asia

KSA Market



The KSA market increased more than doubled in the last decade driven by international traffic growth and the favourable national development

Historical air traffic evolution in KSA (MPax, 2011-2021)



Source: GACA

Note: Domestic traffic is the sum of all airports' traffic, i.e. double counted at country level

- Over the period 2011-19 the Saudi market grew at 8.4% p.a., driven mostly by **international traffic growth**
- Between 2011 and 2015 Saudi Arabia experienced **double-digit-growth** driven by a favourable evolution of country's economy, air transport liberalization and improvement of airport infrastructure
 - New airline AOCs granted entry of Flynas in 2007 SaudiGulf and Nesma Airlines in 2016
 - Increasing **bilateral and multilateral Air Service Agreements**: multiple open skies agreements reached between KSA and major O/D countries
- Economic downturn** and infrastructure constraints slowed the growth since 2016, further reduced (-64%) by the onset of the pandemic in 2020
- Traffic recovery in 2021 is estimated to 47% of 2019 traffic levels

KSA Market



Pre-COVID, growth was fuelled by favourable socio economic factors, market liberalization (both in terms of ASAs & AOCs) and airport development

Main drivers of KSA traffic growth

Socioeconomic factors



- **GDP growth** of ~3.3% p.a. over the past 15 years and ~2% p.a. **expected in the long term**. From 2016-19, GDP growth has reduced to 0.9% p.a. and dropped to -4.1% in 2020 due to COVID-19
- **Population has grown 2.7% p.a.** since 2005 and this ratio is expected to decrease towards world's average
- **Increase of propensity to fly** due to growth of income per capita in the medium and long term

Market liberalization



- Additional Air Service Agreements signed
- **Increasing competition** in domestic market (e.g. entry of Flynas, Nesma, SaudiGulf)
- **Entry of int'l airlines**, especially LCCs (e.g. entry of Flydubai and Air Arabia)
- **High potential** to further develop regional traffic at **secondary airports**

Airport infrastructure



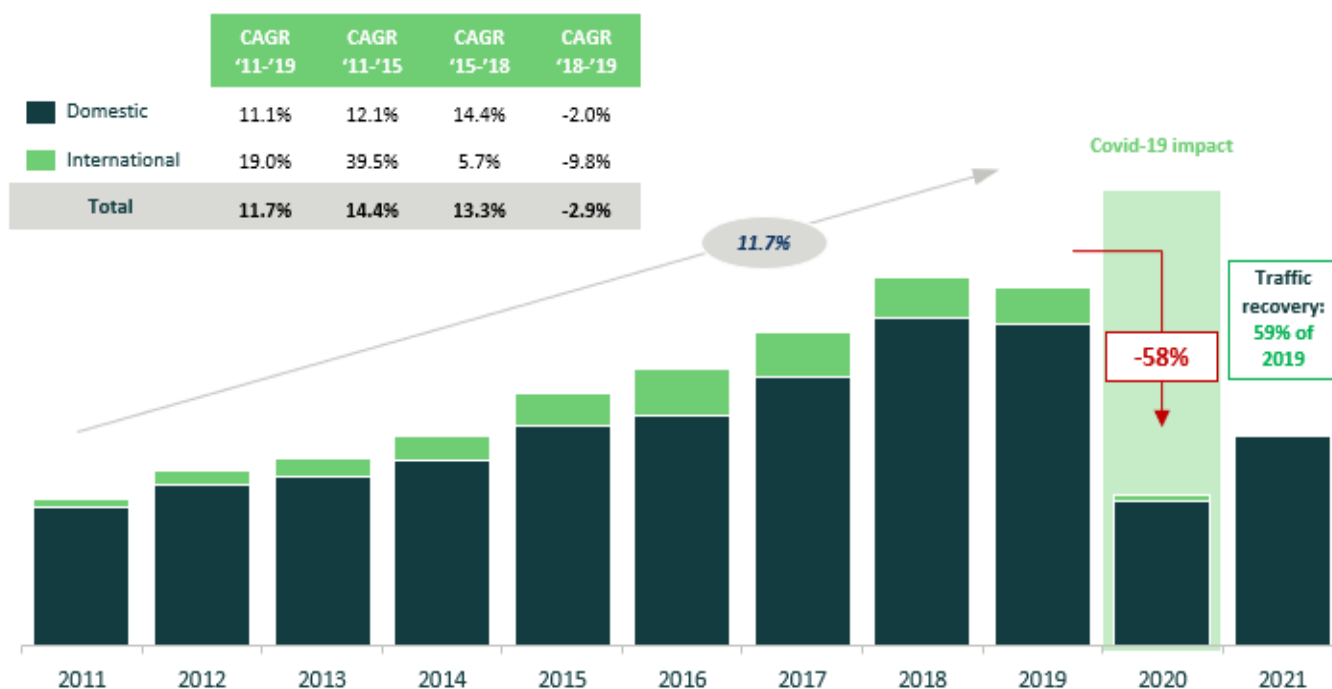
- **27 airports country-wide** allowing 70% of the population to access an airport within a 1.5h drive
- **Unbundling airport infrastructure development** (e.g. MED) initiated by GACA
- **New international airport developments** in NEOM, Red Sea and Amaala
- **Corporatization initiatives** in airport sector (eg. MATARAT) and ANSPs (eg. SANS)

Abha Airport



Passenger traffic at AHB grew at a ~12% CAGR between 2011-2019, peaking at 4.5 million passengers in 2018

AHB traffic evolution (Mpax, 2011-2021)



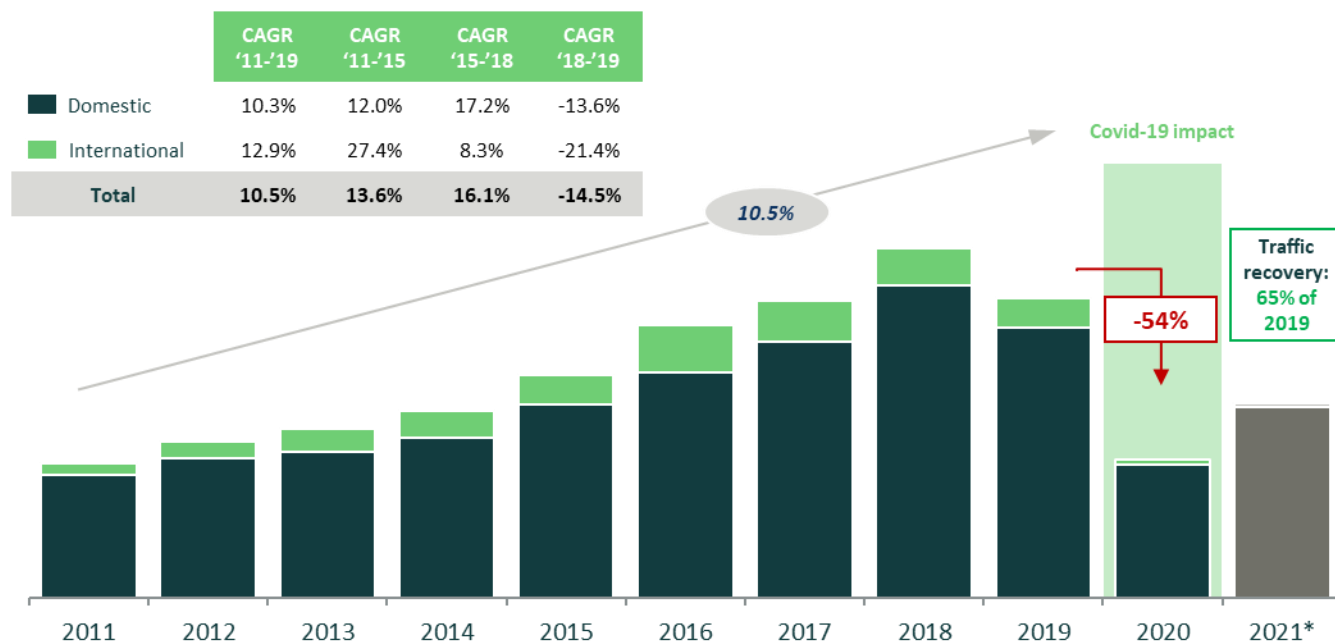
- AHB is the **largest regional airport** in KSA, with a peak traffic of 4.5 Mpax recorded in 2018 before a slight decrease in 2019
- Traffic grew at a solid **11.7% CAGR from 2011-2019**, fuelled by domestic traffic growth and the development of few international flights
- INT segment** gained presence in 2016 but seen a decrease in share after due to:
 - Qatar airways reduced operations in 2017 and stopped service due to international blockade
 - Nesma airlines stopped INT service to AHB from 2018
 - Saudia Gulf started DOM operations at AHB, increasing the DOM market share
- In 2020, AHB's traffic **dropped by 58%** due to the Covid-19 pandemic, less than the global aviation industry, thanks to its high share of the **relatively resilient domestic traffic**

Abha Airport

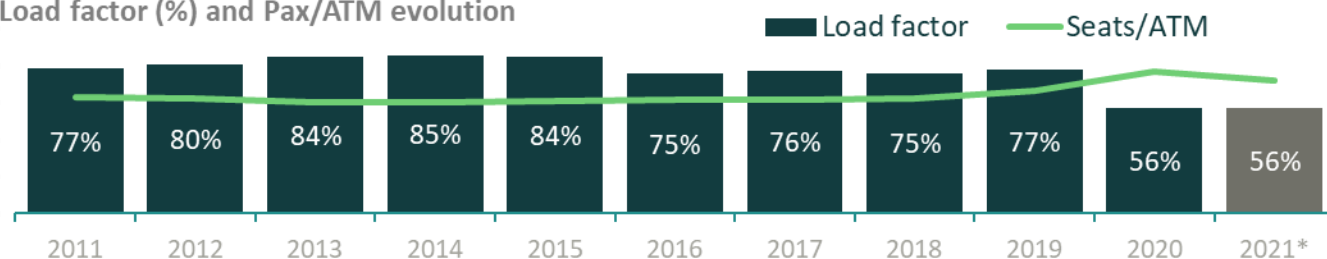


Aircraft movements at AHB grew at a 10.5% CAGR for 2011-2019, reaching a peak of 41,000 ATM in 2018

AHB ATM evolution ('000, 2011-2021)



Load factor (%) and Pax/ATM evolution



Source: GACA, ALG analysis

*2021 estimated from historic ATM evolution

- Aircraft movements at AHB mirrored the passengers trend growing at **10.5%** CAGR over the past decade, with a peak of 41k ATM in 2018
- Load factors peaked in 2015 at 84%** and went down in following years due to the fierce penetration of Flynas in the local market **They fell below the threshold of financial sustainability** for the local airlines as a result of the pandemic
- Operations increased in 2021 faster than the traffic recovery keeping load factors at 2020 levels. However, this is likely to **re-stimulate demand**
- The market is **dominated by single aisle aircraft**, although SAUDIA has recently deployed some of its **old A330 fleet**, part of their strategy to cut frequencies and concentrate demand awaiting for the market to recover

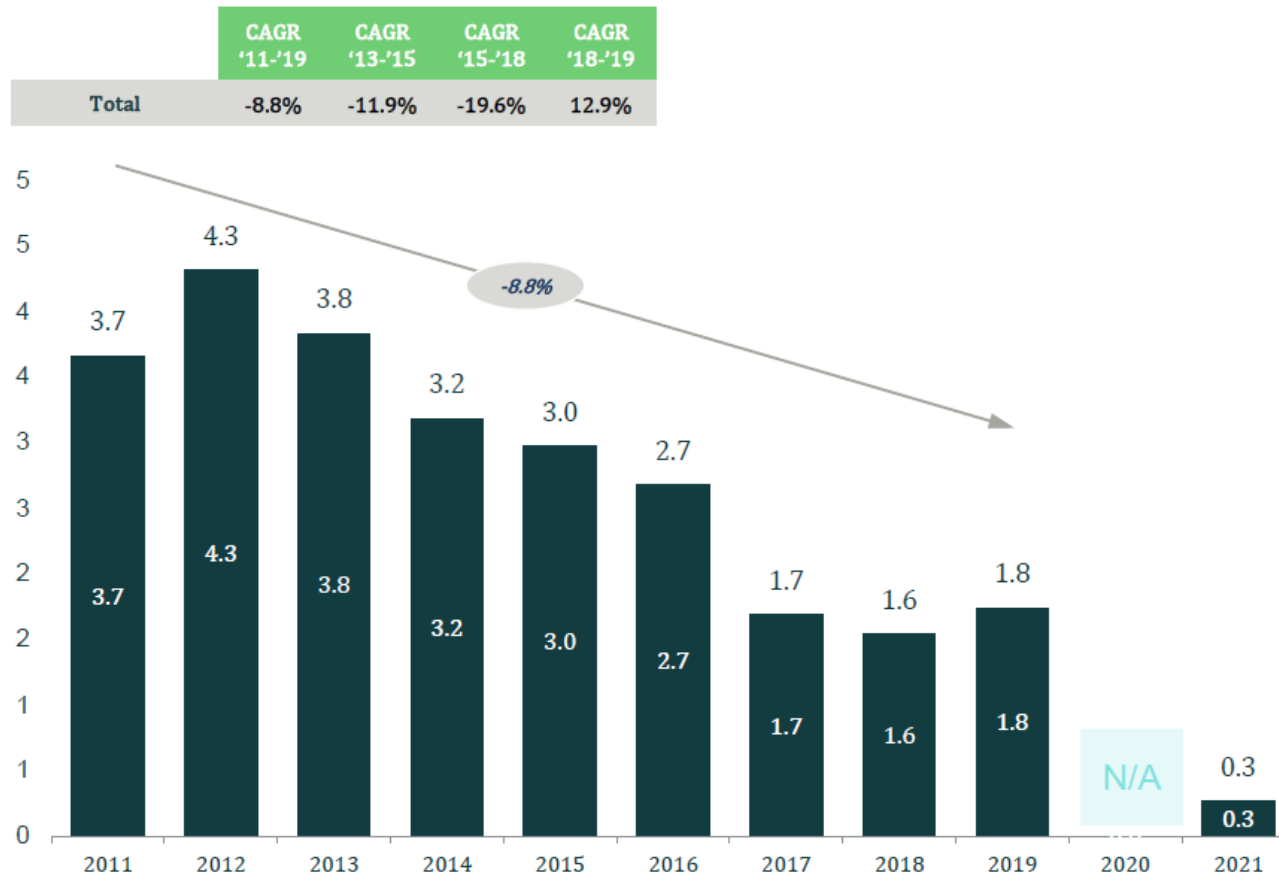
- This justifies the steeper drop of ATMs in 2019 in comparison to passengers with a slight increase of load factors

Abha Airport



Air cargo handled at the airport had been declining between 2012 to 2019, after the peak of 4.3 Kton in 2012

AHB cargo traffic evolution (Ktons, 2011-2021)



Source: GACA, Abha airport traffic data, ECG

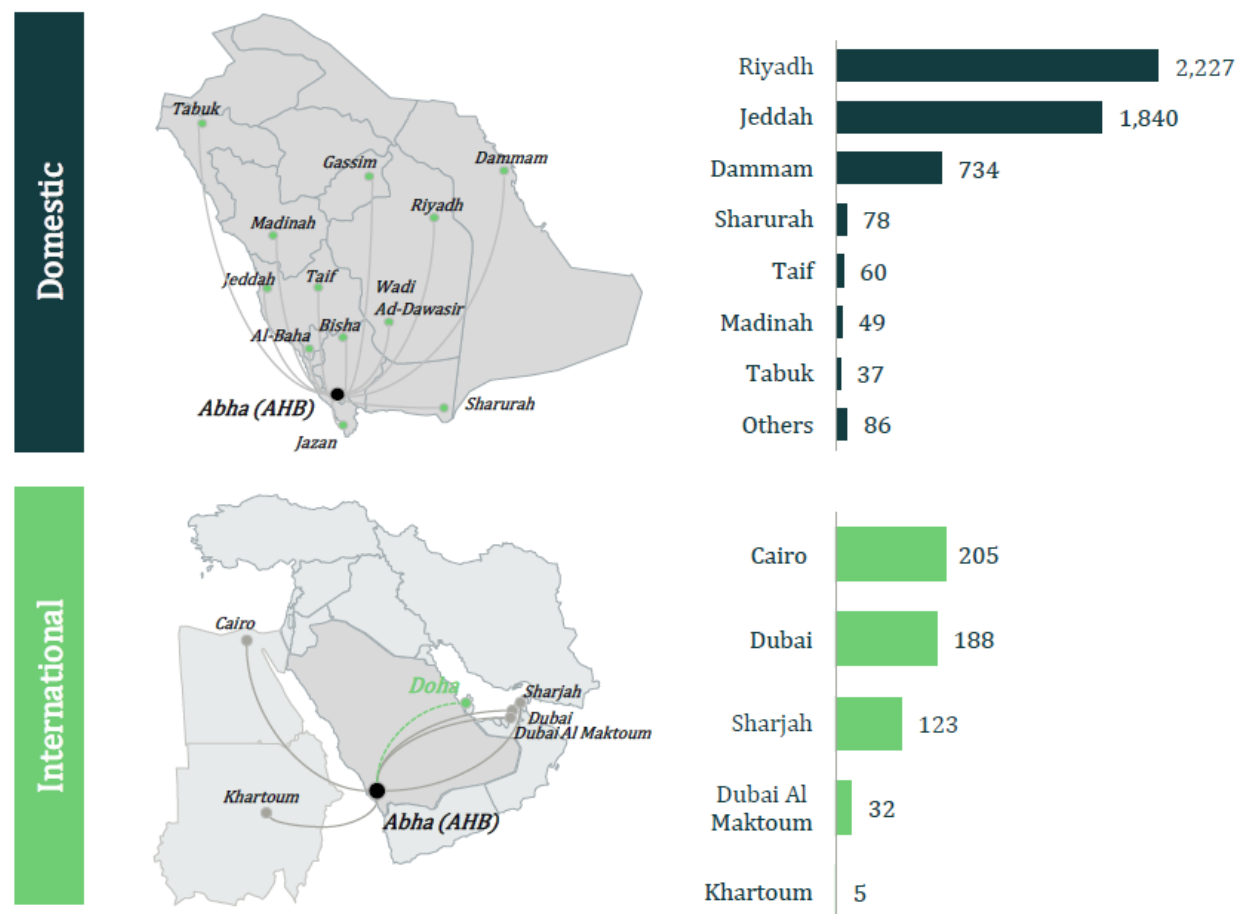
- **Air cargo handled** in AHB declined at a CAGR of -8.8% between 2011 and 2019 peaking at 4.3 Ktons in 2012
- The decreasing trend of cargo volumes has overlapped with the rise in the LCC share at AHB LCCs tend to discard the cargo business, keeping turnaround times as short as possible
 - The **share of LCCs** linearly increased from 8% in 2012 to 23% in 2016 then had a jump in penetration to 31 in 2017
- Moreover, Aseer region is **well connected by land** to major cities in the Kingdom, diminishing the competitiveness of air cargo services from AHB
- The **cargo trade disruptions** at the national level have further hampered the air cargo at AHB:
 - Reduction in national trade by 37% in 2015 with those commodities with high affinity for air cargo (clothing, medicaments and electronics) being most impacted

Abha Airport



AHB, pre-Covid , served twelve domestic destinations and five international ones, 3 of them in the UAE

Domestic and International destinations from AHB ('000 seats, 2019)



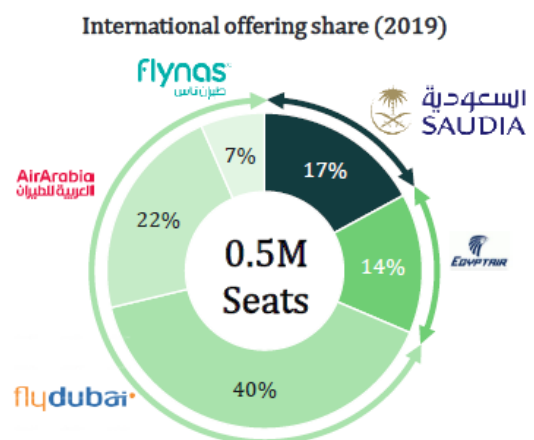
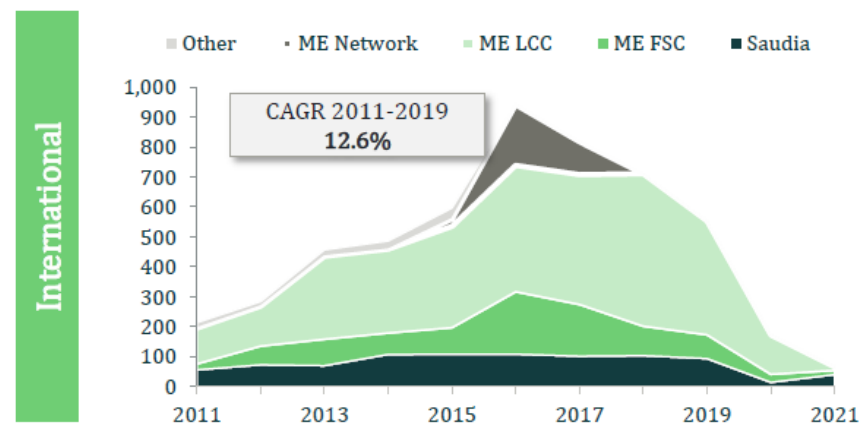
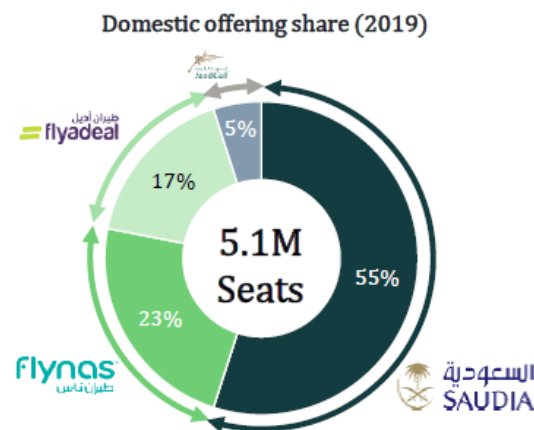
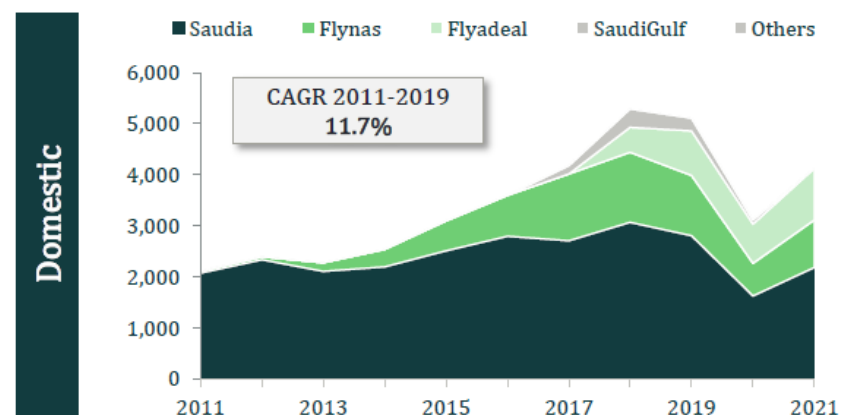
- **AHB's domestic network** connects the city with almost half of domestic airports in the Kingdom **Riyadh and Jeddah** being the most important routes (80% of total domestic seats)
- **AHB added 5 domestic routes** between 2016 and 2019, expanding the network to a total of 12 Saudi destinations; it was reduced to 7 in 2021 due to COVID 19
- **Cairo** emerged in 2019 as the **top single international destination** with 37% of total int'l seat offering. This showcases the large number of Egyptian labourers flying mainly for VFR purpose
- However, **more than 60% international seats** deployed in 2019 were to UAE airports (Dubai, Sharjah and Dubai Al Maktoum) It serves mainly transiting passengers to/from the Indian subcontinent
- AHB's international network was limited to Cairo and Sharjah in 2021

Abha Airport



Seat offering to/from AHB has traditionally been dominated by SAUDIA for the domestic market and local/regional LCCs for international routes

Seat offering breakdown by carrier ('000 seats, 2011-2021)



- **More than half (55%) of the domestic offering is served by SAUDIA** mainly connecting AHB to the Saudi's national hubs, and to international destination afterwards
- The remaining 45% of the domestic seats are split between the **local LCCs**; Flynas (23%) Flyadeal (17%) and Saudigulf (5%). They primarily **connect AHB to other regional airports** with point to point service
- International operations are dominated by regional LCCs with UAE based **Flydubai** and **Air Arabia** serving **62%** of the total int'l offerings. **SAUDIA** and **Flynas** contribute to around **23%** while the balance was offered by Egypt air

Source: CAPA, OAG, ALG analysis

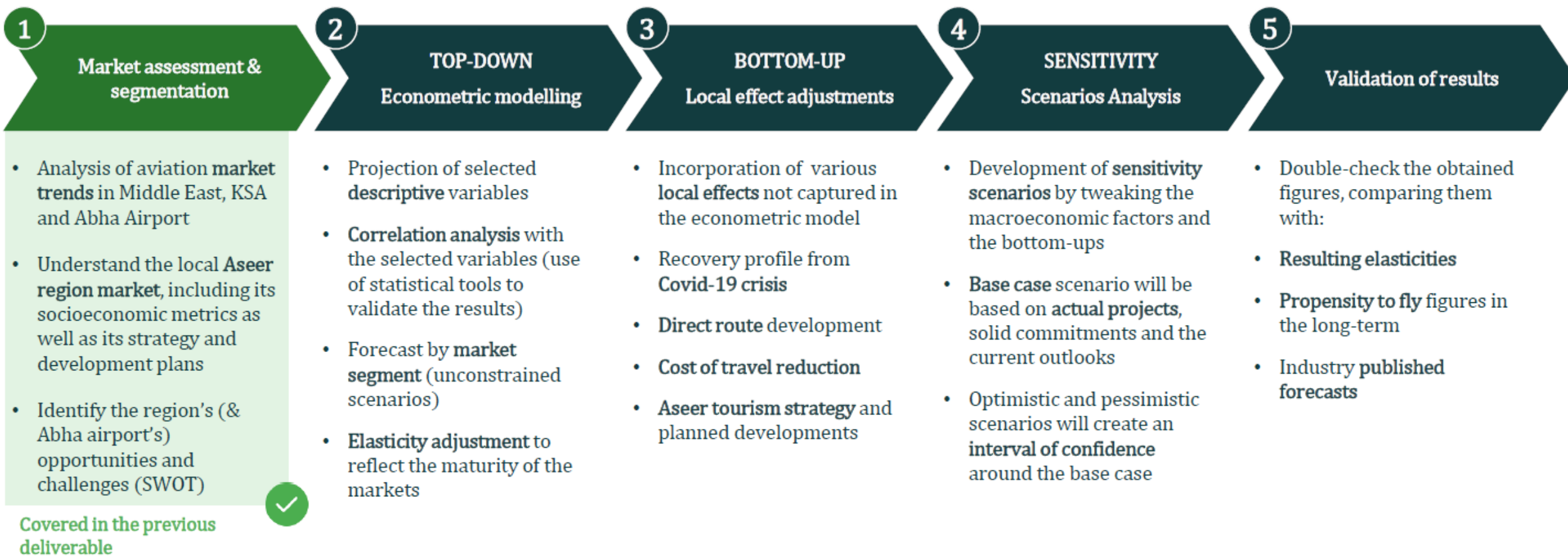
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Traffic Forecasts

Traffic forecast: Methodology



Traffic forecast projects air travel demand driven by long term macroeconomic trends, complemented by local considerations of Abha Airport



Traffic forecast: Top-down - Variable selection



GDP is the preferred variable due to its strong correlation with traffic and the availability of robust projections

	ECONOMY - RELATED					INDUSTRY - RELATED	
	GDP	Investment and Spending	Population	ForEx	Oil price	Yields	Tourism
Relation with air traffic	GDP reflects the economic development of a country and wealth level of its citizens and economic sectors	Captures the capacity of each sector to acquire goods and services and their ability to acquire and create assets (such as airports)	Population reflects the development of the country and represents the volume of people which have direct access to air transport	As local currency devalues, foreign currencies become stronger and inbound traffic is stimulated because travel becomes cheaper	Fuel usually represents the largest OpEx for airlines. Thus, air fares are directly correlated with Brent price (lower yields, higher traffic)	The offer of airlines directly affects yields and stimulates short-term traffic demand. Yields represent the accessibility to air transport	Tourism is one of the main sources of air traffic, and therefore airport traffic is directly correlated
Pros & Cons for air traffic forecast	Pros <ul style="list-style-type: none"> Robust projections are available Normally correlates extremely well 	Pros <ul style="list-style-type: none"> Projections available in some countries Correlation with traffic 	Pros <ul style="list-style-type: none"> Projections available Tends to correlate well with domestic traffic 	Pros <ul style="list-style-type: none"> Projections available Tends to correlate well with inbound traffic 	Pros <ul style="list-style-type: none"> Projections available Tends to correlate well with traffic 	Pros <ul style="list-style-type: none"> Good correlation with short and long-haul markets 	Pros <ul style="list-style-type: none"> Good correlation factors with traffic
	Cons <ul style="list-style-type: none"> National projections may not represent small markets 	Cons <ul style="list-style-type: none"> Already captured by the GDP Long term projections not available 	Cons <ul style="list-style-type: none"> Very conservative May intercorrelate with GDPs 	Cons <ul style="list-style-type: none"> Different impact for outbound and inbound Volatile projections 	Cons <ul style="list-style-type: none"> Volatile projections Difficult to find a good correlation 	Cons <ul style="list-style-type: none"> No data available in several countries No robust projections available 	Cons <ul style="list-style-type: none"> No robust projections available; usually projections are too optimistic (targets) May intercorrelate with GDPs
Suitability	+	+/-	+/-	+/-	-	-	+



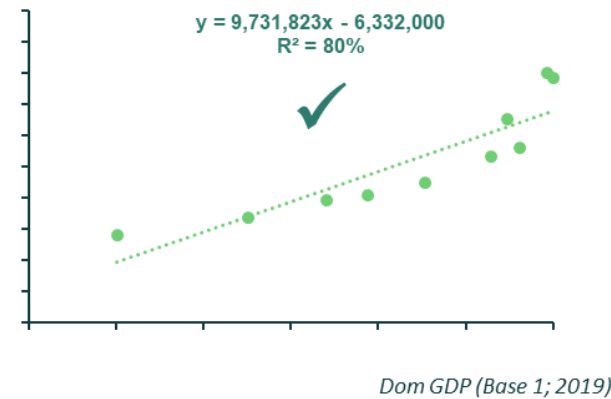
Traffic forecast: Top-down - Econometric model

The linear regression analysis indicates an acceptable degree of correlation between domestic & international traffic and their respective macro drivers

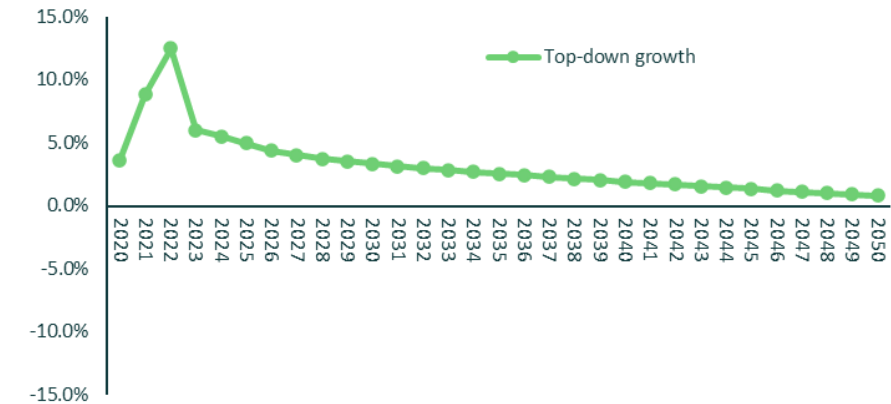
Linear correlation KSA GDP vs Domestic traffic in AHB



DOM traffic (Mpax)

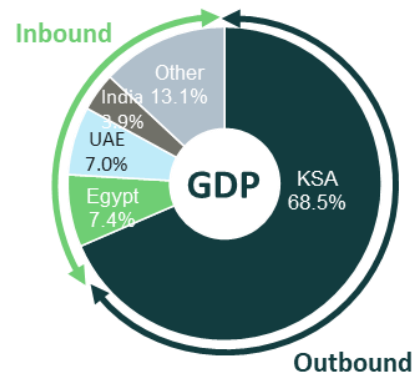


YoY growth

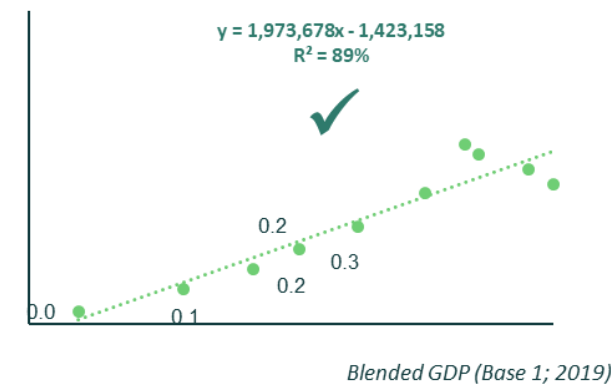


Linear correlation Blended GDP vs International traffic in AHB

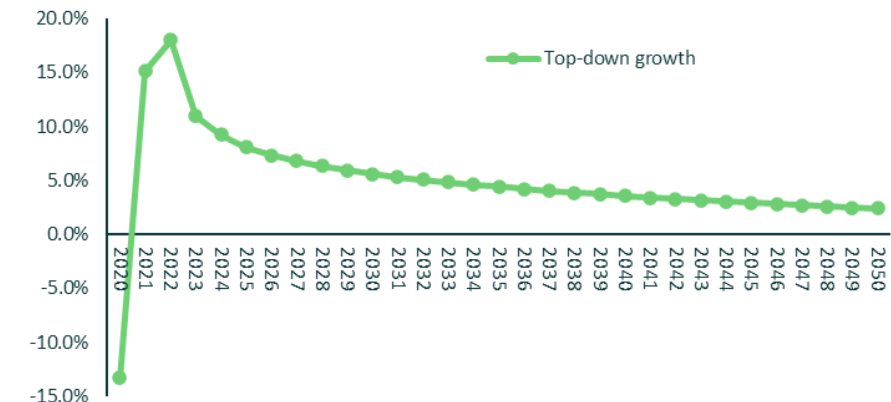
Reflecting the points of origin for Abha's traffic profile



INT traffic (Mpax)



YoY growth



Traffic forecast: Top-down - Results

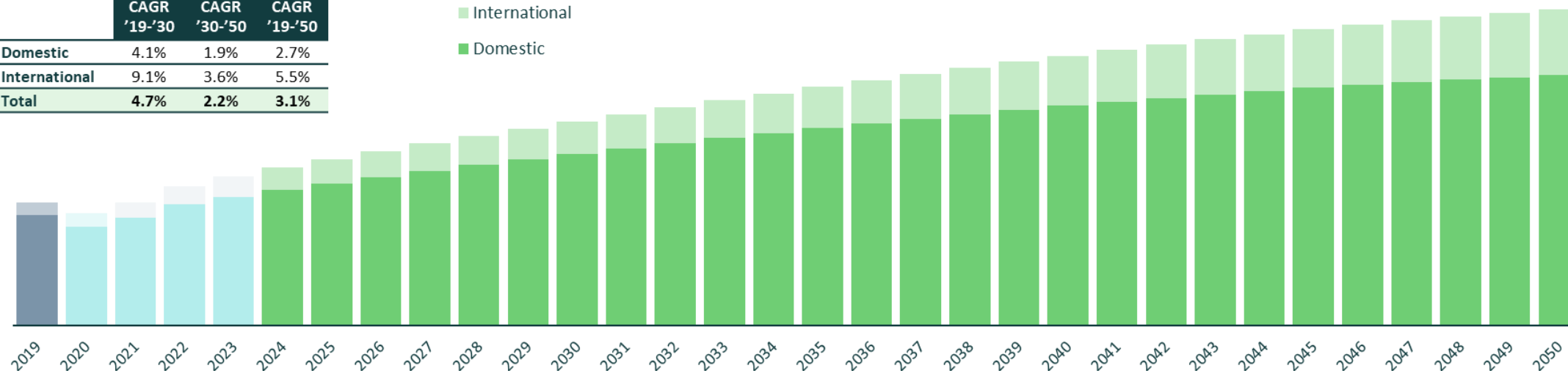


Top-down traffic forecast results in a CAGR of 4.7% for the period 2019-2030, with international traffic growing 2.4x faster than domestic

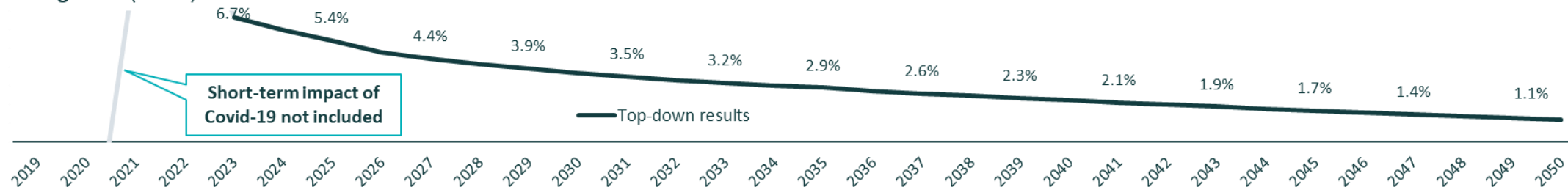
Traffic forecast results based on organic projections (Mpx)

	CAGR '19-'30	CAGR '30-'50	CAGR '19-'50
Domestic	4.1%	1.9%	2.7%
International	9.1%	3.6%	5.5%
Total	4.7%	2.2%	3.1%

International
Domestic



Traffic growth (% YoY)







Organic projections are going to be updated to incorporate local effects impacting the Abha Airport market: Covid-19, yields reduction, tourism development, etc.



Traffic forecast: Bottom-up - Methodology

Four bottom-up adjustments are applied to the organic growth, capturing particularities that will affect AHB

Bottom-up adjustments

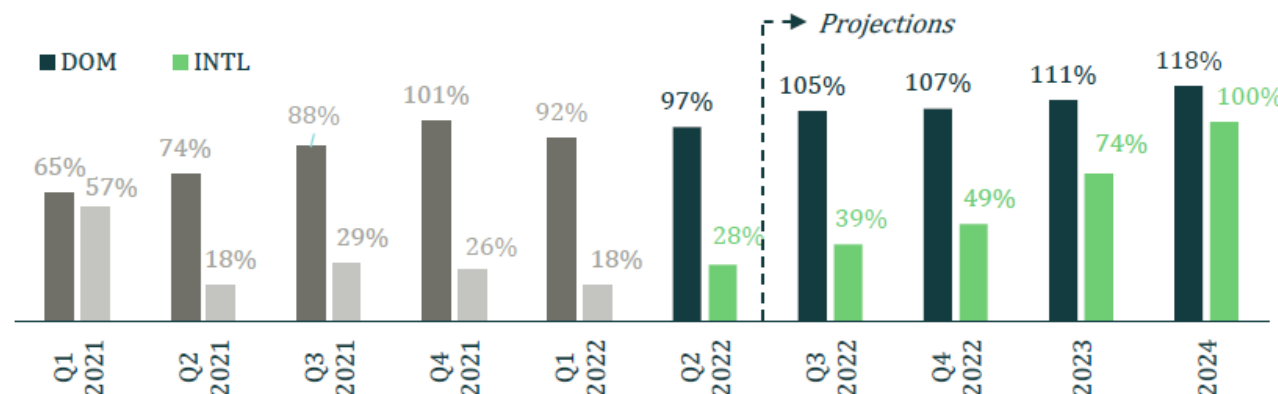
Short term	Covid-19 recovery		<p>The recovery profile from the Covid-19 crisis is modelled, considering:</p> <ul style="list-style-type: none"> - Supply side: the timing of reopening flight operations from AHB to regional countries, as well as the deployment of capacities in the domestic segment - Demand side: passenger confidence which is set to recover as vaccination rates increase in the Kingdom and the region
	Direct route stimulation		<p>New direct international route creation will stimulate latent O&D demand</p> <ul style="list-style-type: none"> - It is assumed that new routes/additional frequencies will be created to satisfy O&D demand that is not served/underserved by direct flights - This will create latent demand that would not exist otherwise
	Cost of travel reduction		<p>Traffic stimulation due to further decrease of yields is expected in KSA; however, this will mainly occur in the regional international market due to the Cost of travel reductions impact</p> <ul style="list-style-type: none"> - Yields are estimated to drop by 11-16% in the international market and 2-6% in the domestic market - Air traffic demand's elasticity to prices considered ~ -0.8
Mid term	Inbound tourism development		<p>As Aseer Development Authority (ASDA) boosts its touristic standing in the Kingdom as a year-round destination, especially as the Kingdom opens up and introduces tourist-friendly policies</p> <ul style="list-style-type: none"> - The strategy for Aseer capitalizes on its historic, cultural and natural specifications. The region possesses a unique climate in the kingdom. ASDA is also set to establish touristic development areas, including mega projects to be developed by PIF

Traffic forecast: Bottom-up – Covid-19 recovery



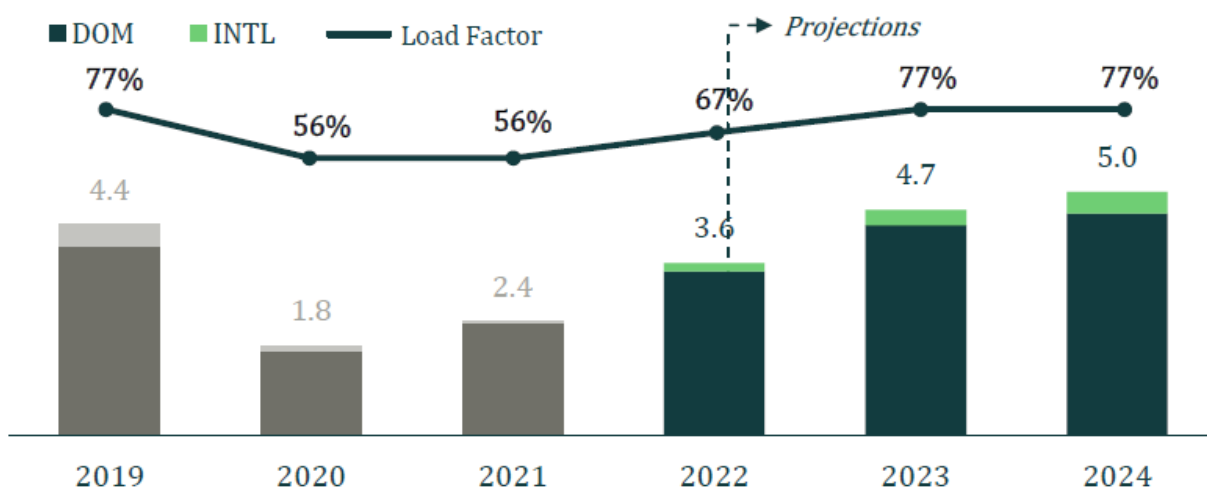
AHB is on the way to recover its 2019 traffic volumes by 2023, driven mainly by the resiliency of the domestic segment

Seat supply in AHB compared with 2019 levels



- **Seat supply** in the **domestic** segment has continued increasing specially to major airports (mostly RUH), **exceeding 2019 levels in Q3**
- Stoppage of some **PSO routes** had only **minimal impact** on AHB's seat supply and is expected to come back soon
- In the international segment, 2019 flights to **UAE** (~ 60% of 2019 supply) **have not yet restarted**. Only Cairo route is now operational, with announced offerings to **Kuwait in Q 1 2022**

Short-term Covid-19 recovery profile at AHB (Mpx)



- **Sustained growth** in the domestic traffic in 2022 and 2023, following the **market supply recovery** pattern observed throughout 2021 and Q1 of 2022 is **anticipated**
- Load factors in 2022 is expected to be between the rates of 2020 and 2019 while **full recovery in load factor (77%) expected in 2023** for the DOM
- Full recovery for **international segment** is assumed by **2024**, with UAE and other routes coming back in the next 2 years

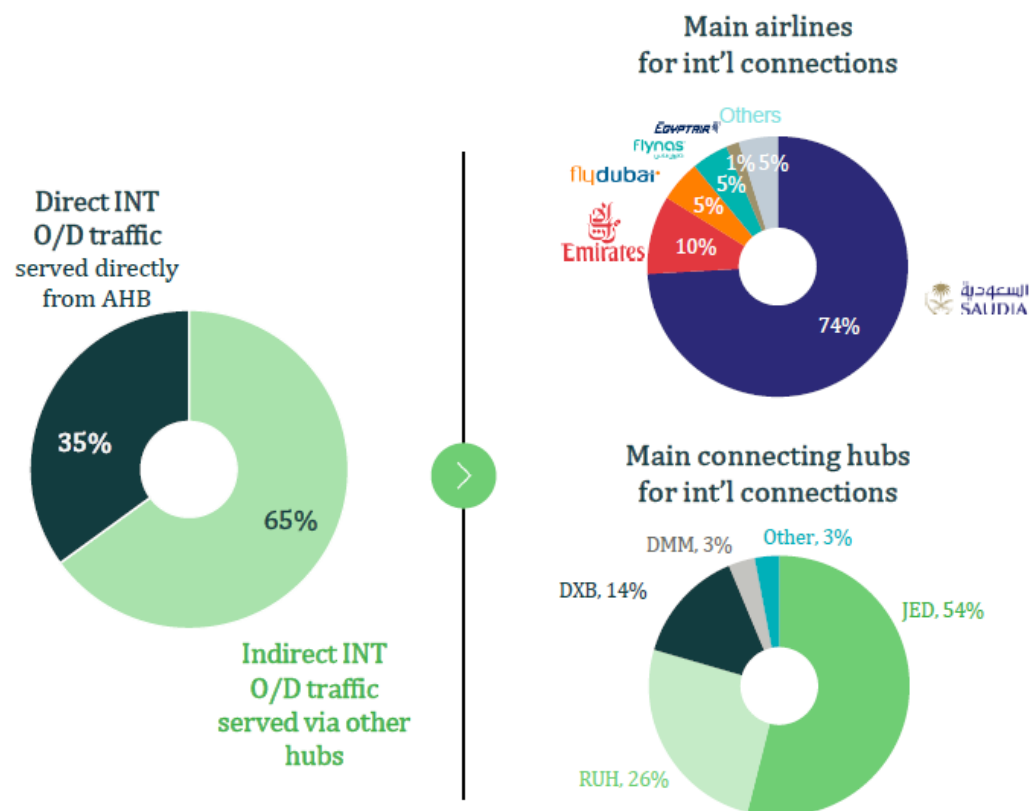
Traffic forecast: Bottom-up - Direct route stimulation



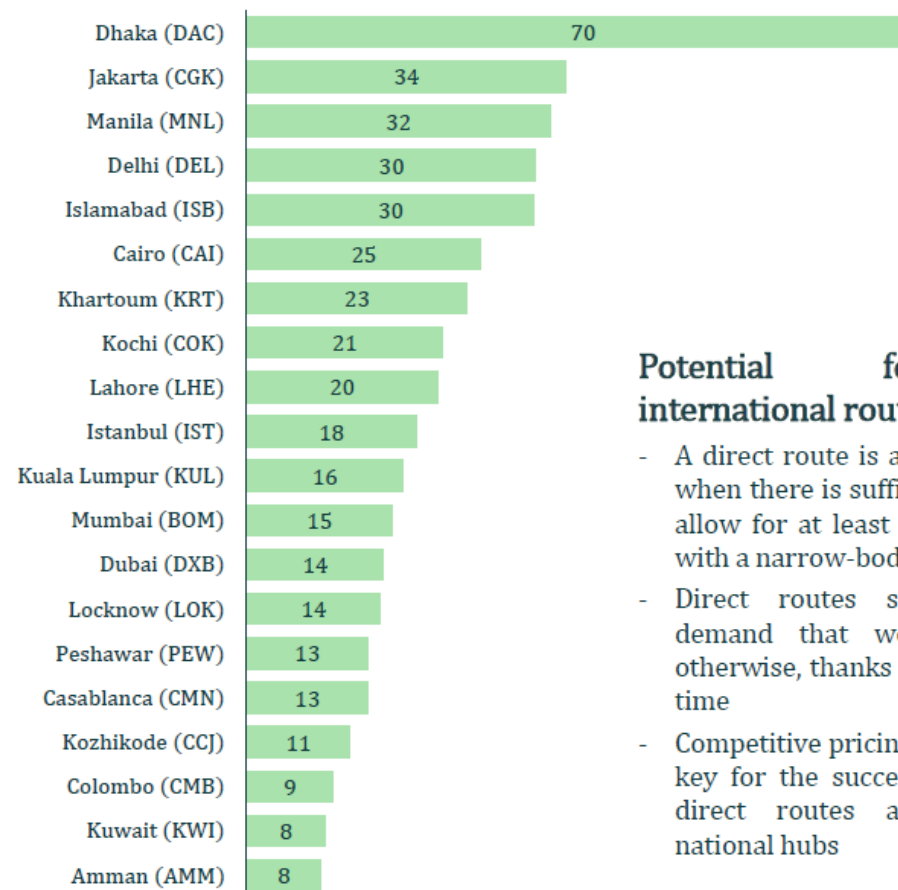
Southeast Asian markets are currently underserved from AHB: an opportunity to open direct routes and stimulate latent demand

Main indirect O/D international markets in AHB

THERE IS POTENTIAL FOR DEVELOPING NEW DIRECT INTERNATIONAL ROUTES TO O/D MARKETS NOWADAYS SERVED VIA THE MAIN HUBS



TOP-20 indirect flows from AHB ('000 pax)



Potential for new international routes

- A direct route is assumed to open when there is sufficient demand to allow for at least 3 weekly flights with a narrow-body aircraft
- Direct routes stimulate latent demand that would not exist otherwise, thanks to the savings in time
- Competitive pricing (LCC model) is key for the success of short-haul direct routes and bypass of national hubs

Traffic forecast: Bottom-up - Cost of travel reduction



The transformation of the Saudi aviation sector is expected to increase the competitiveness of air travelling and stimulate price sensitive demand

 <small>الهيئة العامة للطيران المدني</small> <small>General Authority of Civil Aviation</small>	Initiative Description	Yield impact
 Fuel services charges reduction	<p>Jet fuel prices at the major Saudi airports are 5% to 20% higher than the regional benchmark, hammering the competitiveness of the national sector. The Ministry of Energy is leading the effort to cut Aramco's jet fuel price with collaboration from GACA. The latter is also undertaking direct negotiations with current Fuel Farm Operators and into-plane service providers (ITPs) to reduce their margins</p>	<div>  Domestic  Drop of ~1.5% </div> <div>  Medium-haul  Drop of ~1% </div>
 Airport tariff and regulated charges review	<p>GACA, in line with the Aviation Sector Strategy goal to enhance the competitiveness of Saudi airports, has launched a revision into airport regulated charges. It entails reducing both aeronautical and passenger transport charges, and introducing new incentive framework to attract airlines and promote traffic recovery. Airport charges are recommended to decrease between 10% & 45% in the domestic segment and between 35% & 57% for the international one</p>	<div>  Domestic  Drop of ~1% </div> <div>  Medium-haul  Drop of ~12% </div>

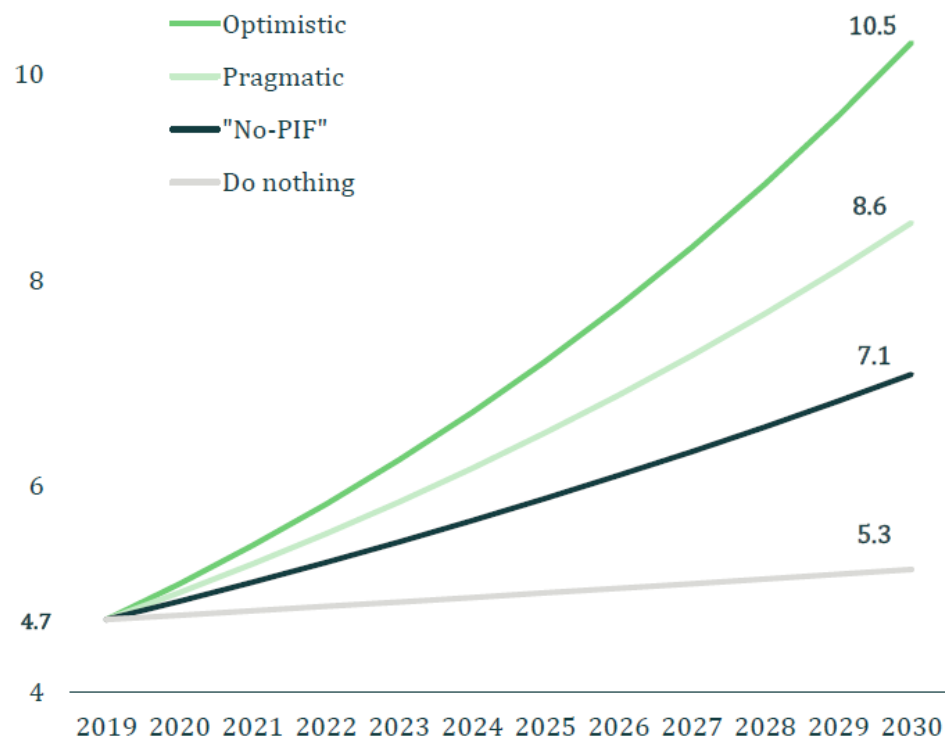
- Once air fares are down, research suggests that demand will be stimulated. The elasticity between cost of travelling and demand stimulation varies attending to geographic markets and scale of the changes (route-specific demand is more elastic to pricing than nation-wide demand)
- Short-haul traffic is more elastic to cost of travelling due to the multi-modal competition. At the same time, reduction of airport charges (fixed per flight) have higher impact on short-haul routes

Traffic forecast: Bottom-up - Tourism development plans



Asser has plans to boost the contribution of tourism to the local economy, increasing the number of visitors to 8.6 Millions by 2030 in the base case

Forecasted growth of annual visitors in Asser (Mn, 2019-2030)












- The traffic forecast has considered the organic growth of AHB's traffic, taking into consideration the region's economic growth, the traffic recovery post-Covid, opening of new direct international routes and the reduction of air tariffs
- The modal split of Asser visitors was calculated using traffic statistics at AHB (inbound travellers, originating from outside Asser) in 2019 versus the number of visitors registered by ASDA at that year (4.7 Millions)
- The anticipated number of visitors, as per ASDA, to use air transport in 2030 has been compared to the 2030 forecast, with the gap considered as the traffic stimulation resulting from the region's planned mega-projects
- It is assumed that the split between passengers originating their trips from outside Abha (Inbound; 41%) and those originating in it (Outbound; 59%) would increase to match the split at the major Saudi airports
- The modal split of visitors is to adjust according to the increasing share of international visitors, given that aviation is assumed to be their only viable way to reach Asser

Strategic assessment of Asser region



5 tourism development locations identified to boost the region's competitiveness and achieve the targeted numbers

Tourism development areas identified in Aseer

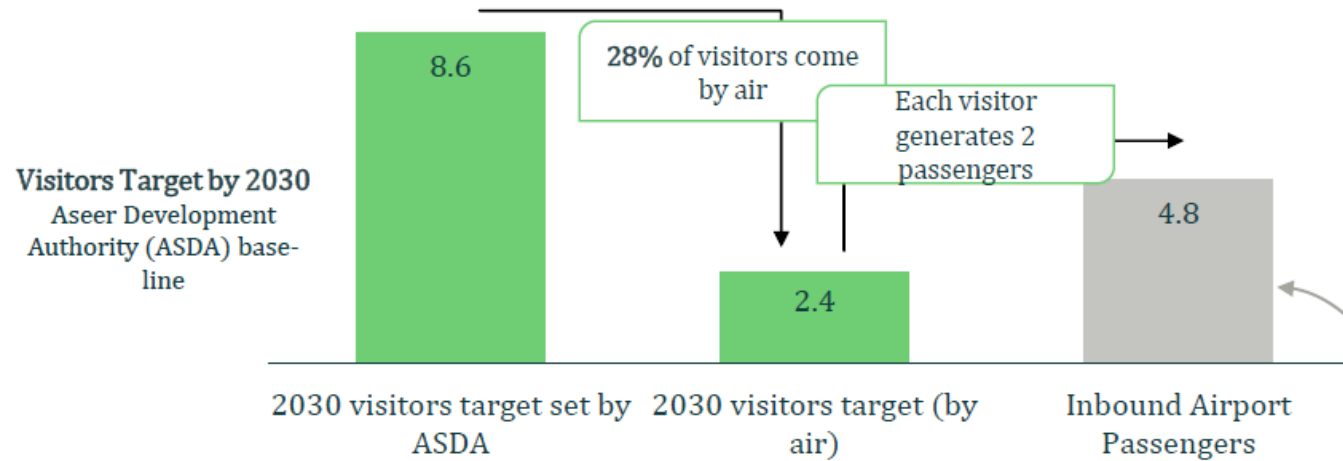
 <p>Namas-Tanomah-Belasmar</p>  <ul style="list-style-type: none"> – Mountain region development to indulge tourists in nature and agritourism including sports activities and wellness centres – Currently, the area has mountain top wellness centres and cliff-side adventure resort 	 <p>Greater Abha</p>  <ul style="list-style-type: none"> – Developing a green, vibrant capital city offering outdoor activities and access to cultural & heritage sites – Abha downtown currently offers many unique sites for tourists 	 <p>Al Majarada- Muhail</p>  <ul style="list-style-type: none"> – Heritage and agritourism development to give tourists a glimpse of Aseer's history – At present, the region offers several historical sites and mountain sceneries 	 <p>South coast & Islands</p>  <ul style="list-style-type: none"> – Coastal tourism development by promoting water sports activities and beach holiday – The coastal region is currently equipped with shorefront hotels and luxury marina developments 	 <p>Bisha (Desert)</p>  <ul style="list-style-type: none"> – Desert tourism development plans to engage tourists in adventure activities and cultural events – The area currently has a stargazing observatory / planetarium and a desert theme park
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Traffic forecast: Bottom-up - Tourism



The tourism targets of ASDA are expected to generate 2,400,000 visitor to Abha Airport by 2030

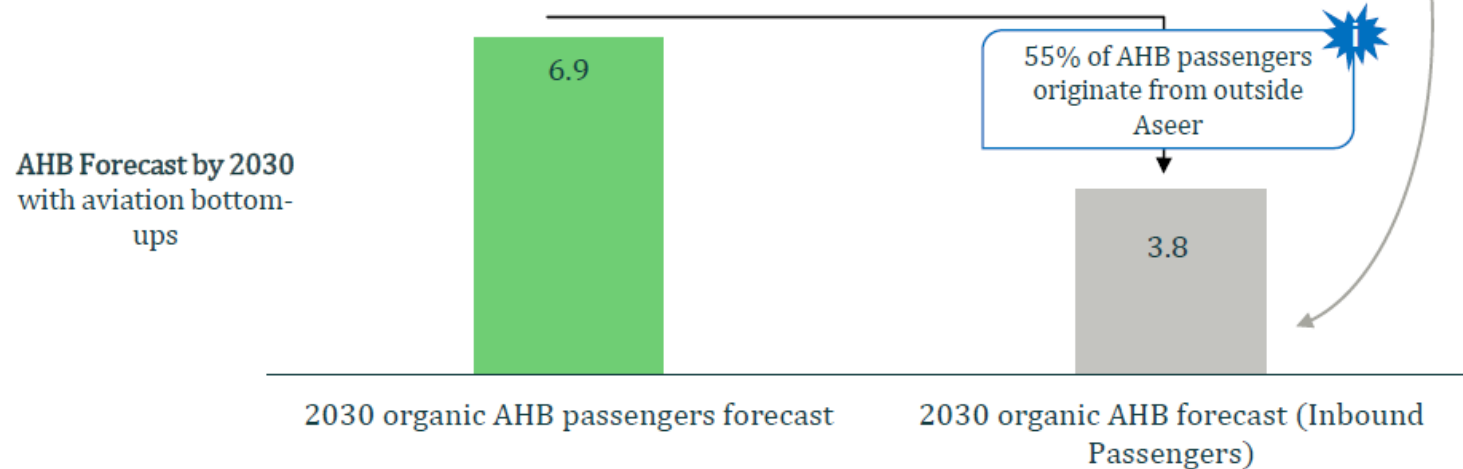
Visitors as per ASDA (Million visitors, 2030)



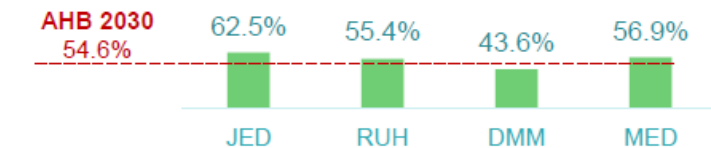
Visitors targeted by ASDA – AHB forecast (Inbound)
 = +1,000,000 airport passengers

*Those are mainly visitors attracted by the **inorganic diversification effort** and the **additional megaprojects planned** for the region, including Souda, Habala and Abha Downtown*

Organic AHB forecast (Million, 2030)



Inbound passengers share in Saudi airports (2019)



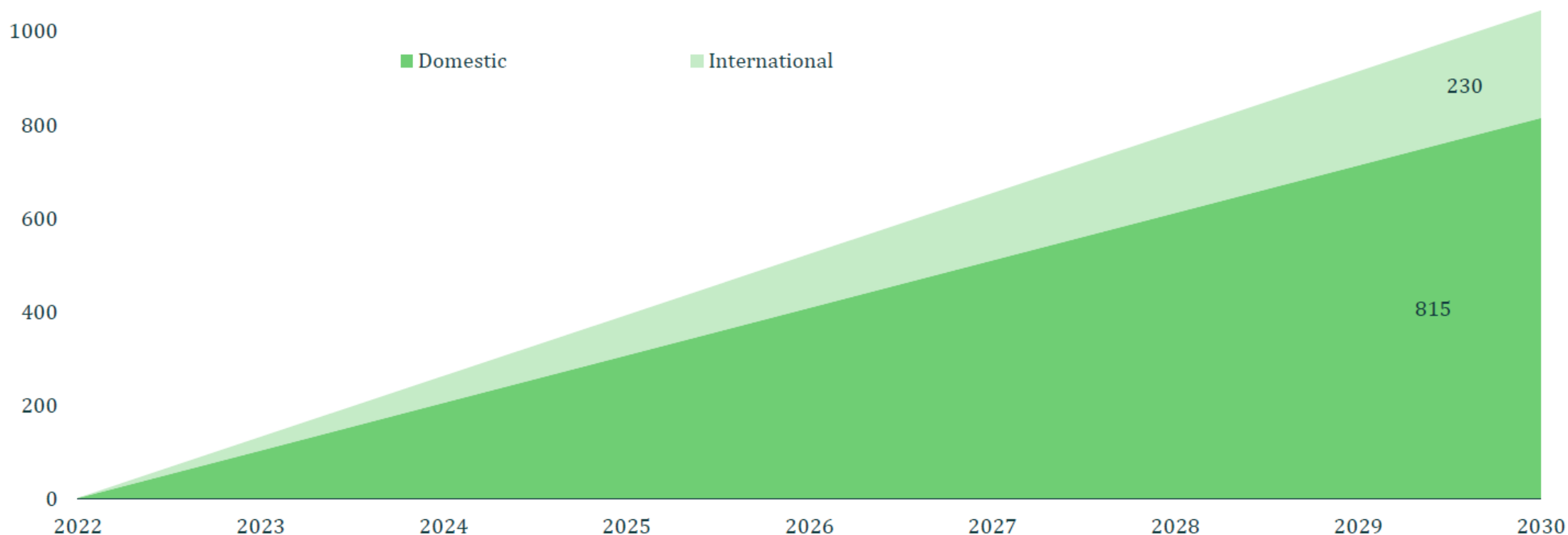
AHB is set to have an inbound share of passenger comparable to other major airports in the Kingdom by 2030, driven by the organic and economic developments in the region

Traffic forecast: Bottom-up - Tourism



The inorganic surge of +1,045,000 tourism passengers is expected to feed primarily the DOM segment, as planned by ASDA

Passengers stimulated by ASDA plans ('000 pax)

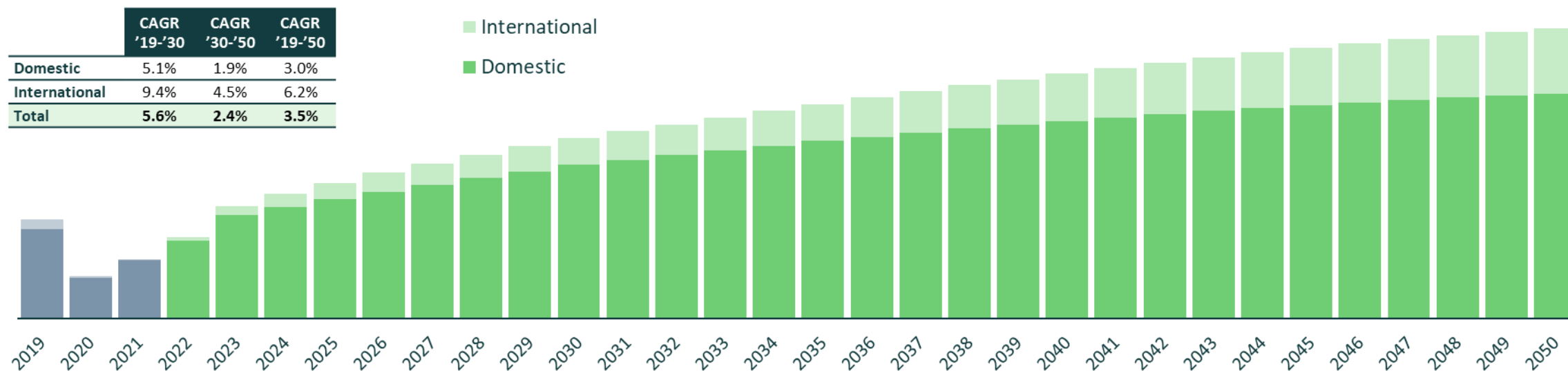


Domestic leisure visitors will continue to dominate the tourism landscape in Aseer, in line with the region's strategy. However, a strong growth in the international segment, fueled by the cultural changes the Kingdom is undergoing. Visitors attracted by Aseer's mega-projects will share the same profile /split as all other leisure/business visitors

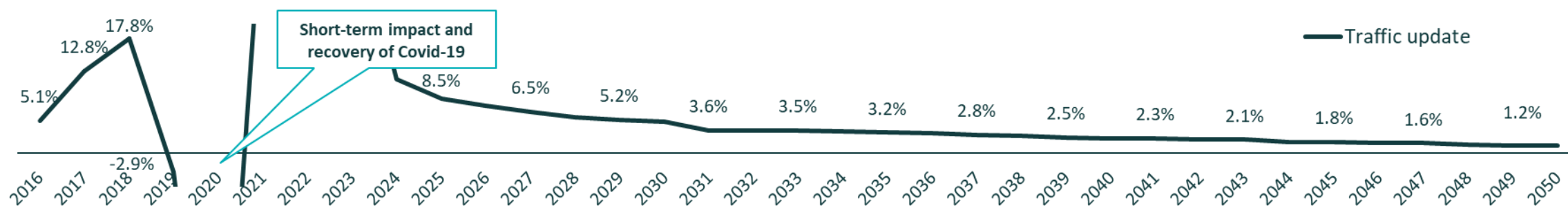
Traffic forecast: Bottom-up – Results



Total traffic is projected to grow at a 5.6% CAGR until 2030, and 3.5% until 2050, with international traffic growing twice as fast as domestic



Traffic growth (% YoY)

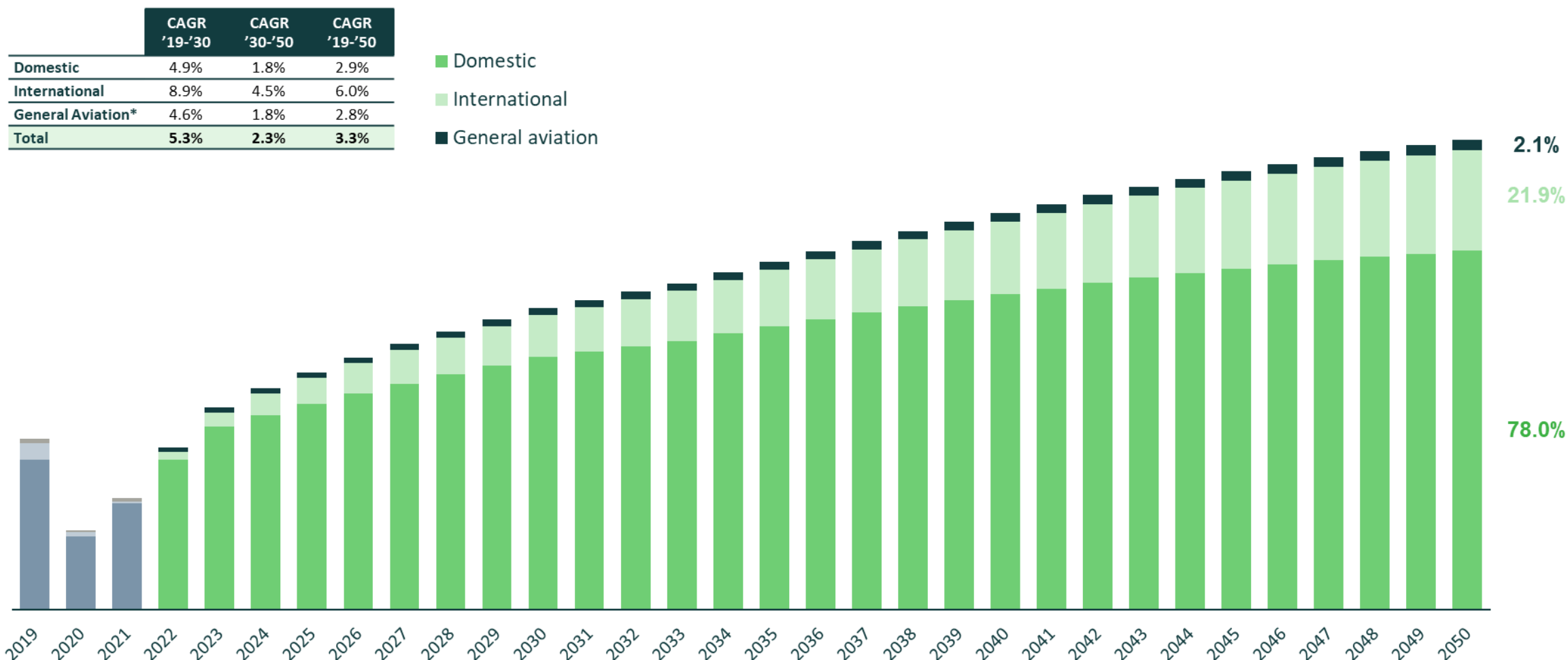


Traffic forecast: Bottom-up - Results



Operations at AHB is estimated to grow at a 5.3% CAGR, reaching 62k annual ATMs in 2030 and 97k annual ATMs in 2050

ATM Forecast Results (kATMs for 2019-2050)

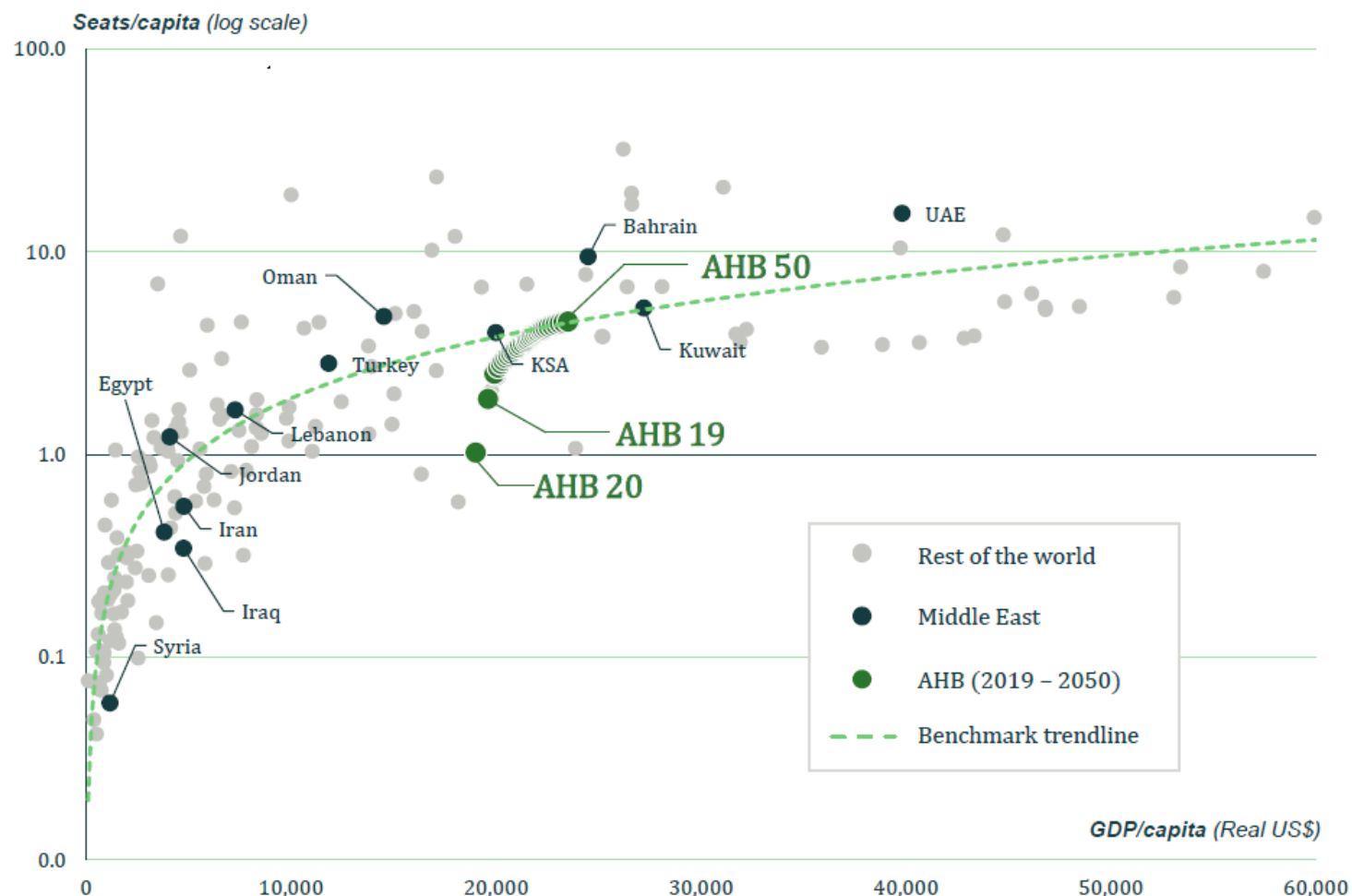


Traffic forecast: Results validation



Propensity to fly in AHB is forecasted to rise over the next three decades, aligning with the global benchmark and bridging the current gap

Benchmark propensity to fly (Seats per capita vs GDP per capita 2019)



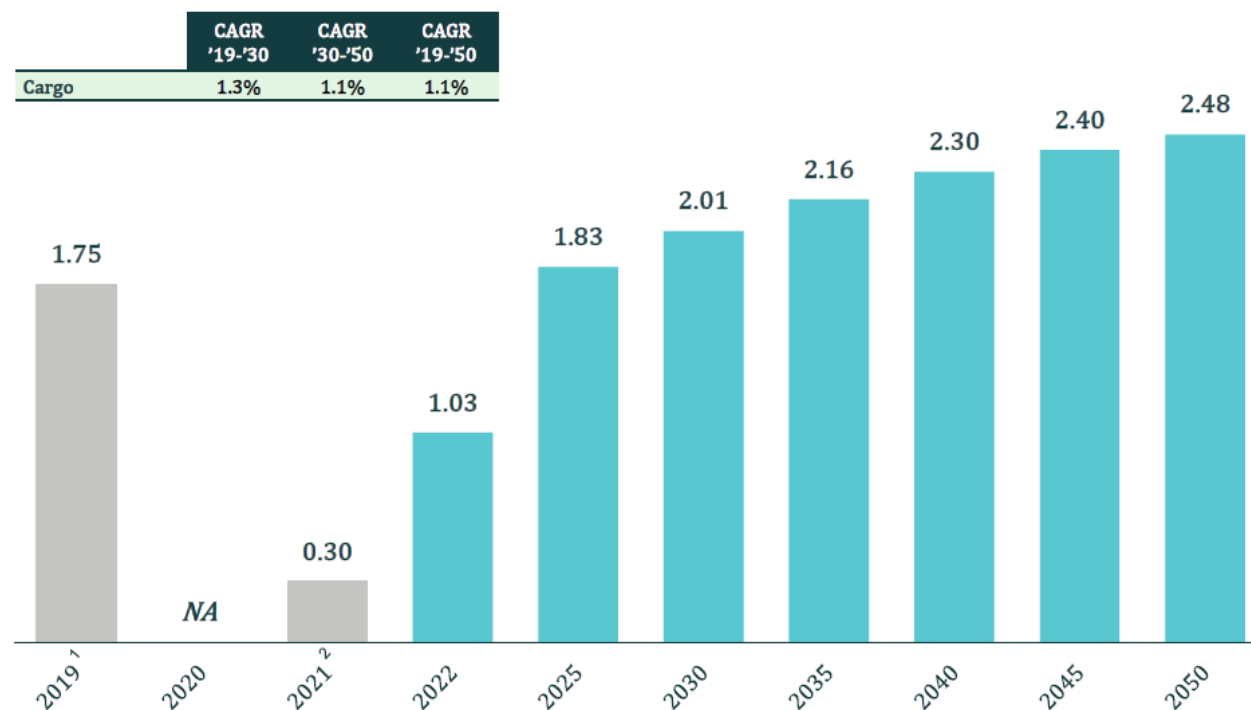
- In 2019 AHB propensity to fly was **below global and national level** reflecting region's high connectivity by road
- The offering reduction in 2020 due to the Covid-19 crisis has resulted a decline in the propensity to fly
- The future route development potential and the ongoing GACA initiatives to **reduce air transport yields** will **enhance aviation competitiveness**
- In addition, the tourism developments currently initiated by the Asser region stakeholders is expected to have a positive impact in this growth
- In the long term, however, growth will **slow down** as the market grows towards maturity

Traffic forecast: Results



Cargo traffic is set to reach 2.0 kTon in 2030 and 2.5 kTon in 2050, growing at a CAGR of 1.1%

Cargo Forecast Results (kTon, 2019-2050)



¹ As reported by ECG Report dated May 2020; ² As reported by Abha Airport Statistics
Source: Abha Airport Statistics, ECG Report, GACA

- Cargo is assumed to follow the GDP growth with one to one elasticity from 2023 growing at a rate of ~ 1% CAGR
- Cargo is to **recover 2019 levels in 2023** following the full recovery of capacities and full traffic of domestic traffic
- Asser region has a flourishing **agriculture industry**, contributing to the air cargo market at AHB. **Flowers and agriculture products are time sensitive** cargo, with high affinity to air transport
- However, the region lacks high end industry, which is the major user of air transport
- The air cargo market faces fierce competition from land transport, given the region's strong land connectivity

Air cargo belly capacities are to be consistently higher than the forecasted air cargo traffic (cargo load factors being <10% in 2030 and 2050), indicating that no freighters are expected to operate in AHB by 2050

4

Capacity- Demand Assessment



Design parameter











The design parameters have been calculated based on AHB's 2019 schedule, industry standards and methodologies and the traffic forecasts

Design parameters	Definition	Selection criteria and forecasting methodology
<p>Annual traffic (Pax & ATMs)</p>	<ul style="list-style-type: none"> – Annual traffic is the main driver to forecast peak hour demand – Ratio Peak hour vs. Annual traffic decreases as air traffic volume increases in the airport. 	<ul style="list-style-type: none"> – Passenger and ATMs traffic forecast
<p>ATM/h</p>	<ul style="list-style-type: none"> – Peak hour ATMs are the maximum number of landings and take-offs during one hour in the airport – Main parameter to design the airfield capacity, the runway and the taxiways 	<ul style="list-style-type: none"> – In the air transport industry, the day whose peak ATM/h is in the highest 2% to 5% of the year is commonly used as Design Day. It is selected here as the tenth busiest day of the year – Peak hour: busiest rolling hour (10-minute periods) of the Design Day – Forecast: based on peak hour ATMs vs annual ATMs benchmarking
<p>Stands</p>	<ul style="list-style-type: none"> – Demand peak of stands is the total number of airplanes that remain grounded or parked during the same time of the day – Main parameter to design the apron capacity 	<ul style="list-style-type: none"> – Peak hour: busiest rolling hour (10-minute periods) of occupied apron stands simultaneously – Forecast: growth based on peak hour ATMs growth
<p>PHP</p>	<ul style="list-style-type: none"> – Maximum number of passengers inside the passenger terminal building at the same time (considering a 1h period) – It is the main driver to determine the terminal capacity, land accesses and the parking lots – PHP analysis is broken down into international and domestic arrivals and departures 	<ul style="list-style-type: none"> – Passenger peak hour is defined as the busiest hour of the design day – Forecast: based on PHPs vs annual traffic benchmarking, with starting point using peak ATM/h and pax/ATM

Airport Capacity Summary



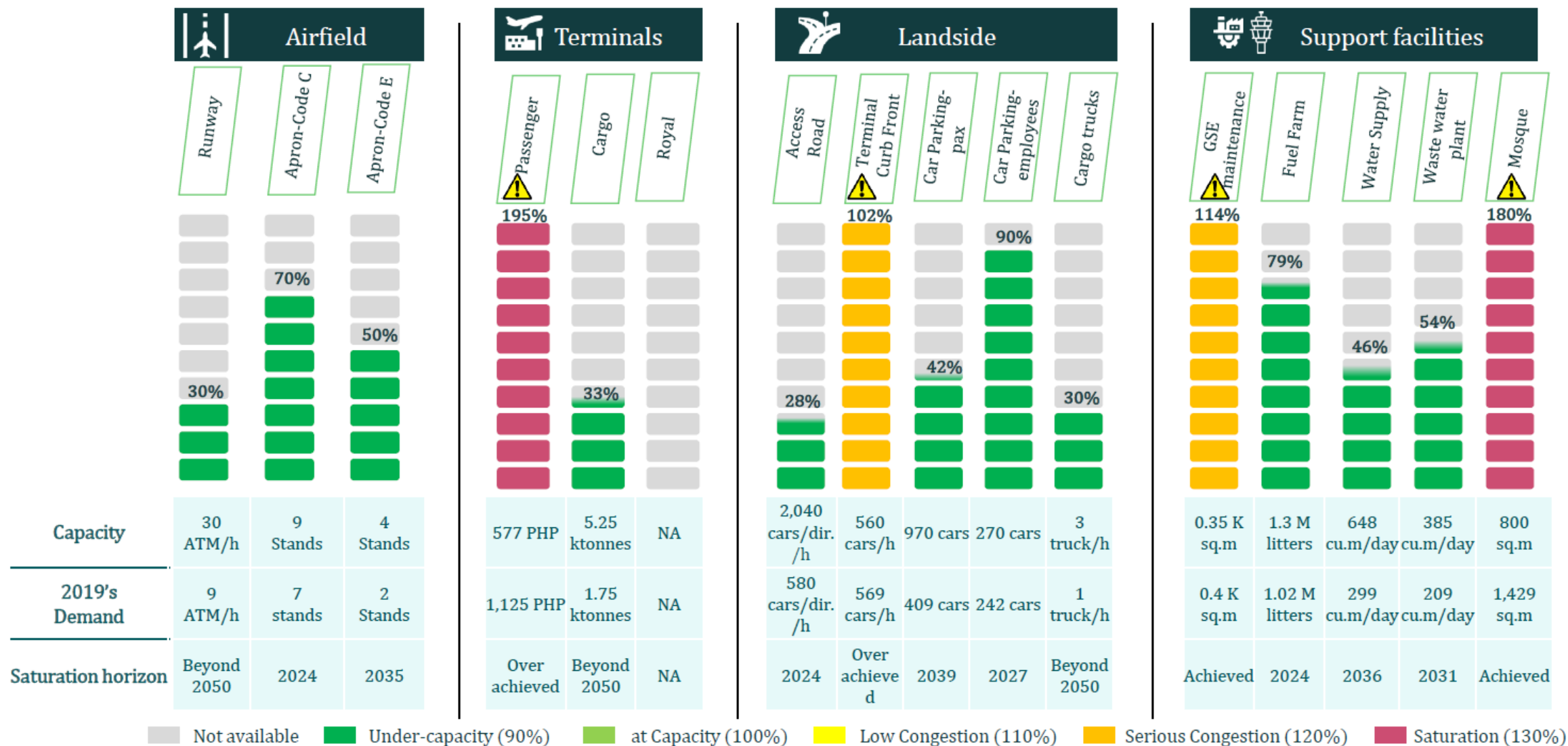
Summary of current airport subsystems' capacity

Airfield	 Runway	24-30 _{ATMs/h}	 Apron	13-15 _{ATMs/h}
Terminals	 Passenger	577 _{Pax/h} 2-way passenger capacity	 Cargo	5,250 _{Tonnes/yr.}
Landside	 Access Roads	2,040 _{car/dir./h} <i>Level of service D</i>	 Parking	
	 Curb front	560 _{car/h}		
			 Passengers	969 _{cars}
			 Employees	270 _{cars}
			 Cargo	3 _{trucks/h}

Airport Capacity Summary



Summary of current airport subsystems' capacity

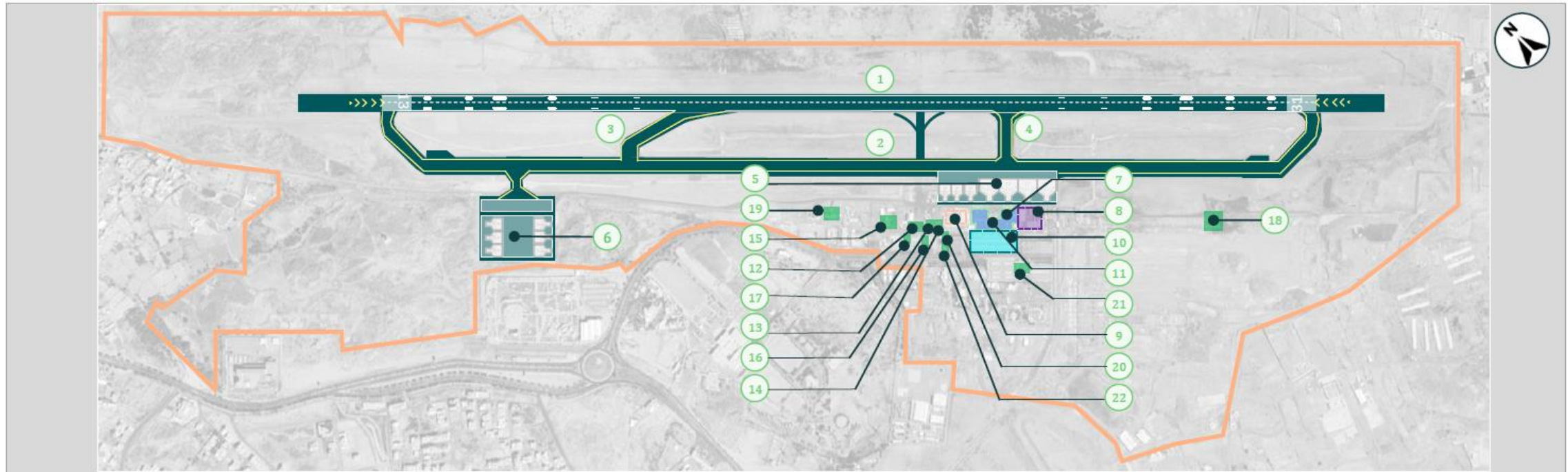


Airfield characteristics



AHB infrastructure is composed of a single runway, parallel taxiway and two aprons, with fully developed landside facilities

AHB layout



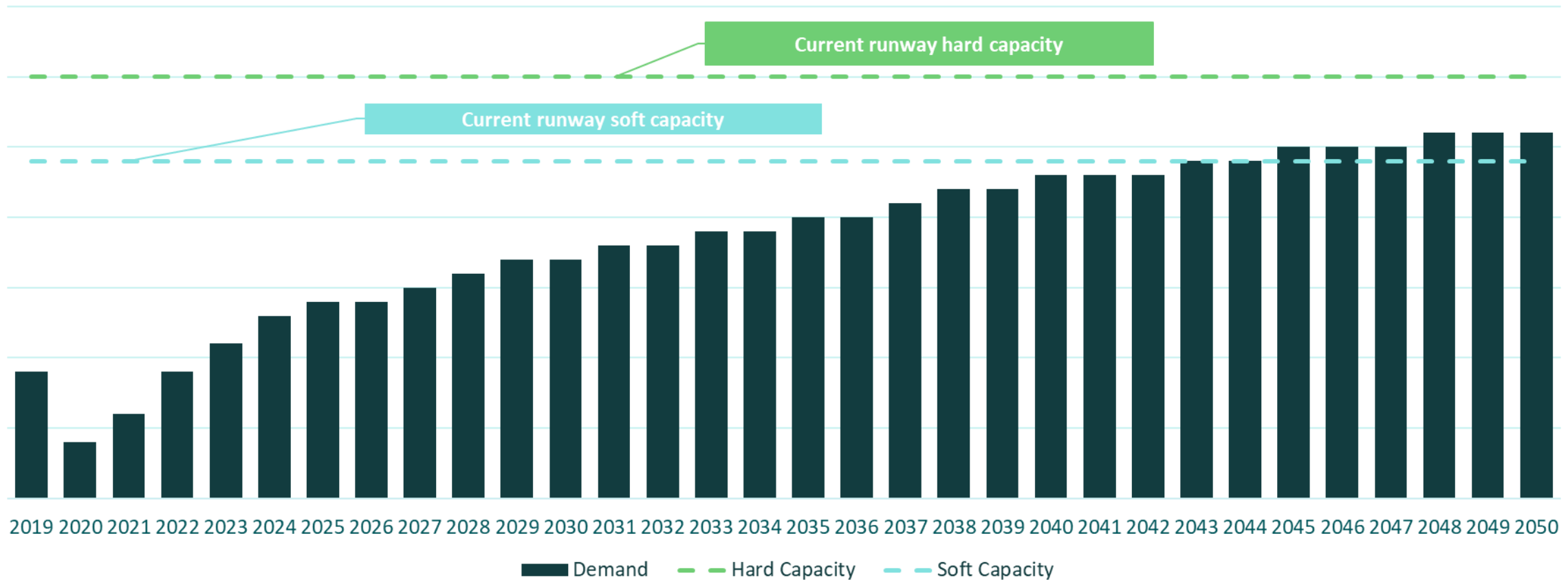
- | | | | |
|----------------|--|---|--------------------------------|
| 1 Runway 13-31 | 7 Passenger terminal | 13 Ground Service Equipment maintenance (GSE) | 19 Waste water treatment plant |
| 2 Taxiway A | 8 Royal terminal | 14 Saudia MRO facility | 19 Meteorological facility |
| 3 Taxiway A1 | 9 Cargo terminal | 15 Fuel Farm | 20 Airport clinic |
| 4 Taxiway A2 | 10 Car parking | 16 Electrical substation | 21 Mosque |
| 5 Apron 1 | 11 Air Traffic Control (ATC) | 17 Water supply | 22 IT Data building |
| 6 Apron 2 | 12 Aircraft Rescue and Firefighting (ARFF) | | |

Maneuvering area



Current runway capacity is enough to accommodate the airport peak hour demand

Runway capacity-demand (2019-2050, ATMs/h)



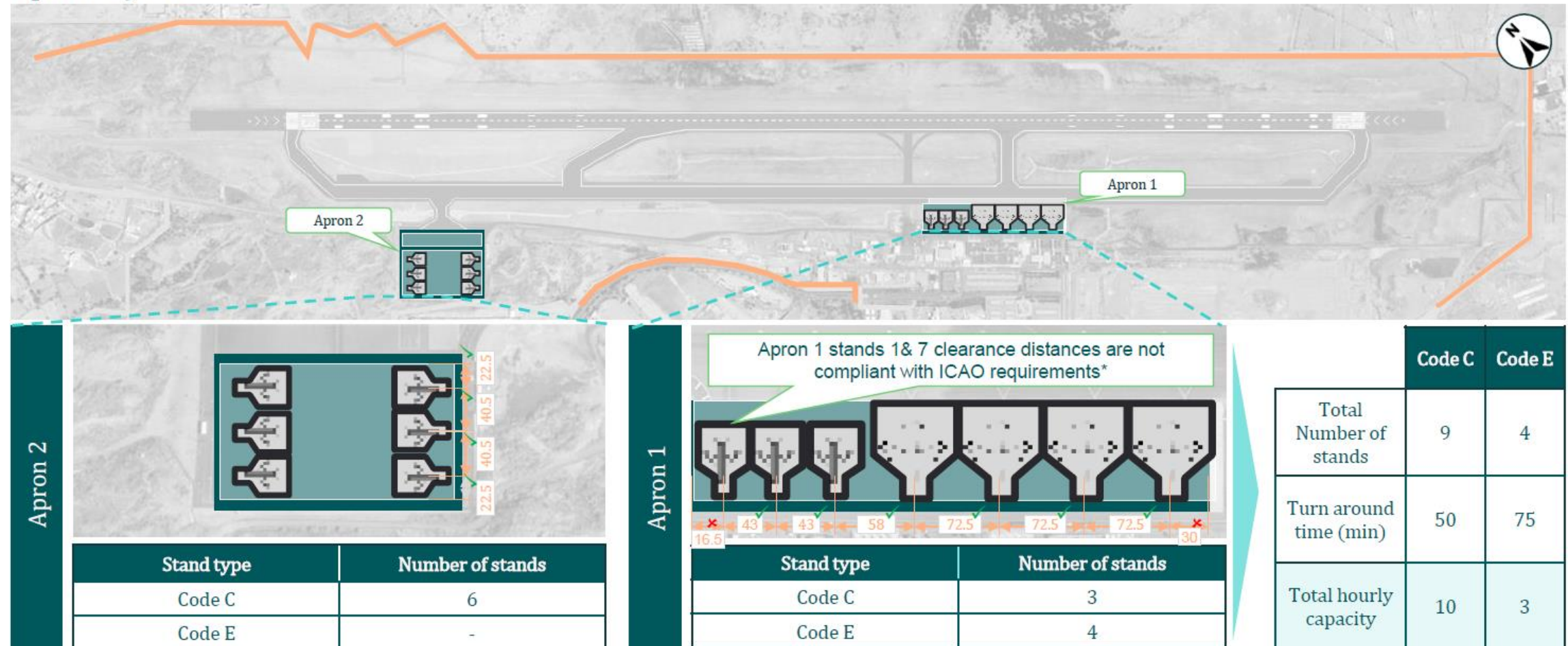
New developments, such as new rapid exit taxiway for aircraft landing from THR 13, could be carried out to enhance maneuvering area operational efficiency and avoid soft saturation for the runway towards the end of the concession period

Aprons



AHB has a total of 9 code-C and 4 code-E stands, distributed in two aprons, Apron 1 in front of the passenger terminal and Apron 2 towards THR 13

Apron layout



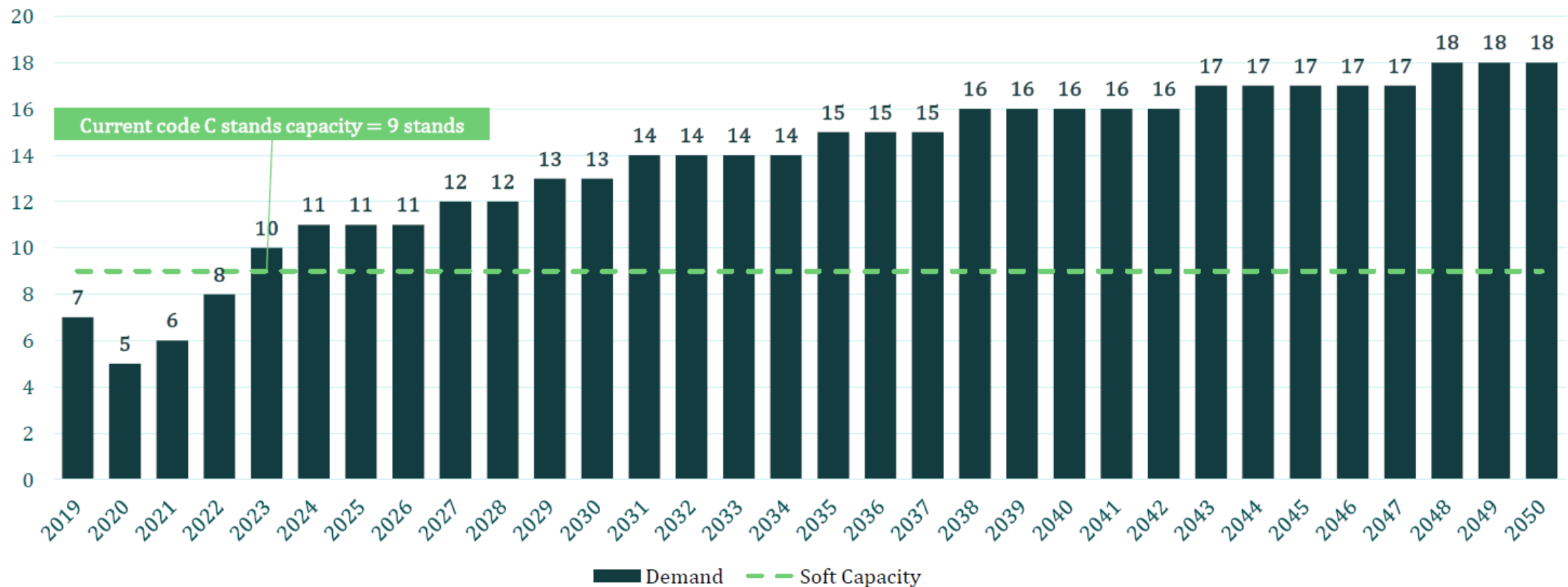
*Stand No. 1 has a clearance of 16.5 m instead of 22.5 and stand No. 7 has a clearance of 30 m instead of 40

Aprons



Current code C stands will be saturated by 2023, requiring expansion of the current apron

Code C stands capacity-demand (2019-2050, stands)



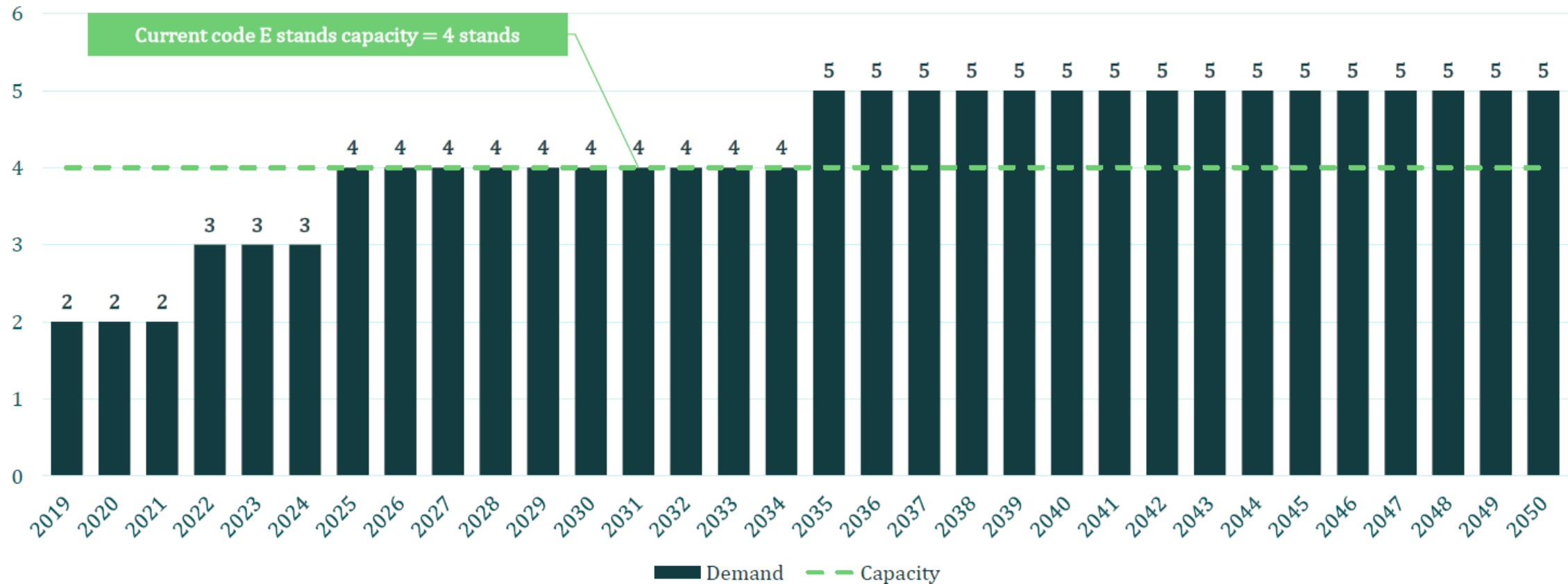
Expansion of the apron could be delayed 2-3 years if code E stands are utilized for code C aircraft, as the stand peak hour are different for code E and C aircraft

Aprons



Current code E stands will be saturated by 2035, when the total stands demand will reach 5

Code E stands capacity-demand (2019-2050, stands)



Operational optimization of turn around times can further enhance the current stands capacity, which will postpone the need for expansions

Passenger terminal



The evaluation criteria have been assessed quantitatively and qualitatively through the use of the appropriate tools and software

Passenger terminal location



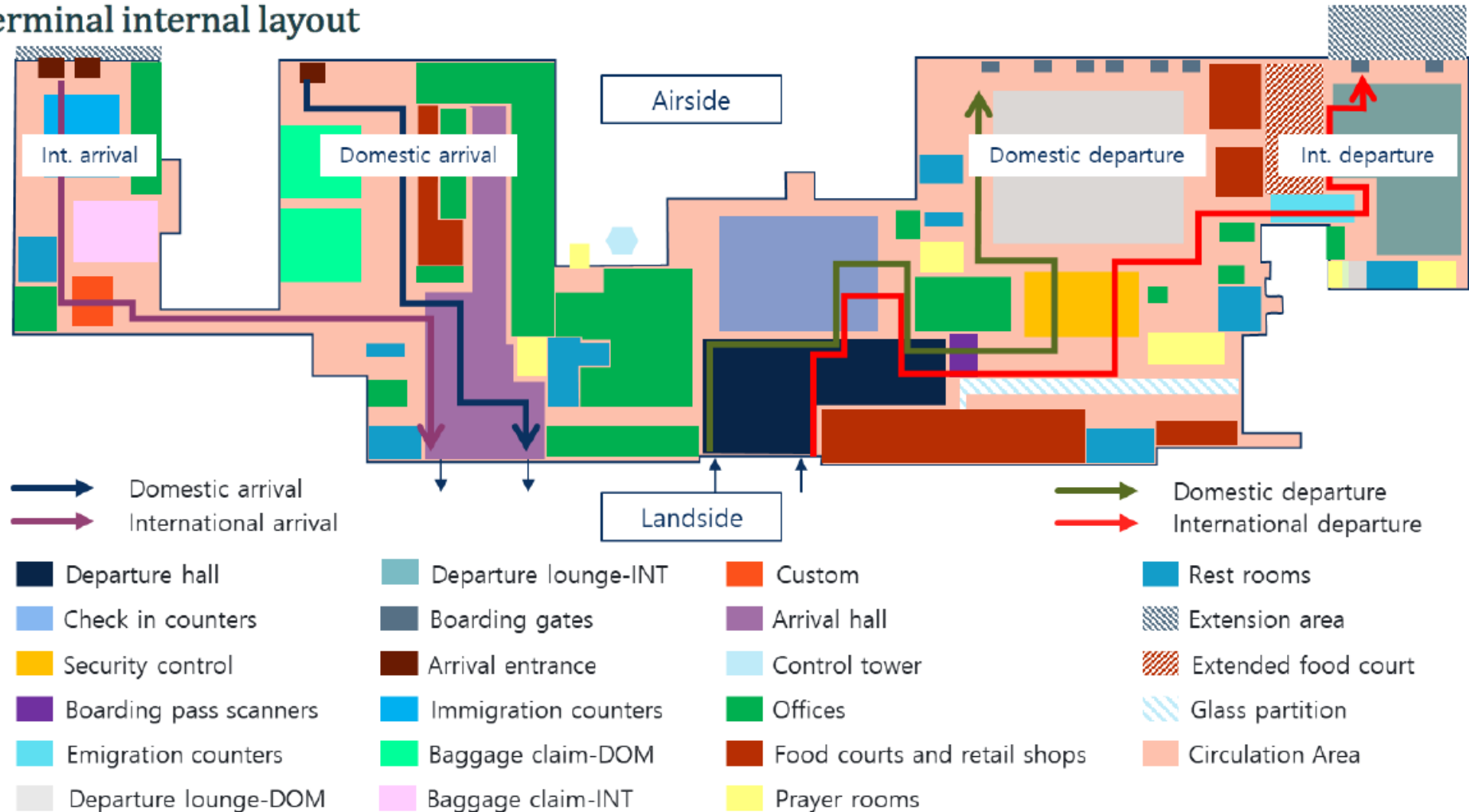
- AHB has a single passenger terminal building that is being used for both domestic and international passengers. Both commercial and general aviation passengers are accommodated in the terminal
- The terminal building is located in front of Apron 1
- Expansion of the terminal is not possible without demolishing the cargo terminal and/or the royal terminal
- The terminal building has two levels, ground level is for passengers' processing while the first floor is the employees' offices
- AHB's terminal has no passenger boarding bridges. All stands are remote and passengers need to go walking or have to be transported by bus to board the aircraft

Passenger terminal



AHB departing passengers are processed in the eastern side of the terminal, while the western side is for the arriving passengers processes

Passenger terminal internal layout

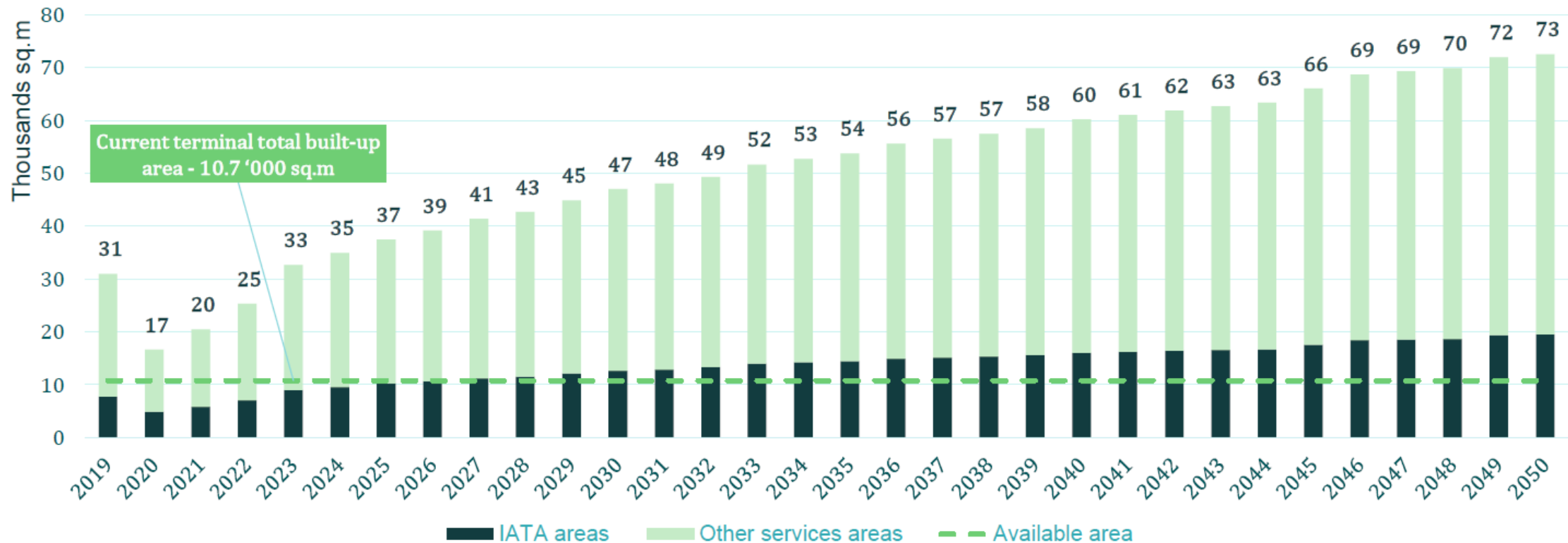


Passenger terminal



The existing terminal will be operating at nearly 3 times its capacity when the traffic recovers, requiring immediate construction of a new passenger terminal

Terminal capacity-demand

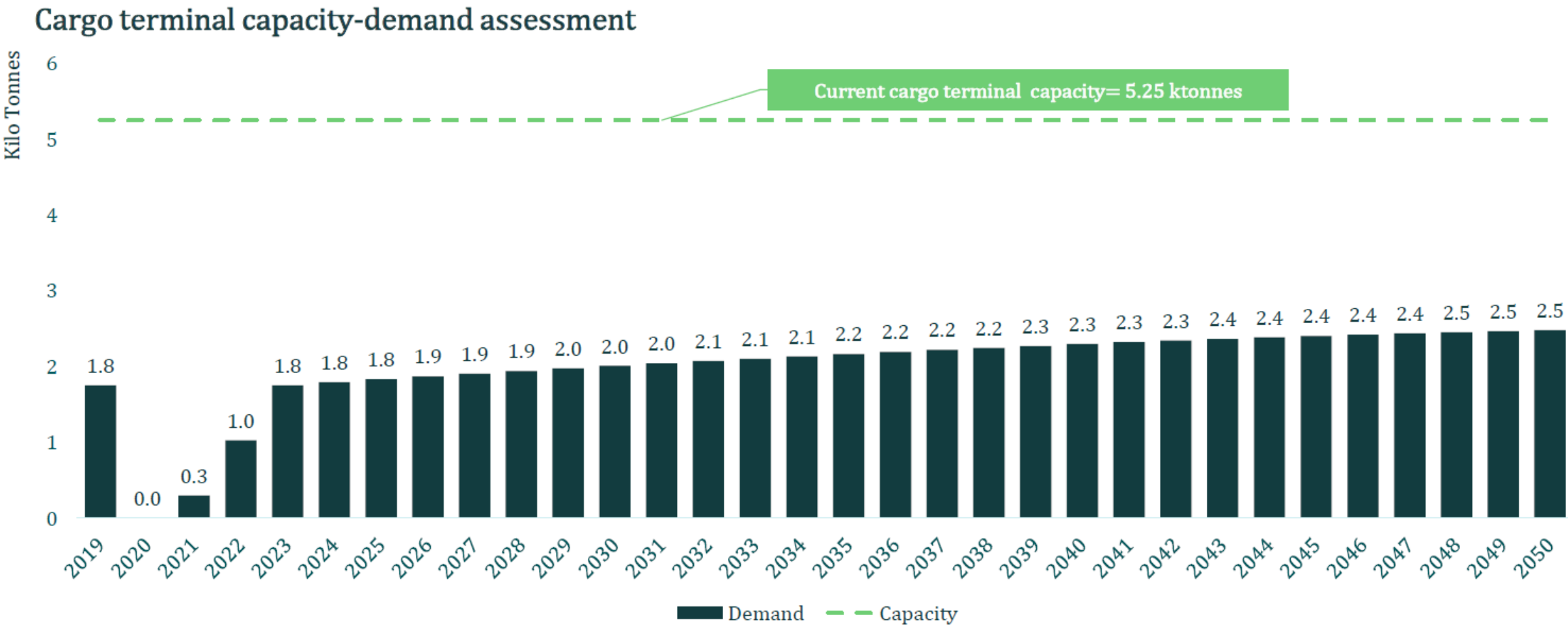


Considering additional space requirements for commercial spaces, circulation areas, lounges, offices, BHS system, and other inefficient use of spaces, the total terminal area for a **high level of service** in 2050 should be ~73,000 sq.m

Cargo terminal



Current cargo terminal capacity is sufficient to handle cargo demand beyond 2050

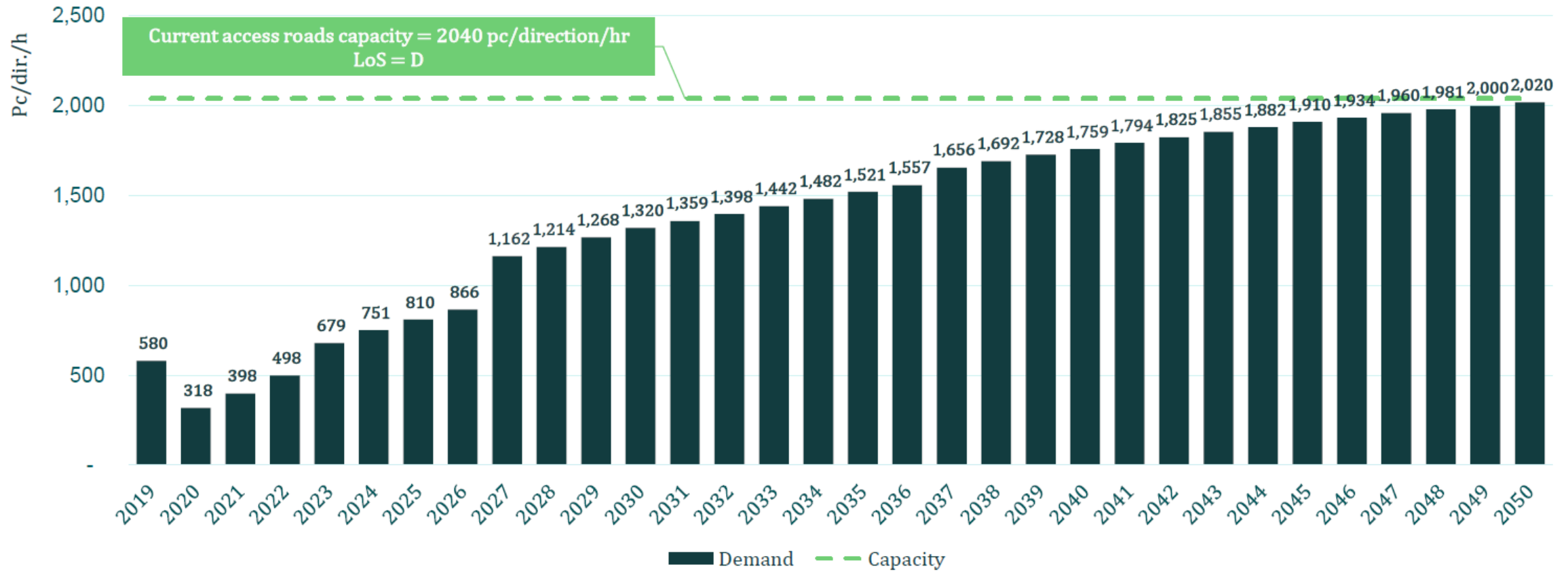


Access roads



Current access roads are sufficient to provide a level of D service

Access road capacity-demand assessment

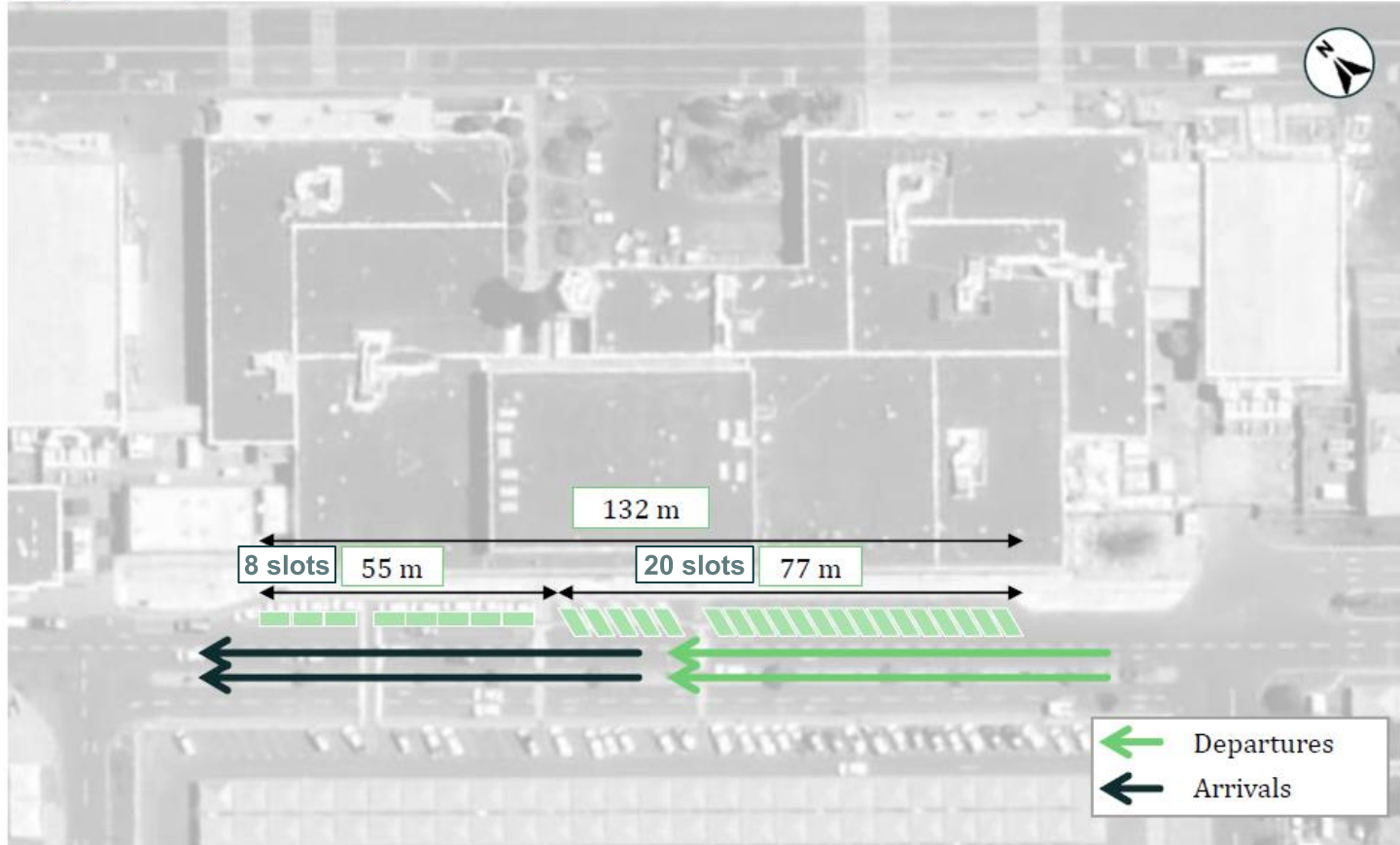


Curb front



Passenger terminal curb front can accommodate 28 private vehicles simultaneously, with two parking configurations: 60 degrees and parallel

Airport curb front



- Terminal curb front occupies most of the area in front of the terminal, with a total length of 132 m
- **The eastern 77 m** of the curb front have a 60 degree parking, with a **total of 20 parking slots**. The remaining **55 m** have parallel car parking, with a **total of 8 parking slots**
- Having different parking configurations for curb front in the airport is not a common practice in the aviation industry. It is recommended to unify the parking configuration for same curb front
- Curb front parking is for short term stops, in which cars drop off departing passengers or pick up arriving passengers
- Current curb front has an **hourly capacity of 560 pc/h**, with an average of **3 minutes dwell time**

Car parking



Current passenger parking facilities has enough capacity to accommodate the anticipated demand until 2039, where expansions will be needed

Passenger car parking capacity-demand

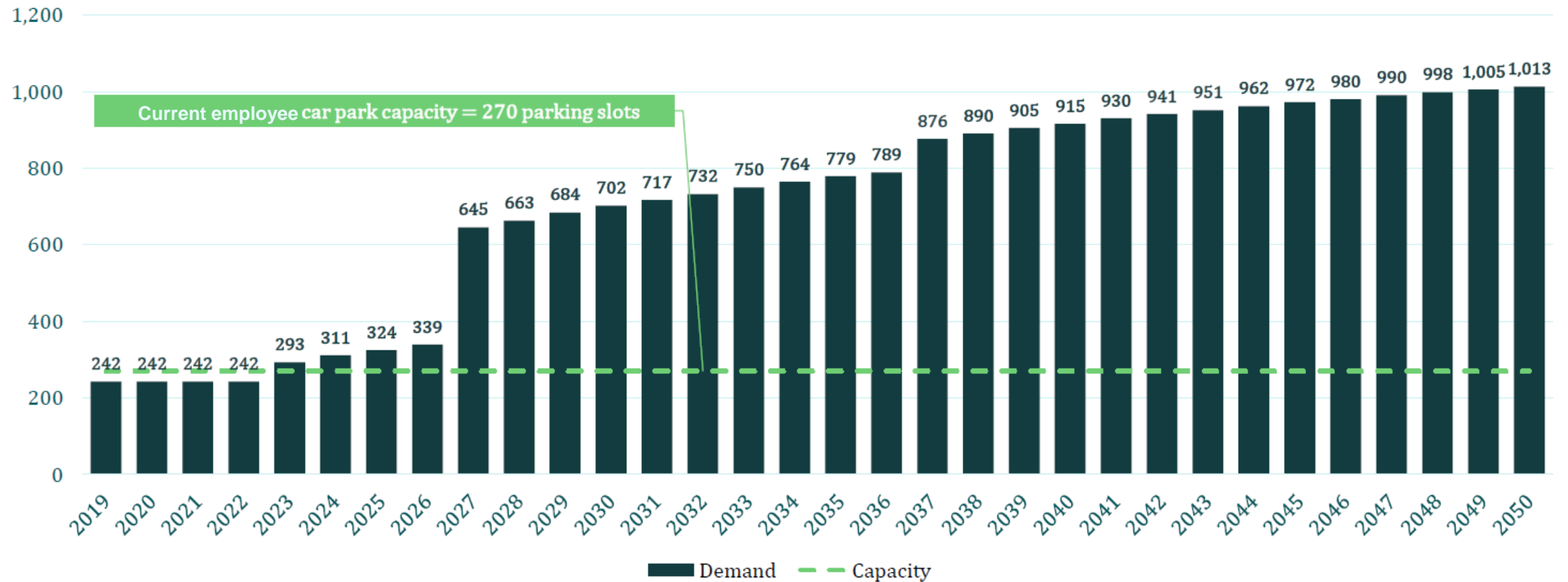


Car parking



The employee parking is near saturation, and employees are required to park in passenger parking areas or other areas in the airport surroundings

Passenger car parking capacity-demand

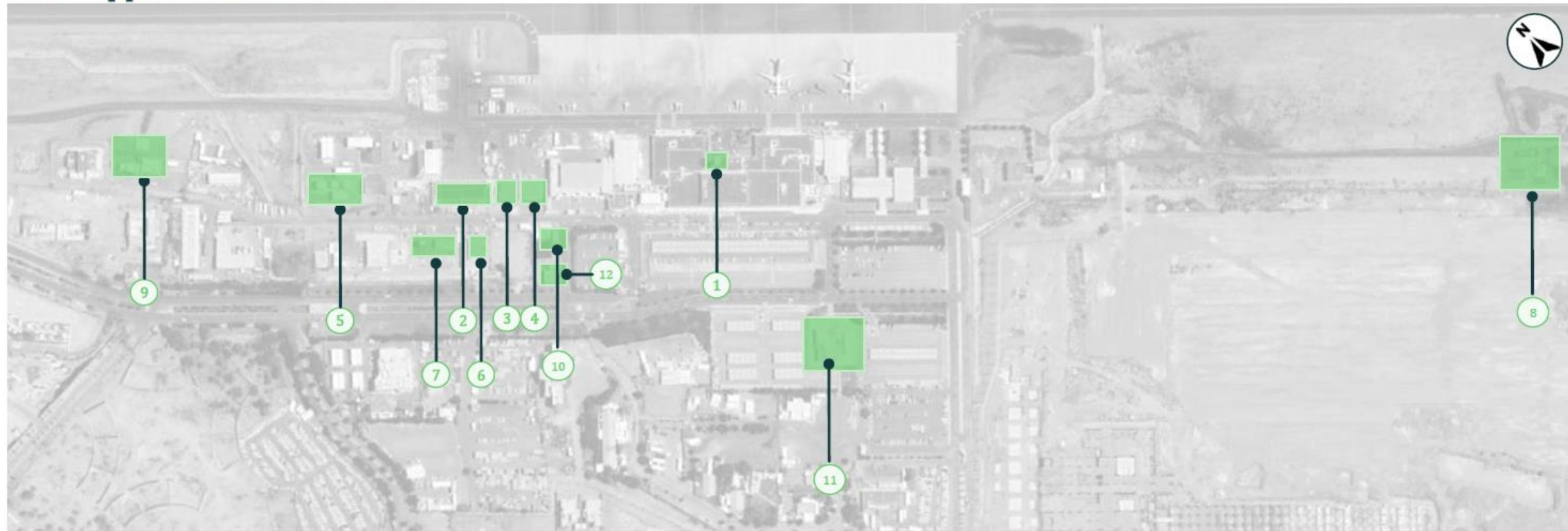


Support facilities



Airport support facilities are located at both landside and airside based on their roles within the overall airport ecosystem

AHB support facilities location



- | | | | |
|---|-------------------------------|-------------------------------|--------------------|
| ① Air Traffic Control (ATC) | ④ Saudia Maintenance facility | ⑦ Water Supply | ⑩ Airport clinic |
| ② Aircraft Rescue and Firefighting (ARFF) | ⑤ Fuel farm | ⑧ Waste water treatment plant | ⑪ Mosque |
| ③ Ground Service Equipment maintenance(GSE) | ⑥ Electrical substation | ⑨ Meteorological facility | ⑫ IT Data building |

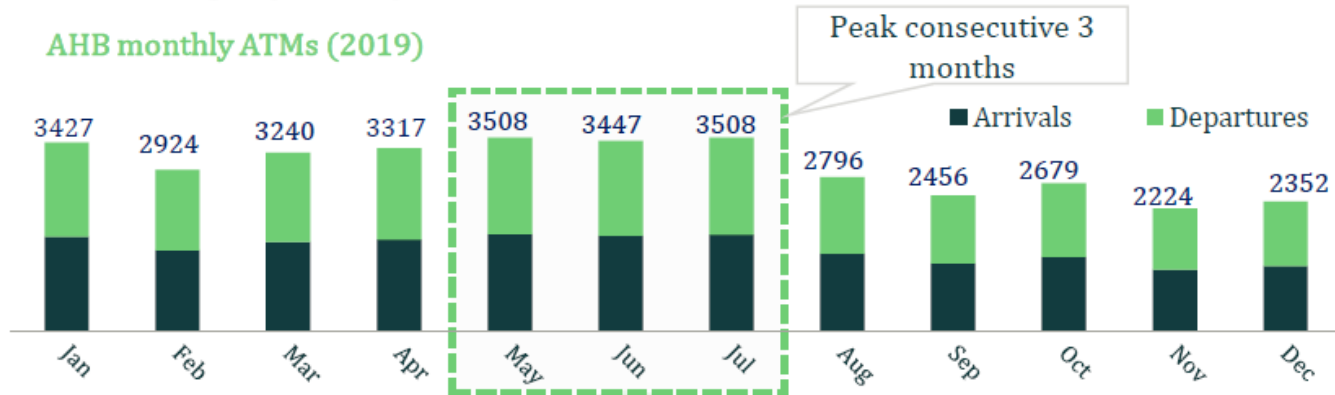
ARFF



Aircraft Rescue and Fire Fighting (ARFF) category requirements is based on the largest aircraft that will use the aerodrome in consecutive months (Response time < 3 minutes)

ARFF category analysis

AHB monthly ATMs (2019)



AHB's fleet composition during peak consecutive 3 months

Aircraft category	Aircraft model	Overall length (m)	Fuselage width (m)	ATMs during peak consecutive 3 months
CAT 6	A320	37.6	3.95	9,899
CAT 7	A321	44.5	3.95	564
	B737-800	39.5	3.8	
	B737-900	42.1	3.8	
CAT 8	A330-200	58.8	5.6	0
CAT 9	A330-300	63.7	5.6	0

AIP declared ARFF category: **CAT 8**
(based on number of vehicles and personnel)



Others

Other key support facilities

GSE Maintenance

- Current GSE facilities are mainly **dedicated for GSE service and quick check ups** and can not perform heavy maintenance for GSE fleet
- Current area is 0.35 K sq.m. and is already operating in **saturation conditions**, and needs to be expanded in the short term

Saudia maintenance building (MRO)

- Only MRO facility in the airport
- Most MRO works in Abha are **visual inspections for the aircraft**
- Major maintenance for Saudia fleet is carried out in **Jeddah or Riyadh**

Fuel Farm

- Current Fuel farm capacity is **1.30M litre** sufficient to accommodate the airport demand **until 2024**, in line with the international best practices

Electric substation

- The airport is equipped with 100% power backup through a 2,000 KW generator
- As per 2019 power consumption, current power supply equipment switches, bus bars, transformers and main backup generator **are saturated**
- Expansion of the airport facilities will **require expanding current power supply facilities**

Water Supply

- 6 storage tanks of 100 cubic meter each and 3 booster pumps, with a total capacity of **648 cu.m /day**
- Sufficient to accommodate airport's demand **until 2036**
- Avg. water consumption is 22.7 litre/pax + Wudu' in the mosque 2.31 litre/pax reaching total consumption of 25.1/pax

Waste water treatment

- Total capacity of **385 c.m/day**
- Expected to be saturated by 2031
- Relocation of the facility should be considered if the current location is chosen for the new terminal

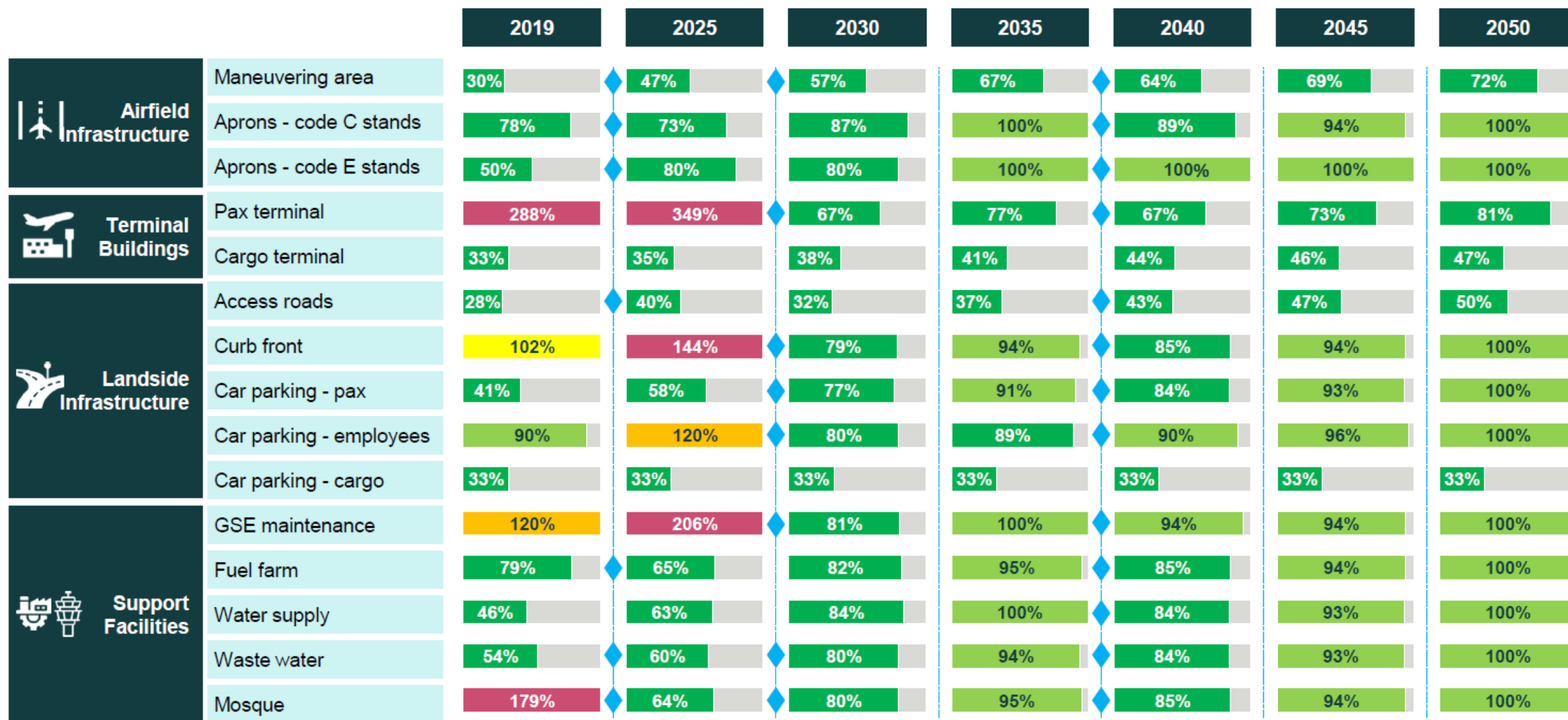
5

Infrastructure Development Plan

Airport subsystems' utilization summary



Summary on 5 years period plan



Planned development/expansion
 Under-capacity (90%)
 at Capacity (100%)
 Low Congestion (110%)
 Serious Congestion (120%)
 Saturation (130%)

Airfield developments



Airfield Development summary

Airfield short-term to mid-term developments



Short-term developments

- Improvements in maneuvering area including strip grading, vegetation removal for RWY and TWY along with the addition of new taxi lane B and B1
- Development of two new aprons: Apron 3 for serving the aircraft from the new terminal and a standalone apron near RWY 31 end
- Visual aids for apron and taxiway (markings) and stop way lights for RWY



Mid-term developments

- Addition of a new rapid-exit taxiway to improve the operational efficiency of the TWY 31
- Extension of Taxi lane B1 parallel to the Apron 3 expansion
- Expansion of Apron 3 to accommodate two more stands
- Addition of a new remote apron (Apron 4)



Terminal developments

Terminals Development summary

Terminal short-term to mid-term developments



Short-term developments

- Demolition of incomplete foundation from the past terminal development
- Construction of **new passenger terminal**
- A new royal terminal with an area of 2,000 sq.m to be built next to Apron 2
- Current terminal can be utilized as management buildings/offices for employees



Mid-term developments

- Expansion of **passenger terminal**

Landside developments



Landside Development summary

Landside short to mid-term developments



Short-term developments

- Construction of new access road leading to the main terminal consisting of 8 lanes (4 lanes per direction).
- Development of new car parking facility for passenger and employees, closer to the new terminal location with the same capacity
- Development of new Royal/VIP terminal parking and road access.

Mid-term developments

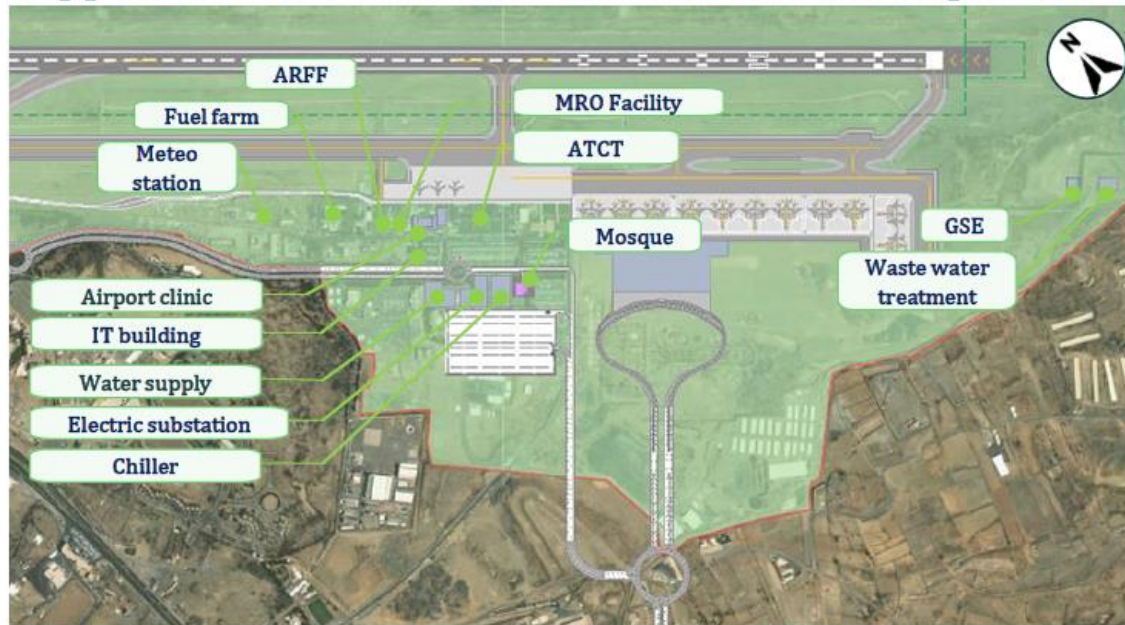
- Expansion of car parking area increasing in 2037, increasing capacity to >2,200 car places.



Support facilities development

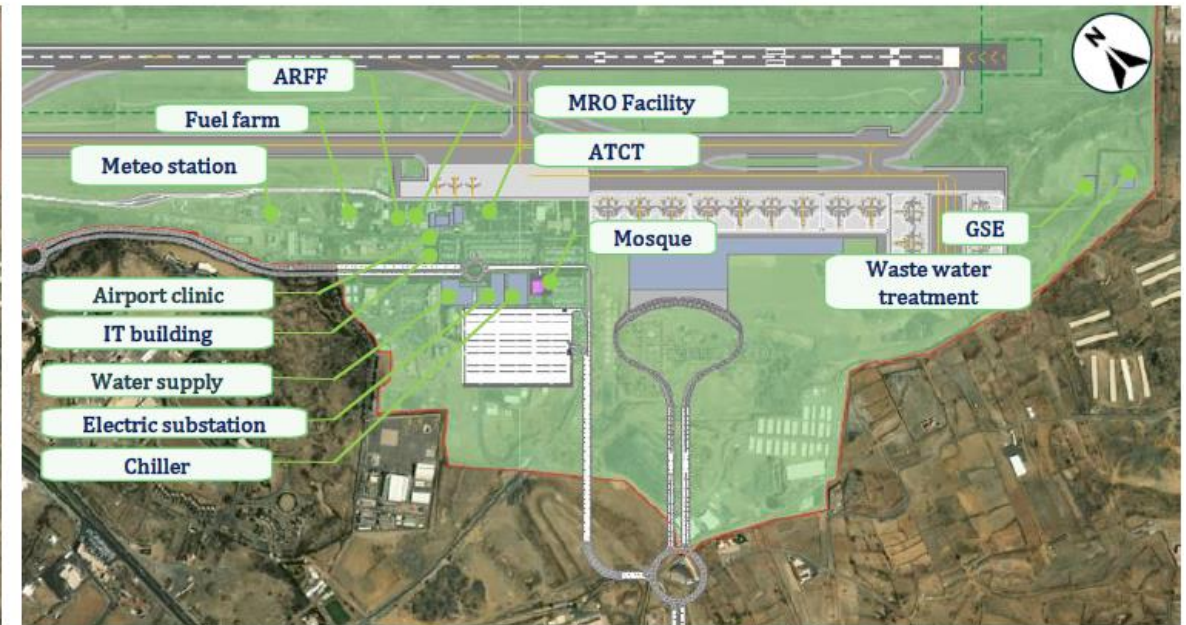
Support facilities Development summary

Support facilities short-term to mid-term developments



Short-term developments

- Development of new **GSE maintenance hanger** (960 Sq.m) and demolition activities of the old hanger
- Expansion of **fuel farm** to increase capacity to 2.26 M liters
- Expansion of **wastewater treatment** plant to increase processing capacity to 479 Cu.m/day and old wastewater plant demolition
- Expansion of **Mosque** to increase its area to 2,900 Sq.m
- New electric substation, chiller and water supply facilities



Mid-term developments

- Expansion of **GSE maintenance hanger**, to increase the area to 1,080 Sq.m
- Addition of fuel tanks to increase **fuel farm** capacity to 2.9 M liters
- Expansion of **water supply system**, to increase the capacity to 875 Cu.m/day
- Expansion of **waste water treatment** plant to increase processing capacity to 612 Cu.m/day
- Expansion of **Mosque** to increase its area to 3,700 Sq.m

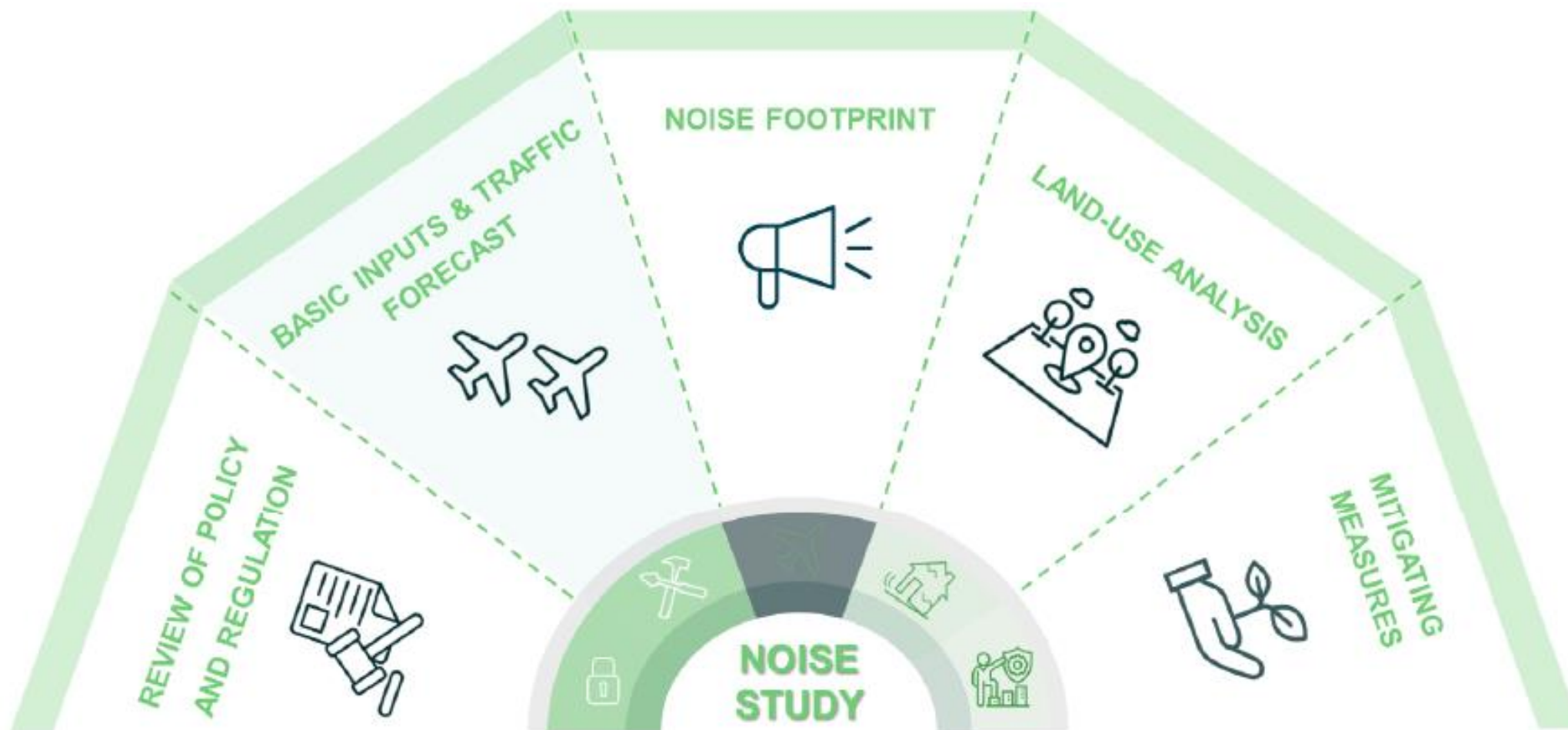
5

Environmental Assessment

NOISE ASSESSMENT



The methodology for airport noise impact assessment used consists of 5 main steps



NOISE ASSESSMENT



Aircraft operations analysis

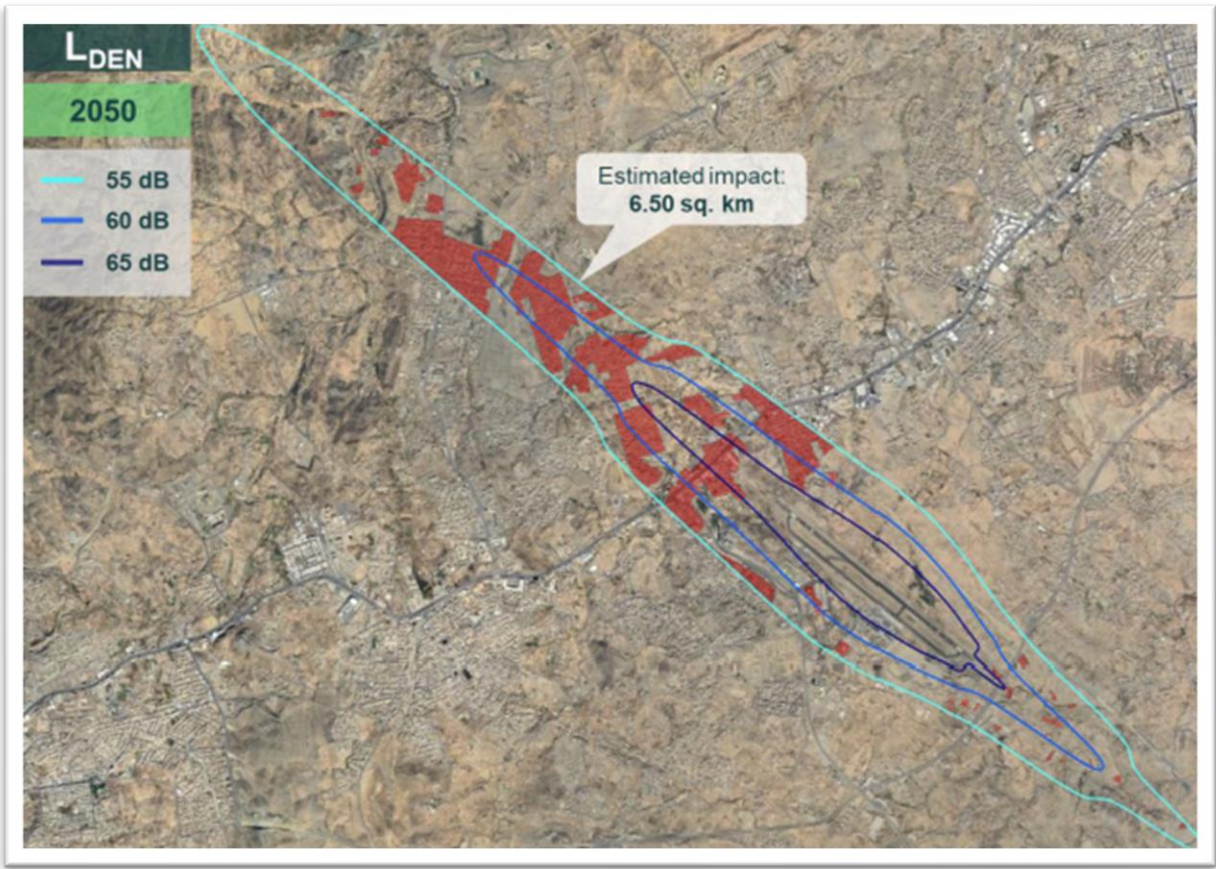
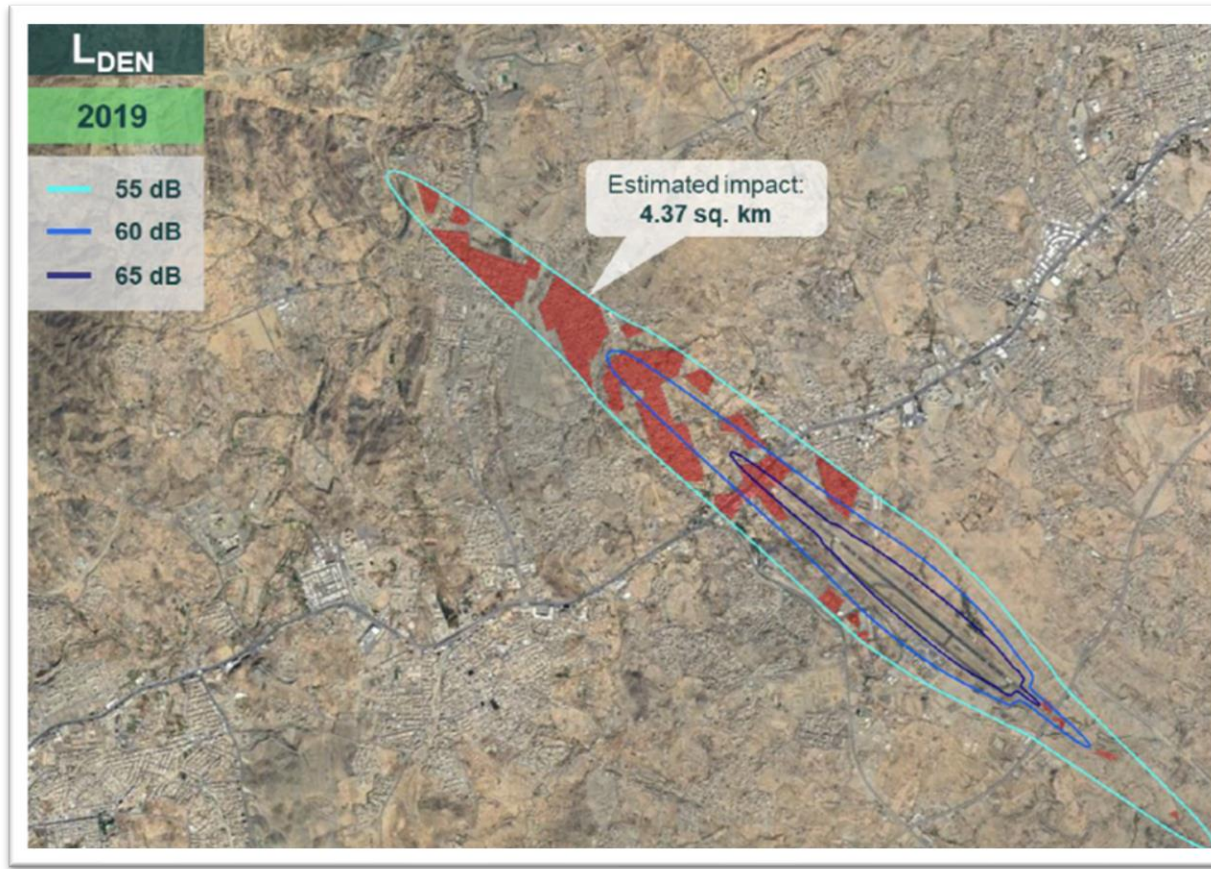
		Average daily operations (2019)			
Type of aircraft	Model	Day (9h-19h)	Evening (19h-23h)	Night (23h-7h)	Total
Medium Jets	Airbus A320neo	50	12	26	88
	Boeing B737-8MAX	3	1	1	5
Large Jets	Airbus A330neo	2	0	1	3
Total		55	13	28	96

		Average daily operations (2050)			
Type of aircraft	Model	Day (9h-19h)	Evening (19h-23h)	Night (23h-7h)	Total
Medium Jets	Airbus A320neo	137	34	71	242
	Boeing B737-8MAX	8	3	3	14
Large Jets	Airbus A330neo	6	0	3	9
Total		151	37	77	265

NOISE ASSESSMENT



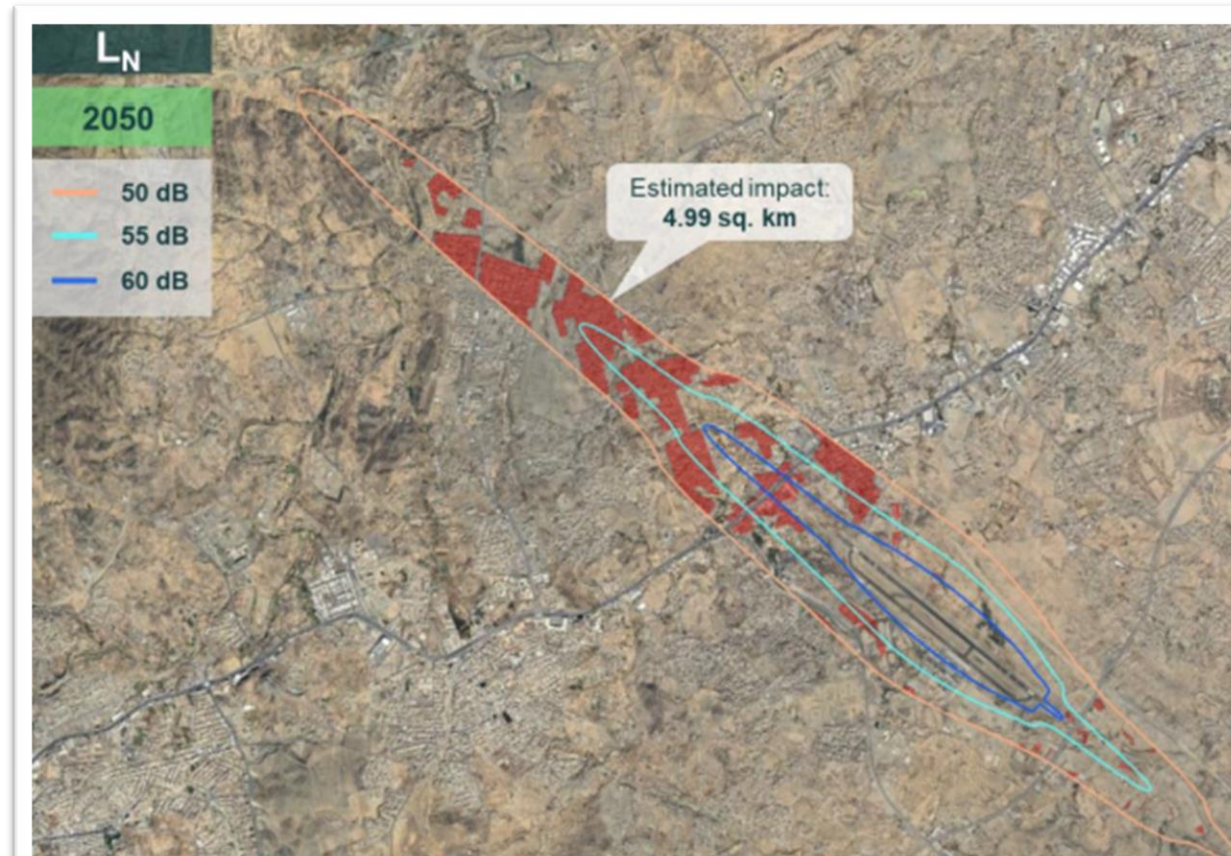
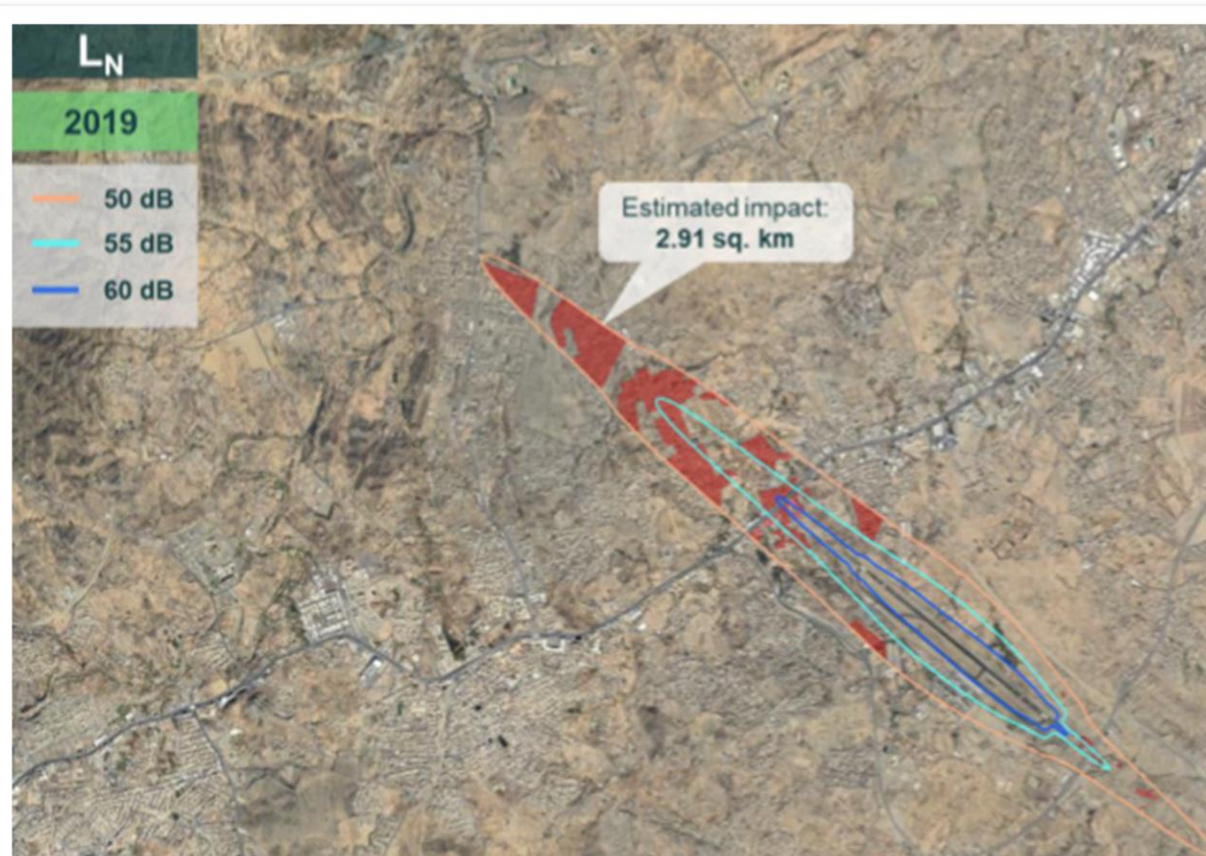
Noise impact analysis: Assessment of noise levels over a 24-hour period



NOISE ASSESSMENT



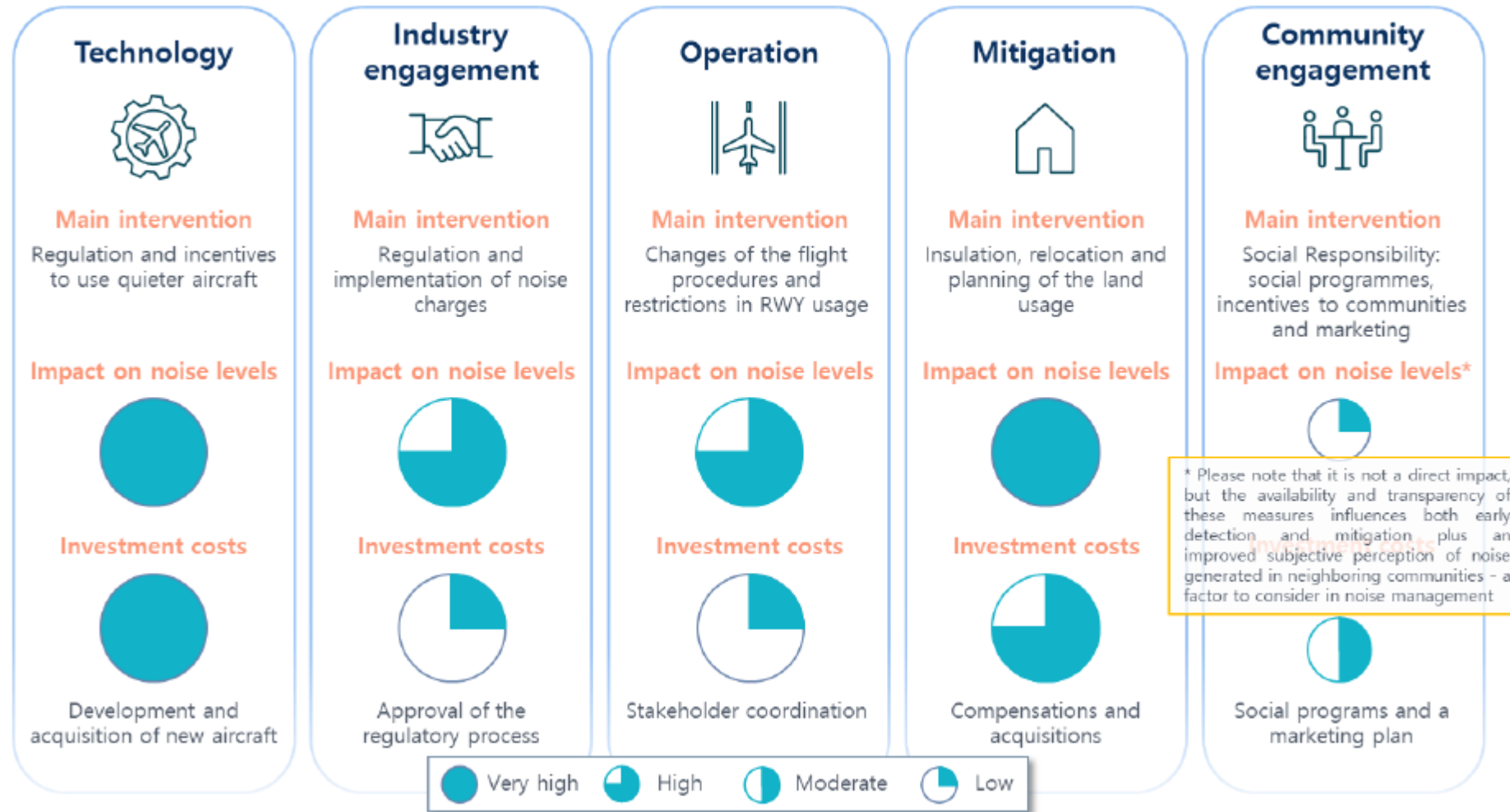
Noise impact analysis: Assessment of noise levels over night period time



NOISE ASSESSMENT



Mitigation measures: Practices for managing environmental noise at an airport

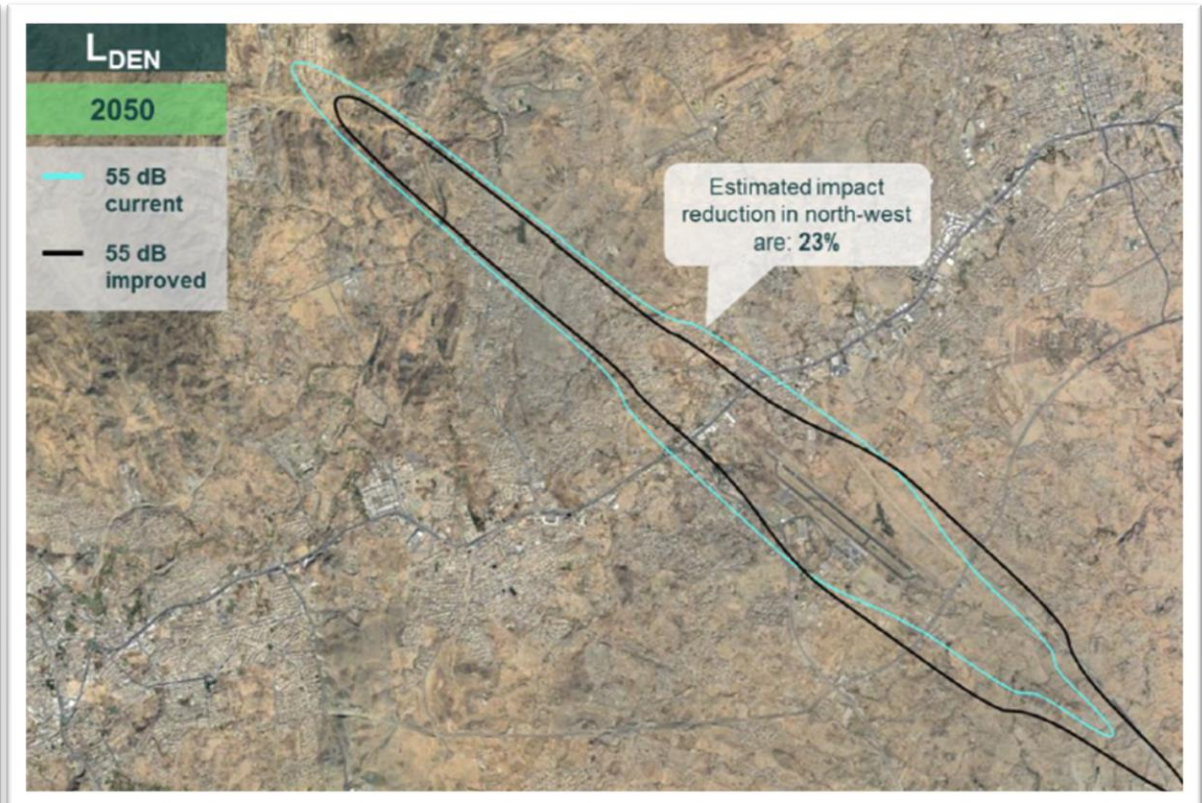
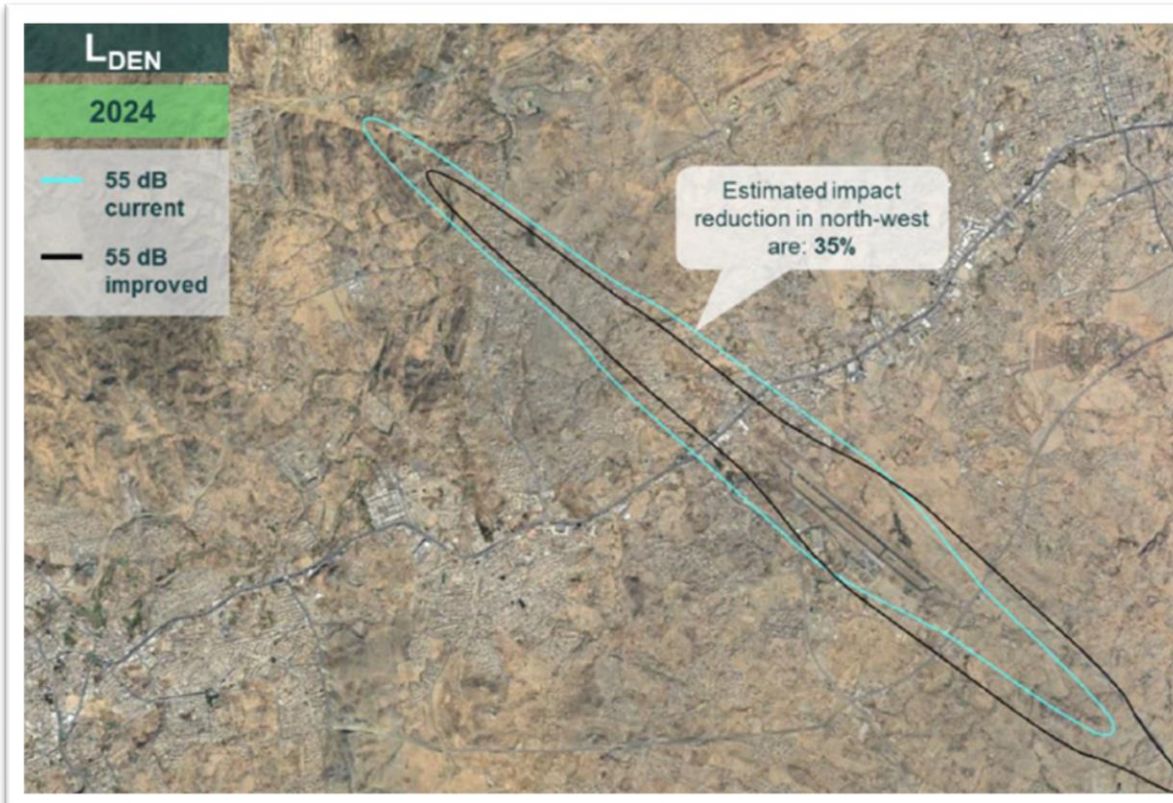


NOISE ASSESSMENT



Mitigation measures: Example of Noise impact mitigation (Operational procedures change)

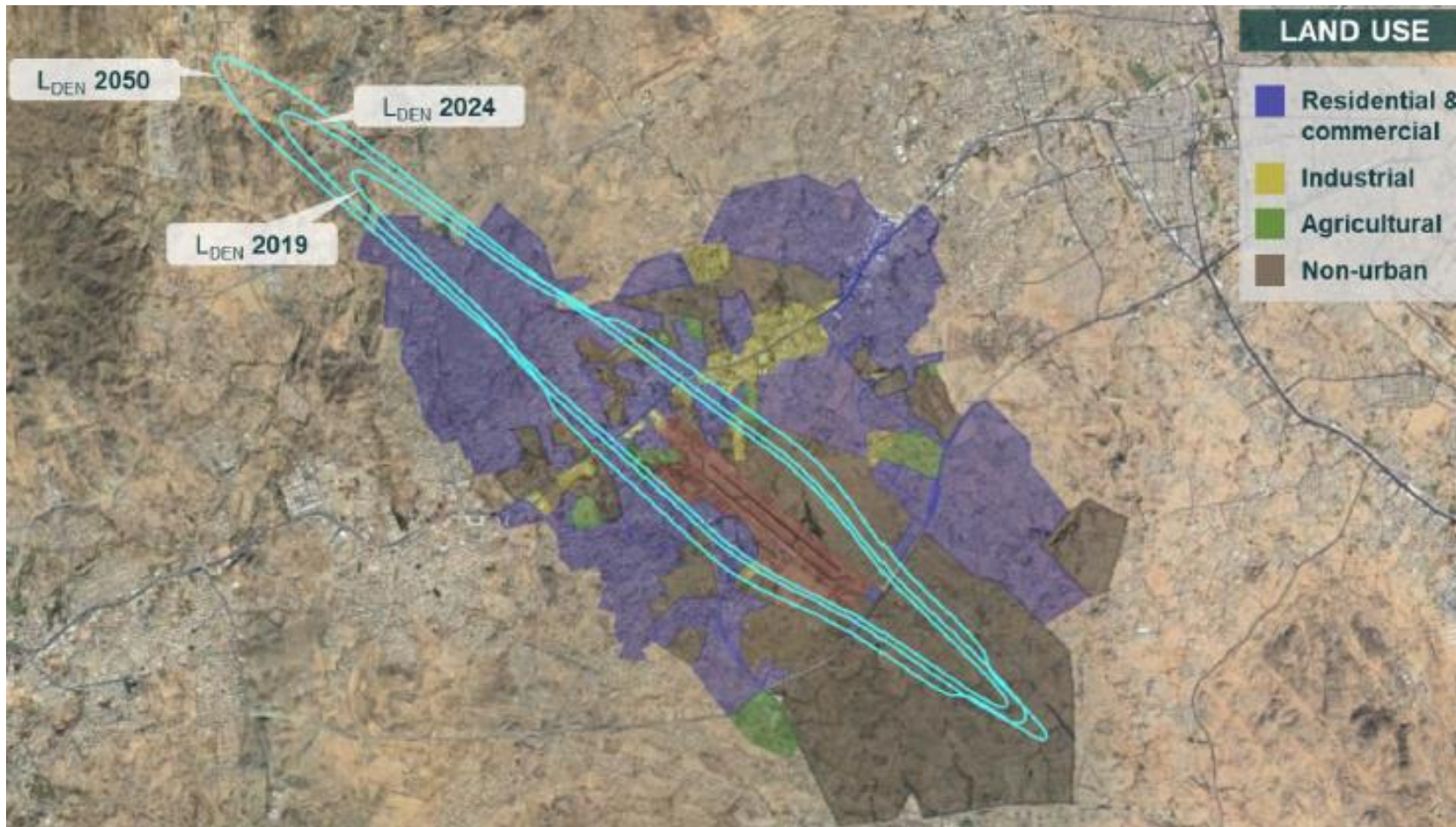
- Current Abha Airport operation is assumed as follows
 - Arrivals: 85% from RWY 13 / 15% from RWY 31
 - Departures: 25% from RWY 13 / 75% from RWY 31
- If the departures configuration is inverted (75 % from RWY 13), a significant reduction in impact in north-west area is achieved, particularly, 35% for 2024 scenario and 23% for 2050



LAND USE ANALYSIS



Analysis of existing land uses surrounding Abha Airport



- Land use mostly falls within four main categories:
 1. Residential & Commercial
 2. Industrial
 3. Agricultural
 4. Recreational and transportation
- the categories of mostly affected areas are **residential and commercial**, particularly to the **north-west** of the airport

WATER MANAGEMENT SYSTEM



Water supply

- Abha Airport average water consumption is estimated around 22.7 liters per passenger plus 2.3 l per passenger has been added for worshippers Wudu' in the mosque reaching a **total consumption per passenger of 25 l/passenger**.
- **The airport can encourage water efficiency measures as the following:**
 - Simple technologies like aerators, low-flush toilets and rainwater capture systems.
 - 'Drywash' technique for cleaning aircraft can reduce cleaning water consumption by 95% compared to the traditional way.
 - Graywater may be useful for other activities, such as irrigation of landscaping.
 - Water infrastructure like drains and culverts should be designed for adequate capacity, and kept clear and functioning.
 - When developing new facilities, the use of smart building and design practices helps airports minimize their water consumption. The certification systems for green building designs and sustainable infrastructure such as ISO 14001 standards consider issues of water use and conservation within their rating systems.

WATER MANAGEMENT SYSTEM



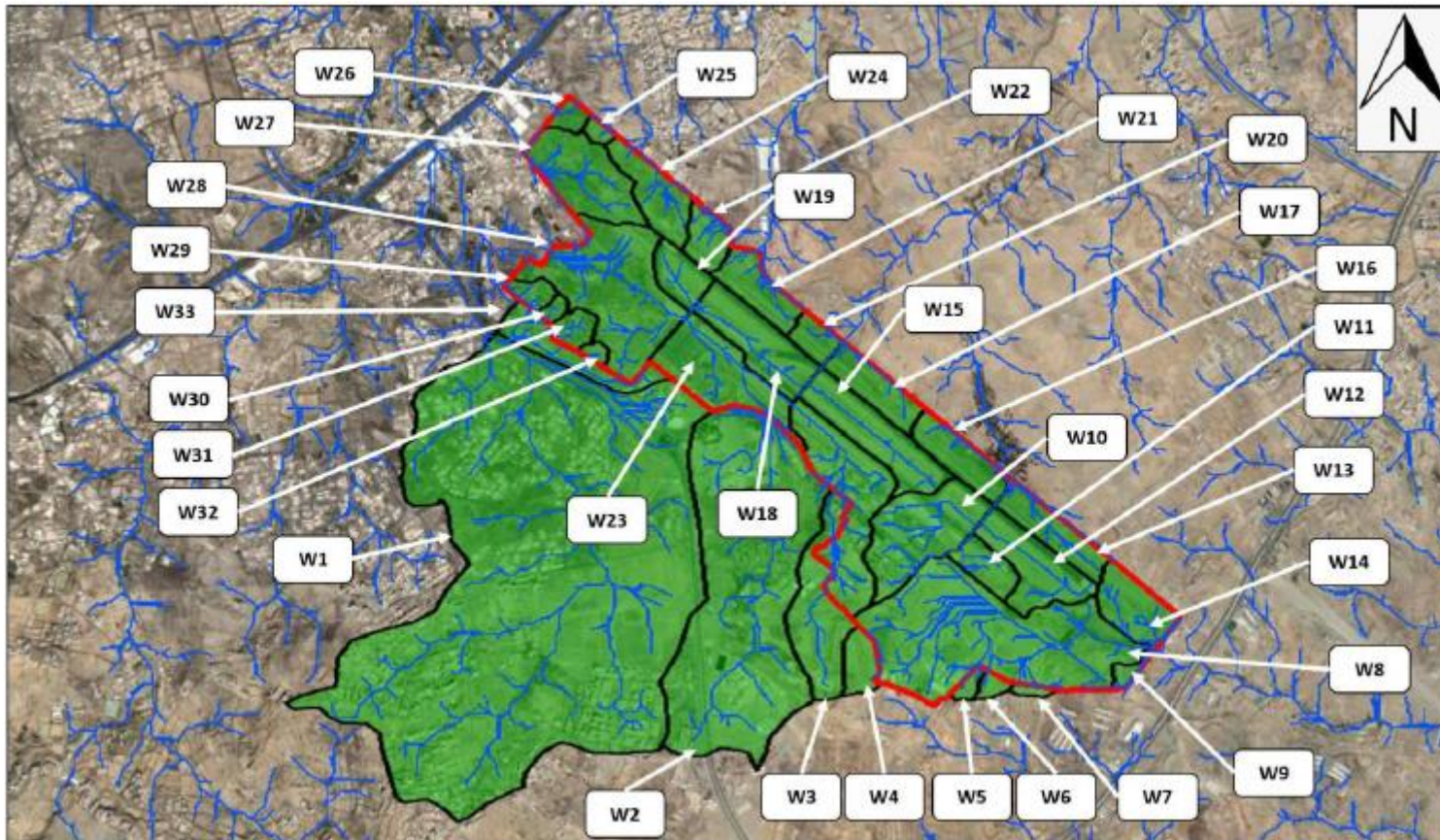
Water Handling: Aircraft Operations Safety

- Many stormwater management options could become wildlife attractants (if no protection is put in place) and thus create potential hazards for aviation.
- Most airports establish wildlife management plans that identify potential hazards and outline procedures for managing water, wildlife, and to support the operational safety of aircraft.
- Stormwater runoff from the airport runways, taxiways and aprons picks up contaminants from aircraft activities, and there is a risk those substances will contaminate surrounding water supplies.
 - Many activities at the airport have potential to impact water quality include:
 - Fuel, from spills during refuelling and leaks from pipes or tanks
 - Fire suppressant chemicals and foams dispersed in firefighting exercises
 - Dust, dirt and hydrocarbons from paved surfaces and engine leaks
 - Herbicides and pesticides

WATER MANAGEMENT SYSTEM



Water Handling: Abha Airport existing streams, watershed delineation and channels & culverts



- The airport area is affected by **33 different streams and watersheds**, most of which are included inside the airport area border.
- **8 of them** act as external streams and watersheds that either intersect or pass near the project area boundary
- **The rest 25 streams and watersheds** are developed based on the location of each existing hydraulic structure so that the flow generated at each is calculated

WATER MANAGEMENT SYSTEM



Water Handling: Abha Airport existing streams, watershed delineation and channels & culverts

The airport system is served by a series of existing channels and culverts



Recommendations

A detailed Hydrology & Flood Protection Study conducted in 2020 by the airport proposed several recommendations, as follows:

- Upgrade of several existing culverts as shown in the report
- Proposal of northern channel to mitigate flood water away from the airport without connecting it to the airport system
- Proposal of central channel to transfer received runoff from external sources to the airport existing system safely. This channel will also act as an internal drainage structure
- Identifying the flow rate that the airport expansion drainage system must take into consideration

WATER MANAGEMENT SYSTEM

Water disposal



- **Waste water treatment plant** has a total of three tanks; aeration tank, chlorination tank and irrigation tank with daily capacity of **385 cu.m**, **43 cu.m** and **287 cu.m** respectively.
- It is located in the proposed area for the new terminal / apron; therefore, it will need to be relocated.
- Limiting the amount of pollutants used on airport is a major focus in reducing the amount of treatment and facilities
- **Proper storage and handling of pollutants** is key to preventing spills, and the airport must also isolate the pollutants that they use from non-polluted water flowing on the airport to avoid contamination
- All these measures will help:
 - reduce the cost of water
 - reduce environmental impacts
 - improve resilience to risks associated with water shortages, floods, and climate hazards
 - Re-use of treated wastewater for agriculture purposes

Thank You



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Holding