COVID-19 AND TRANSPORT

REIMAGINING TRANSPORT AND MOBILITY FOR A SUSTAINABLE ECONOMIC RECOVERY

WHITE PAPER II

SEPTEMBER 2020

SNC·LAVALIN

ATKINS **Acuity**
Member of the SNC-Lavalin Group

Executive Summary

Since we published our first White Paper on COVID-19 and Transport, Keeping Our World Moving During and After the Crisis, in May 2020, Coronavirus has continued to impact the countries of the GCC and spread across the World. It is now clear that the pandemic will spread wider, peak later and last longer than early forecasts. Cases and deaths are likely to continue until therapeutic care further improves and a vaccine is widely available, possibly in the first half of 2021. Until then the realities of social distancing, face masks, track & trace, home working & localized lockdowns will remain a constant & unsettling reality for millions.

Whilst containing the Virus remains vitally important, especially in preventing a resurgence of runaway community transmission, the focus in the second half of 2020 is on re-opening economies and restarting growth. With stringent national lockdowns now largely lifted, the challenge is how to achieve or maintain re-opening safely, restore business and consumer confidence and provide the right economic and fiscal stimulus which will support the early stages of a viable recovery towards the end of the year.

For the transport sector, this also means allowing people, businesses and communities to reconnect with jobs, services and opportunities, whilst controlling Coronavirus and mitigating a return of the congestion, road casualties, pollution and other externalities which characterized the pre-pandemic paradigm. At SNC-Lavalin, we have worked through collaboration of our transport planning and strategic advisory experts across the World to develop a three-phase model which we call Reopen – Recover – Reimagine. This frames how the transport sector should respond to the unprecedented socio-economic shock inflicted by COVID-19, as well as impacts of low oil prices on GCC exports and finances.

Even before COVID-19, the transport sector globally was facing the prospect of major changes in the ways that people and goods move. Demographics, urbanization, big data, digitization, future mobility technology and service models, environmental sustainability, futureproofing and climate change all represent disruptive megatrends with a potentially transformative impact. This requires a response from policy makers, regulators, infrastructure owners and service operators, as well as customers and wider civic society.

Transport agencies and organizations worldwide will therefore need to work with their partners to set and achieve new objectives, support a sustainable economic recovery and proactively plan the future of their places. Aligning this with our three-phase model, this gives rise to a range of supply, demand, planning, operational, regulatory and financial considerations which must be planned, implemented, monitored and evaluated at each stage.

Looking at the future of transport after COVID-19 is resolved, there is significant uncertainty. Despite some imaginative and headline-grabbing initiatives in the past six months, the crisis years of 2020-2021 are likely to be hard for many public and private players. Impacts will be fluid, unpredictable and complex.

With recovery to 2025 and beyond, there are grounds for some optimism that previous trends, for example around technology, new service models and multi-modal planning concepts, will eventually re-assert themselves and indeed many will accelerate as regulators, industry and consumers look towards cleaner environments, decarbonization of transport, flexible and personalized digital services on demand, as well as fostering innovation as a source of competitive advantage and wealth creation. This is likely to take place within an substantially shaken-out, consolidated and stronger supplier market, with policy and regulatory objectives also likely to include building in resilience to future pandemics and other crises.

Looking beyond the immediate crisis, our reimagined approach therefore brings together a broader agenda combining three pillars of spatial proximity (land use), physical mobility (transport) and digital connectivity (information and telecommunications) and comprises eight cross-cutting building blocks. The building blocks have global relevance and applicability, although the precise context, problem definition, terminology, policies priorities and translation into action will vary by country, city and region. They represent a challenging agenda for debate, policy development and tangible action across the transport sector over the coming years.

The eight building blocks are:

> Embed Sustainability and Social Inclusion within Accelerated Infrastructure;
> Connect People, Services and Opportunities Digitally;
> Enable and Reconfigure Future Mobility Technologies and Services;
> Reaffirm Public Transport as the Backbone of Mobility;
> Expand Definitions and Action on Transport Health, Safety and Wellbeing;
> Commit the Whole Transport Sector towards Credible Net Zero;
> Optimise Asset and Supply Chain Performance and Resilience; and
> Deliver Smart Governance, Regulation and Collaboration.

The fundamental choice for policy makers already seems clear. Do we come out of COVID-19 by falling back on old ways, abandoning new opportunities, and focusing on legacy infrastructure and services? Or do we maintain, or better still redouble, our efforts to forge a new paradigm which propels us to a vision of a more sustainable, equitable and resilient mobility system and experience? The answer is self-evident; the best way to predict the future is to create it.

Disclaimer

This White Paper has been prepared by Atkins Acuity, a member of the SNC-Lavalin Group, in response to the COVID-19 (Coronavirus) Pandemic as it stands in September 2020. At the current time, the situation globally and in the GCC Region continues to evolve, with continued uncertainty as to the full extent and ultimate end-point of the Pandemic. What is clear is that the human, economic and social impact remains real and tangible, and that organisations continue to have a duty to act to protect their employees, associates and stakeholders, address business challenges and risks, help to mitigate the impacts of the Pandemic and support the medium- and long-term recovery in whatever ways they can.

The material in this White Paper will be periodically updated.

Sources are acknowledged and include the World Road Association (PIARC), the International Association of Public Transport (UITP), the International Monetary Fund (IMF), Bloomberg, World Economic Forum, The National, Khaleej Times, Arab Times and Dubai Media Office.

For up-to-date information on COVID-19, please see reports from the European Centre for Disease Control and Prevention, the US Centre for Disease Control and Prevention, and the World Health Organisation, and the live tracker of global COVID-19 cases from John Hopkins University.

This White Paper is intended for general informational purposes only and does not take into account the reader's specific circumstances, and may not reflect the most recent developments. Atkins Acuity disclaims liability for the accuracy and completeness of the information set out and for any acts or omissions made based on such information.

For more information, contact our Advisors listed on the final page of this White Paper.

1. COVID-19 CONTINUES TO PRESENT A PUBLIC HEALTH EMERGENCY, BUT THE FOCUS IS NOW ON ECONOMIC RECOVERY AND REFORM

A Crisis Like No Other

The World Health Organisation declared COVID-19[1] an international health emergency on 30th January 2020 and a global pandemic on 11th March. Compared to previous pandemics such as SARS, the current crisis is a "black swan event" without precedent, exhibiting multiple and acute impacts over and above conventional disaster management and recovery.

Since we published our first White Paper on *COVID-19 and Transport, Keeping Our World Moving During and After the Crisis,* in May, Coronavirus has continued to spread across the World. It is now clear, as cases surpass 27 million, with 880,000 deaths (6th September 2020), that the Pandemic will spread wider, peak later and last longer than early forecasts. Cases and deaths are likely to continue until therapeutic care improves and a vaccine is widely available, possibly in the first half of 2021. Until then the realities of social distancing, face masks, track & trace, home working & localised lockdowns will remain a constant & unsettling reality for millions.

The Crisis remains as much an economic crash as it is a public health emergency, sparking a dramatic slowdown in business activity, a stalling of international travel and large rises in job furloughs and redundancies. Globally, economic growth in 2020 is forecast to be -4.9 per cent (IMF World Economic Outlook, June 2020), a more negative outcome than initially anticipated and with recovery projected to be weaker than previously projected. Whilst global economic growth may resume next year, global GDP by the end of 2021 is now expected to be 6.5 percentage points below the pre-COVID-19 levels of January 2020. Economists talk about 2022, or even 2023 or 2024 for some sectors, as the time horizon for full recovery.
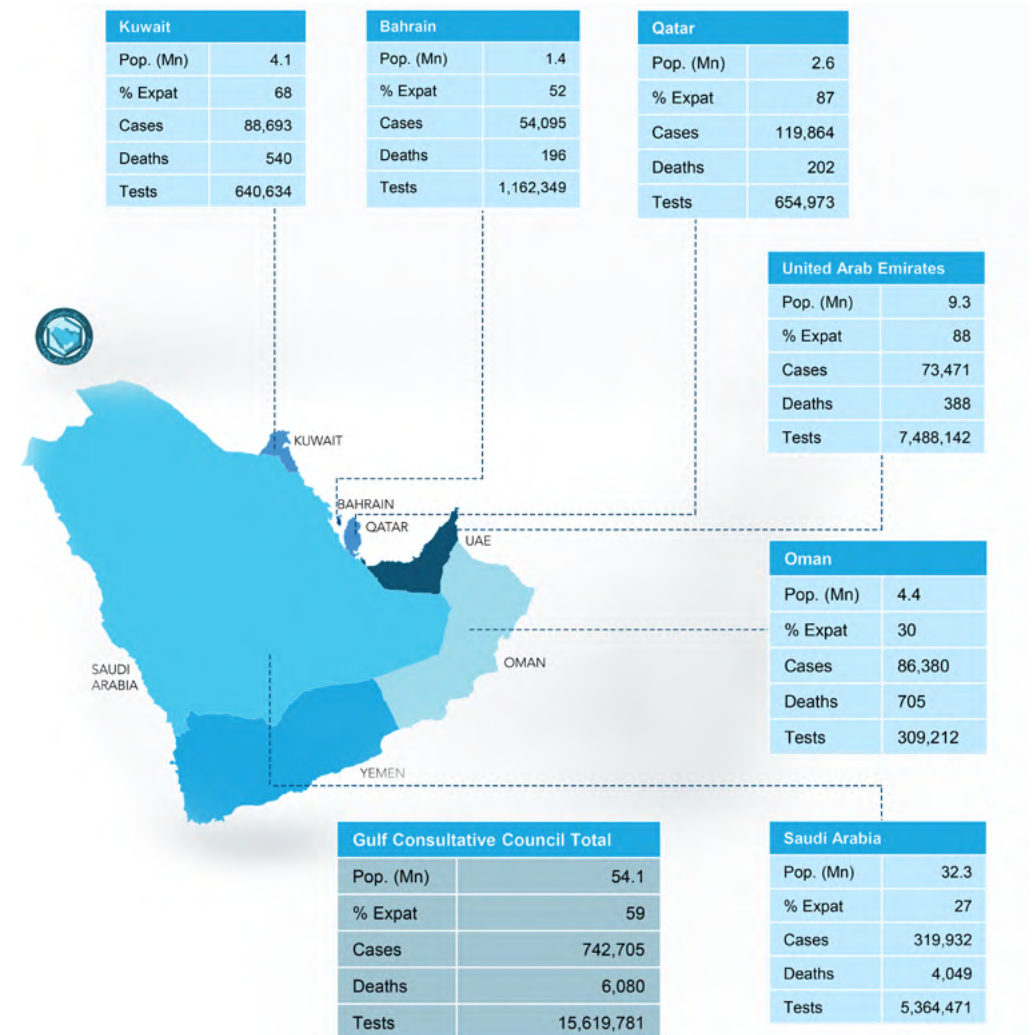
In the GCC, countries face a "perfect storm" of circumstances as the economic impacts of the Pandemic and associated lockdowns combine with oil prices currently at the level of US$ 40 per barrel[2], few Governments are able to balance their budgets or maintain spending at their current levels. Yet even as global commerce resumes, oil prices are unlikely to recover to anything near historic levels.

The World is moving away from fossil fuels, with decarbonisation and a credible global response to the Climate Emergency now changing the long-term geopolitical agenda. COVID-19 offers an early taste of the rapidly approaching post-oil era.

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[1] Coronavirus is the name given to a family of related viruses, many of them causing respiratory and other acute or chronic illnesses. Coronaviruses cause COVID-19, SARS, MERS, and some strains of influenza, or flu. The coronavirus that causes COVID-19 is officially called SARS-CoV-2, which stands for Severe Acute Respiratory Syndrome Coronavirus 2. The name of the illness caused by the coronavirus SARS-CoV-2, COVID-19, stands for "Coronavirus Disease 2019.
[2] Brent Crude US$ 39.83. Bloomberg, 11th September 2020.

Tracker for COVID-19 Situation in the GCC (as of 6th September)

Kuwait	
Pop. (Mn)	4.1
% Expat	68
Cases	88,693
Deaths	540
Tests	640,634

Bahrain	
Pop. (Mn)	1.4
% Expat	52
Cases	54,095
Deaths	196
Tests	1,162,349

Qatar	
Pop. (Mn)	2.6
% Expat	87
Cases	119,864
Deaths	202
Tests	654,973

United Arab Emirates	
Pop. (Mn)	9.3
% Expat	88
Cases	73,471
Deaths	388
Tests	7,488,142

Oman	
Pop. (Mn)	4.4
% Expat	30
Cases	86,380
Deaths	705
Tests	309,212

Gulf Consultative Council Total	
Pop. (Mn)	54.1
% Expat	59
Cases	742,705
Deaths	6,080
Tests	15,619,781

Saudi Arabia	
Pop. (Mn)	32.3
% Expat	27
Cases	319,932
Deaths	4,049
Tests	5,364,471

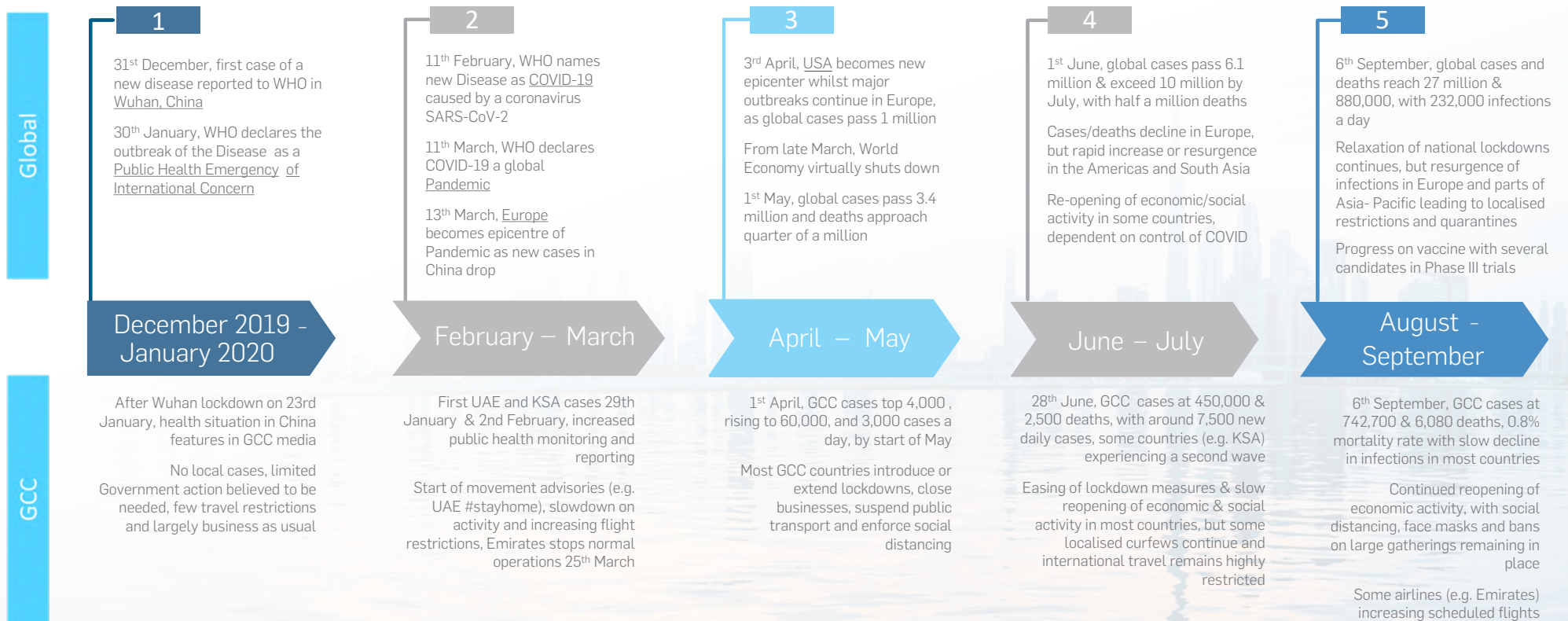## Towards Recovery and Reform

All of this means that the policy goals for Governments around COVID-19 within the GCC have changed as, indeed, they have elsewhere in the World. Whilst containing the Virus remains vitally important, especially in preventing a resurgence of runaway community transmission, the focus in the second half of 2020 is on re-opening economies and restarting growth. With lockdowns now lifted, the challenge is how to achieve or maintain re-opening safely, restore business and consumer confidence and provide the right economic and fiscal stimulus which will support the early stages of a viable recovery towards the end of the year.

In the medium-term, with an effective vaccine available and resolution of the Pandemic within prospect, the regional recovery will need to lay the foundations for the post-COVID World. This will need to move beyond the era of oil dependency, supporting economic diversification,

recognising new constraints on public sector finances, fostering a strong private sector and embracing genuine sustainable development. Initiatives such as Saudi Arabia's Vision 2030 already recognise this, but there is now a new urgency to accelerate and broaden reform. However difficult and painful change will be, made harder by the present crisis, there is now a necessity, as well as a window of opportunity, to do things differently. That task needs to start now.

This broader agenda will shape the GCC transport sector, and the future of the multiple public and private organisations, managers and employees within it. As we said in our first White Paper, transport networks have a vital role in keeping essential goods and workers moving at a time of crisis; they will have a vital role in the recovery too, especially if Governments prioritise and accelerate infrastructure investment and public services as an economic stimulus. This second White Paper explains how.

COVID-19 Timeline to Date

Global

1

31st December, first case of a new disease reported to WHO in Wuhan, China

30th January, WHO declares the outbreak of the Disease as a Public Health Emergency of International Concern

2

11th February, WHO names new Disease as COVID-19 caused by a coronavirus SARS-CoV-2

11th March, WHO declares COVID-19 a global Pandemic

13th March, Europe becomes epicentre of Pandemic as new cases in China drop

3

3rd April, USA becomes new epicenter whilst major outbreaks continue in Europe, as global cases pass 1 million

From late March, World Economy virtually shuts down

1st May, global cases pass 3.4 million and deaths approach quarter of a million

4

1st June, global cases pass 6.1 million & exceed 10 million by July, with half a million deaths

Cases/deaths decline in Europe, but rapid increase or resurgence in the Americas and South Asia

Re-opening of economic/social activity in some countries, dependent on control of COVID

5

6th September, global cases and deaths reach 27 million & 880,000, with 232,000 infections a day

Relaxation of national lockdowns continues, but resurgence of infections in Europe and parts of Asia- Pacific leading to localised restrictions and quarantines

Progress on vaccine with several candidates in Phase III trials

| December 2019 - January 2020 | February — March | April — May | June — July | August - September |

GCC

After Wuhan lockdown on 23rd January, health situation in China features in GCC media

No local cases, limited Government action believed to be needed, few travel restrictions and largely business as usual

First UAE and KSA cases 29th January & 2nd February, increased public health monitoring and reporting

Start of movement advisories (e.g. UAE #stayhome), slowdown on activity and increasing flight restrictions, Emirates stops normal operations 25th March

1st April, GCC cases top 4,000 , rising to 60,000, and 3,000 cases a day, by start of May

Most GCC countries introduce or extend lockdowns, close businesses, suspend public transport and enforce social distancing

28th June, GCC cases at 450,000 & 2,500 deaths, with around 7,500 new daily cases, some countries (e.g. KSA) experiencing a second wave

Easing of lockdown measures & slow reopening of economic & social activity in most countries, but some localised curfews continue and international travel remains highly restricted

6th September, GCC cases at 742,700 & 6,080 deaths, 0.8% mortality rate with slow decline in infections in most countries

Continued reopening of economic activity, with social distancing, face masks and bans on large gatherings remaining in place

Some airlines (e.g. Emirates) increasing scheduled flights

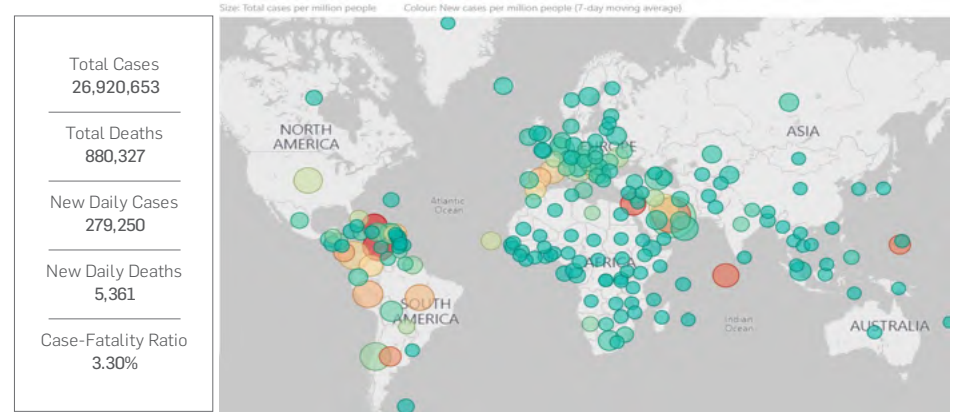# 2. THE DIRECT IMPACTS OF THE PANDEMIC ACROSS THE GCC REMAIN COMPLEX AND WILL RESONATE FOR MANY MONTHS TO COME

COVID-19 Epidemiology

Globally, as of 6th September 2020, reported COVID-19 cases globally topped 26.9 million and 880,000 people were reported to have died. Reported cases in the GCC were initially low compared to Europe, the USA and China, but accelerated dramatically from the beginning of April, reaching 742,705. Deaths have similarly increased, standing at 6,080 as of 6th September 2020, a tangible and tragic loss of human life.

Putting these figures in context, the incidence of COVID-19 in the GCC is well above the recorded global average per million population, exceeding equivalent rates in Europe and on a par with the USA and South America. However, the mortality rate (0.8 per cent) is well below the global average, significantly lower than levels seen in Europe and the Americas. This is likely to reflect the expansion of testing, the lower age profile of the expat working population in most GCC countries as well as the peak of infections coming later in the year, when therapeutic responses were more developed and effective in treating acute cases in hospitals.

Clearly, absolute numbers and rates of infection and deaths from COVID-19 have varied between GCC countries, with Saudi Arabia appearing to be particularly impacted on both counts. However, there are some signs that the Pandemic has passed or is near its peak in all countries; community transmission at the national level has given way to more localised outbreaks which will require careful monitoring and responses in the months ahead, before a vaccine is likely to become available in the first half of 2021.

Global Status of COVID-19 (6th September)

Total Cases	26,920,653
Total Deaths	880,327
New Daily Cases	279,250
New Daily Deaths	5,361
Case-Fatality Ratio	3.30%

Regions	Total Cases	Total Deaths	Total Cases per million people	Total Deaths per million people
South Asia	4,792,769	81,736	2,638	45
South America	6,669,474	211,437	15,444	490
North America	7,480,923	276,330	12,683	468
Middle East	1,574,127	37,767	6,031	145
Europe	3,767,893	209,917	5,034	280
Asia-Pacific	1,342,658	32,075	524	13
Africa	1,292,113	31,058	965	23

New Cases (7-day moving average)
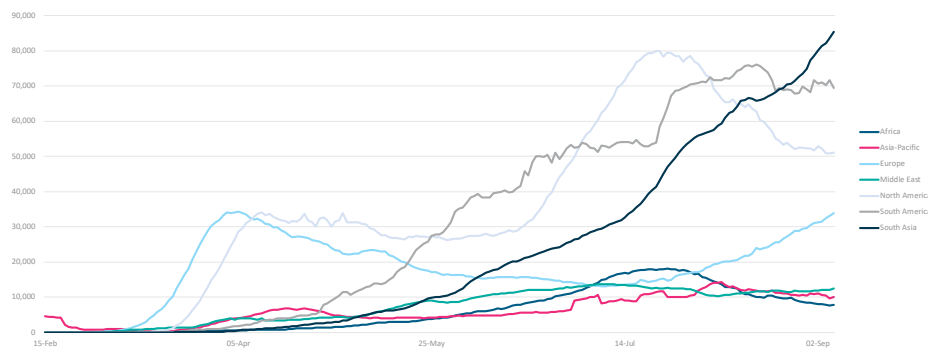
New Deaths (7-day moving average)
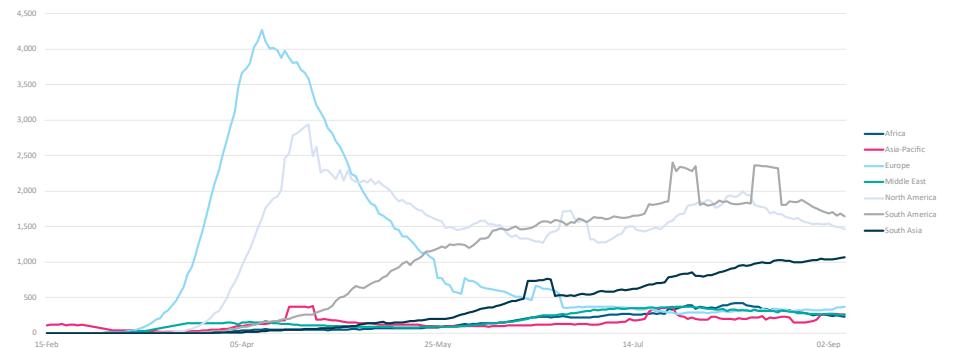
From Lockdown to Re-Opening

Early on in the Pandemic, restrictions on travel, personal mobility, social and business activity were imposed across the GCC as Governments took decisive action to prevent and contain community transmission. Initiatives such as the UAE's National Sanitisation Programme required people to stay at home, make essential trips only and continue professional and personal life online. Regular public transport was suspended or restricted in capacity or operating hours, whilst traffic monitoring was deployed across road networks to ensure journeys were for essential purposes. Likewise, business travel and tourism virtually ceased as borders were closed, airlines ceased scheduled operations and issuance of visas was suspended.

Since May, blanket lockdowns have been progressively eased, with malls, public buildings, mosques, offices and factories re-opening to varying degrees of access and capacity. Nevertheless, many citizens and residents are still encouraged, or are choosing, to stay at home, localised lockdowns remain in some areas and international borders, including airports, remain closed to all but essential travel, cargo, returning residents and repatriation flights.

Looking ahead, further resumption of activity is expected, including tourism, business travel and progressive re-starting of international flights. Nevertheless, restrictions are likely to remain around social distancing, use of face masks and access to certain services. Activity will also be depressed by lack of public trust and confidence, unemployment and repatriation of tens of thousands of expat workers to their home countries.

Status of COVID-19 across GCC (6th September)

Total Cases

United Arab Emirates, 73,471
Bahrain, 54,095
Kuwait, 88,963
Oman, 86,380
Qatar, 119,864
Saudi Arabia, 319,932
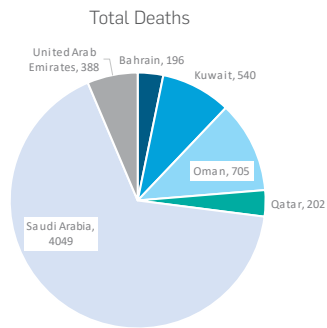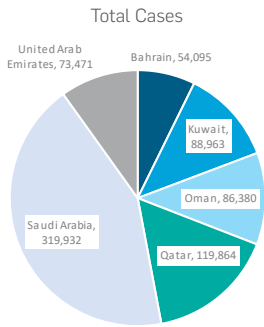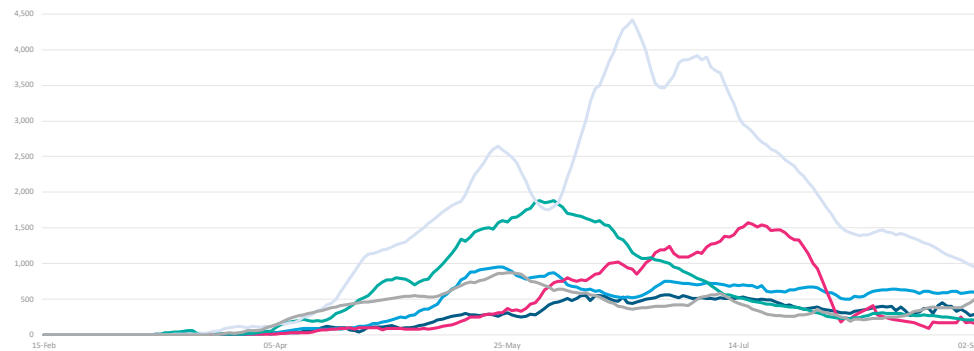
New Cases (7-day moving average)

Total Cases (per million people)

Australia 1,028
Canada 3,484
East and Southeast Asia 305
Europe 5,034
GCC 12,660
India 2,981
South America 15,489
United States 18,870

Total Deaths

United Arab Emirates, 388
Bahrain, 196
Kuwait, 540
Oman, 705
Qatar, 202
Saudi Arabia, 4049

New Deaths (7-day moving average)

Bahrain   Kuwait   Oman   Qatar   Saudi Arabia   United Arab Emirates

Total Deaths (per million people)

Australia 29
Canada 242
East and Southeast Asia 8
Europe 280
GCC 104
India 51
South America 491
United States 570

Impacts of COVID-19 Pandemic on Mobility and Associated Impacts

Impacts on Mobility

Lockdowns and restrictions on activities across the GCC have affected personal mobility and, by implication, access to various destinations and services. Data from Google shows that non-residential destinations have seen falls in activity of 60 to 80 per cent at the height of maximum restrictions. Mobility levels have partially recovered as facilities have re-opened, but are still around 20 to 40 per cent below pre-lockdown levels. It is likely to be some time before activity returns fully, impacted by cessation of businesses and jobs, substitution of activities with online services, and repatriation of laid-off workers to their home countries.

As remarked in our first White Paper, the imposition of lockdowns and restrictions on economic activity have had some positive consequences. Congestion levels have fallen sharply in cities across the GCC, air quality has improved, carbon emissions have fallen and some citizens and residents perceive an improved quality of life in working from home rather than commuting. There is also some evidence that road accidents have fallen in line with reductions in traffic levels, but the impact on accident severity may be less positive as motorists drive faster on quieter roads resulting in higher impact collisions.

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COVID-19 Impacts on Mobility

	Workplace Attendance	Public Transport Stops	Retail & Recreation	Grocery & Pharmacy	Parks & Beaches
UAE	-77% -23%	-84% -38%	-80% -15%	-60% +2%	-86% -33%
KSA	-79% -26%	-88% -45%	-84% -12%	-72% -5%	-81% +5%
Bahrain	-64% -24%	-56% -27%	-61% -16%	-32% -4%	-66% -3%
Kuwait	-83% -30%	-83% -36%	-90% -14%	-81% -10%	-83% -9%
Qatar	-74% -9%	-69% -23%	-72% +5%	-47% +25%	-70% +27%
Oman	-69% -27%	-77% -49%	-67% -14%	-59% -6%	-65% -33%
	minimum *current*	minimum *current*	minimum *current*	minimum *current*	minimum *current*

Source:Community Mobility Reports, Google
The baseline for the data published by Google is the median value for the corresponding day of the week, during the 5-week period between
January 3rd and February 6th, 2020

Changes in Urban Congestion in Selected GCC Cities

Abu Dhabi — Dubai — Riyadh — Jeddah — Kuwait City
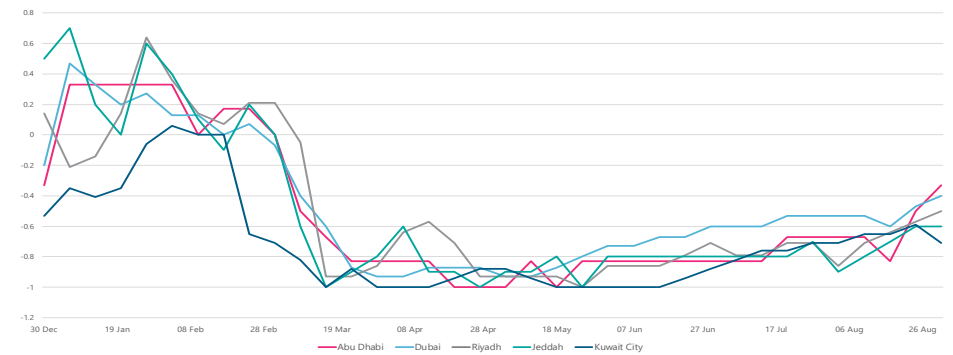
Google Mobility Index - GCC average

Parks — Transit Stations — Workplaces — Residential — Retail and Recreation
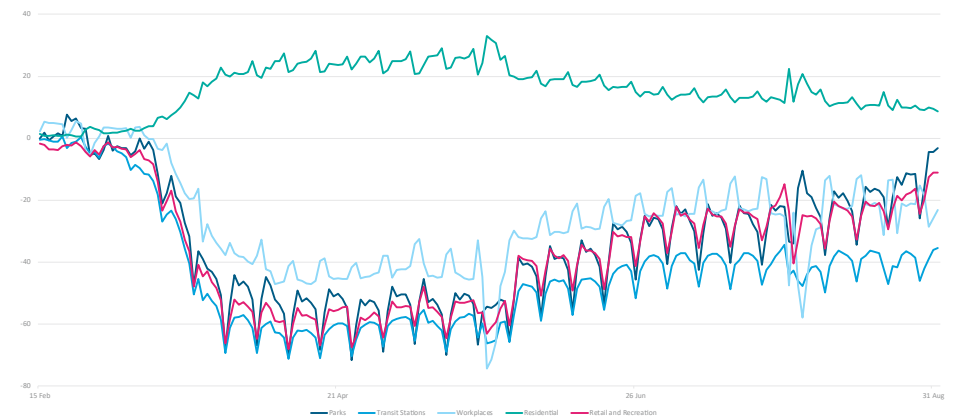
3. THE TRANSPORT SECTOR MUST CHART A PHASED ROADMAP OUT OF LOCKDOWN TOWARDS A REIMAGINED VISION OF THE FUTURE

Overview

Whilst much of the focus of most transport professionals in the GCC and elsewhere has been on tracking, managing and recording the consequences of what the IMF have called "The Great Lockdown," attention has increasingly turned to exit strategies. These need to be designed to not only release people from isolation, but carefully restart economic and social activity and pave the way for a strong and sustainable recovery into 2021 and beyond. For the transport sector, this also means allowing people, businesses and communities to reconnect with opportunities, whilst controlling Coronavirus and mitigating a return of the congestion, road casualties, pollution and other externalities which characterised the pre-pandemic paradigm.

At the time of writing, strict lockdown measures have largely ended in most parts of the GCC, changing at different times and with varying profiles in different places. With the prospect of better epidemiological management, lower rates of infection and mortality and the prospect of a vaccine, it is time to start thinking about life after COVID-19, how we will travel and move people, goods and services, and how this will support a return to a prosperous, sustainable, more resilient and happier society.

The model is structured as follows:

The **Lockdown** period is already easing intermittently in most countries around the World, including the GCC, subject to major falls in the rate of infection from social distancing, Governments' ability to manage the factors influencing the spread of the virus and the need to reverse the major socio-economic and social consequences from long periods of activity and mobility restrictions.

Short-term **Reopening** from Lockdowns is also now under way, based on retention of social distancing, face masks and other personal protection and much greater intelligence in tracking and managing the virus. Risks must be carefully managed until a vaccine and more effective therapeutic treatments are available. This immediate release period may last into the Fall of 2020, but with the very real prospect of partial, short-term or localised lockdowns if infection rates increase again. The latter is already being seen in some places and life is unlikely to get back to "normal" well into 2021.

Reopen ➡ Recover ➡ Reimagine

Since our first White Paper was published, we have worked through collaboration of our transport planning and strategic advisory experts across the World to develop a three-phase model which we call Reopen – Recover – Reimagine. This frames how the transport sector should respond to the unprecedented socio-economic shock inflicted by COVID-19, as well as impacts of low oil prices on GCC exports and finances.

Decisions made over the next few months will be essential in not only restarting economies, including accelerated infrastructure investment, but reframing how the transport sector will develop in a diversified, sustainable and inclusive direction in the next five to ten years. In addition, data and policy decisions will be required at a rapid rate to identify and address some pressing challenges emerging from the pandemic, augment certain pre-established megatrends and realise a range of positive opportunities. Many have already called this the "new normal" for how we anticipate, respond to and proactively create a better future.

This takes COVID-19 as the chance to reset how we identify and access opportunities, physically travel and operate physical resources within the carrying capacity of the natural environment.

Medium-term **Recovery** of national and local economies will be supported as Governments and the private sector assess immediate needs and launch various initiatives for rehabilitating businesses, creating or reassigning employment, and rebuilding the sectors and localities worst impacted. This period is expected to last beyond 2021, including accelerated infrastructure delivery, technology research and other tools of economic stimulus and industrial strategy.

Long-term **Reimagining** of how the transport system will meet future needs, reflecting the impacts, challenges and opportunities of COVID-19 and agendas such as the post-oil economy, social cohesion and wellbeing, the Climate Emergency and Net Zero, looking to transform and future-proof transport infrastructure and services towards 2025 and beyond.

The framework has a strong emphasis on the intelligent application of data and evidence, evaluation and rapidly learning lessons to shape decision-making. Data, testing, learning and knowledge sharing will be critical, most obviously in controlling the spread of COVID-19 over the next few months in the transition from lockdown to successful reopening. Effective use of data will also be central to understanding user perceptions, implications for transport choices, the effect of policy decisions and in collaborative working across public agencies and with the private sector to rebuild prosperous, resilient and sustainable economies and communities, better able to withstand future shocks which will almost certainly arise. A key outcome of this is sound preparation and readiness for the next crisis before it happens.

Reopen – Recover – Reimagine Framework and Roadmap
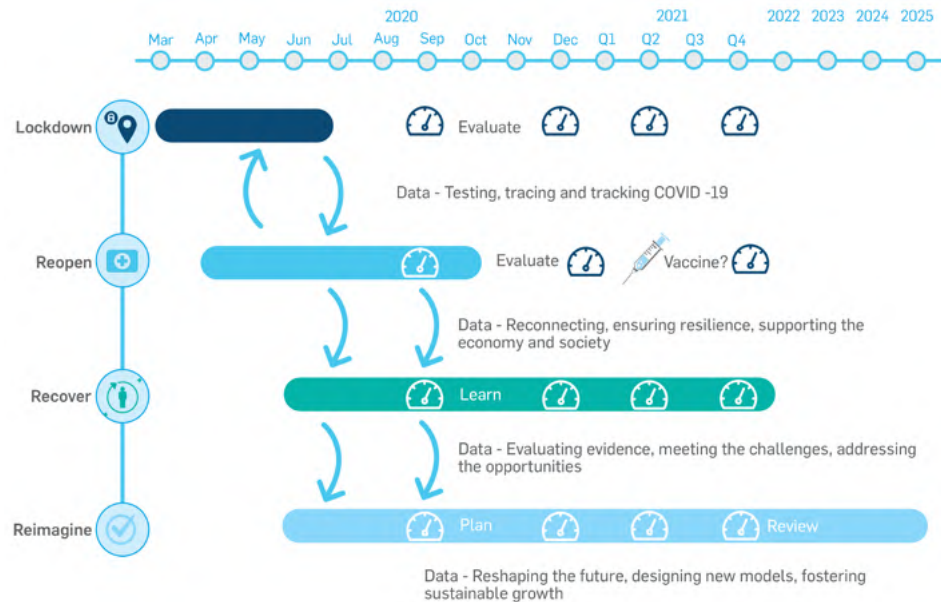
Specific Transport Sector Responses

Even before COVID-19, the transport sector globally was facing the prospect of major changes in the ways that people and goods move. Demographics, urbanisation, big data, digitisation, future mobility technology and service models, environmental sustainability, futureproofing and climate change all represent disruptive megatrends with a potentially transformative impact requiring a response from policy makers, regulators, infrastructure owners and service operators, as well as customers and wider civic society.

On top of this, the requirement for social distancing has already caused profound changes in people's perceptions of different modes and their travel choices. There is a danger that car ownership and use increases as shared transport modes lose public trust and confidence, increasing traffic and congestion. Public agencies must therefore be proactive: the sector is already operating under the new normal. For example, cities worldwide are introducing pop-up lanes for walking and cycling; new emergency contracting regimes are being introduced for public transport, new mobile apps are capable of tracking personal mobility, the development of Electric Vehicles may accelerate and the management of road networks is being considered in light of new expectations, outputs, performance regimes and impact assessments.

Transport organisations worldwide will therefore need to work with partners to set and achieve new objectives, support a sustainable economic recovery and proactively plan the future of their places. Aligning this with our three-phase model, the table below sets out some of the priorities which must be considered across a range of supply, demand, planning, operational, regulatory and financial considerations. This list will evolve as more data, experience and learning emerges across our global network of experts.

Key Priorities for Transport Organisations within Reopen – Recover – Reimagine Roadmap

Dimension	Lockdown	Reopen	Recover	Reimagine
Travel Demand	Restrictions on non-essential trip-making, stay at home campaigns and public fear and anxiety, leading to sharp falls in travel demand (↓70 – 90%) across all modes	Easing of travel restrictions to allow discretionary trip-making leading to partial rebound of travel demand, at least locally (↓20 – 30%) Restricted international mobility	Stimulating trip-making for all purposes in line with economic activity, and restarting of social and cultural life (↓0 – 10%) Reopening of borders and international mobility	Regulating mobility in line with economic and social activity with focus on Avoid – Shift – Improve, including Travel Demand Management, supporting public transport, active travel and traffic management and electrification
Transport Network Management	Keeping key transport networks, facilities and services open at minimum operational capacity for essential users, focused on maintaining supply chains	Re-opening a transport networks, facilities and services for a managed return of some individual and business travel whilst maintaining social distancing & sanitisation	Restoring confidence in networks through visible bio-security measures, communications, positive incentives (e.g. fare discounts), data platforms and technology	Revisiting physical design and operational standards for transport infrastructure, assets and services to strengthen health and safety, biosecurity, flexibility and resilience Asset optimisation, effectiveness and efficiency focused on getting the most out of existing infrastructure and assets Revisiting emergency response, business continuity and workforce contingency plans, procedures and systems in preparation for future pandemics and other crises
Transport Operations, Workforce and Users	Protecting frontline workers and users from infection, reducing non-essential user demand, managing workforce at reduced capacity and social distancing, and maintaining bio-security	Introducing effective and scalable bio-security measures for workers and users to maintain social distancing, reduce risk of infection and track and trace individuals as facilities re-open and demand returns	Maintaining, with reduced inconvenience and invasiveness, bio-security measures for workers and users to reduce risk of infection, track and trace individuals as demand increases	
Transport Regulations and Fees	Suspending, easing or introducing selected transport regulations and fees to allow essential activity, maintain social distancing, protect businesses or encourage a phased re-opening of activity under controlled conditions (e.g. move permits, driver hours, home deliveries, vehicle occupancy, parking fees, road tolls)		Restoration or adjustment of fees and regulations, with phasing & adjustment to meet new or temporary policy goals (e.g. vehicle occupancy, public transport fare discounts)	Revisit and revise transport regulations and fees to strengthen occupational health and safety, respond to future crises and encourage economic development, job creation. sustainability and wellbeing

Key Priorities for Transport Organisations within Reopen – Recover – Reimagine Roadmap

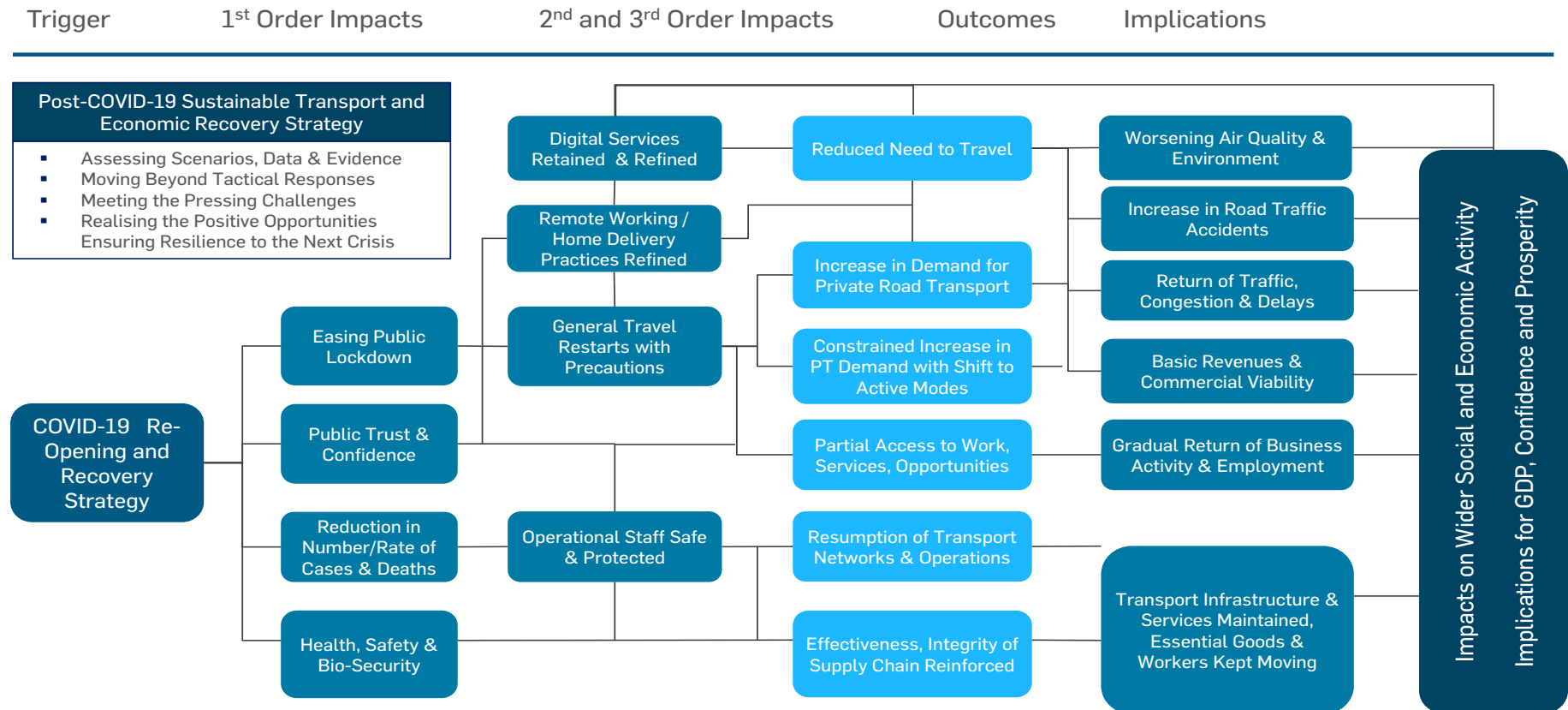| Dimension	Lockdown	Reopen	Recover	Reimagine
Transport Administration and Offices	For office workers, supporting rapid deployment of working from home and remote operation, aided by ICT, video conferencing, online data platforms and cybersecurity measures	Phased return to office for key workers, partially maintaining, and fine-tuning, remote working practices for other in line with government & organisational policies, and worker needs and preferences	Partial/hybrid retention of remote working, at least on a part-time basis, as an ongoing organisational policy and practice, based on worker needs, lifestyle preferences and operational performance	Development of new remote working practices, organisational transformation, new office design and operation, enhanced connectivity digitisation of organisational functions and altered work-life balance for employees in neighbourhoods
Transport Enterprises	Emergency support, including contract suspension of variation, to supplement revenues, safeguard solvency, protect businesses & jobs, maintain sector integrity	Supporting furloughed businesses and workers to return to the market, resume activities and revenue collection and generation, with resumption or variation of contracts	Supporting businesses to return to full commercial activity and viability, including assistance to SMEs, contractual restoration or variation, and managing insolvencies	Recognising need and opportunity for sector and corporate restructuring, consolidation, competitive repositioning, disruptive technologies (e.g. automation) and new business models
Transport Programmes and Investment	Cessation of non-essential activities to protect workers, conserve materials and components and keep key routes open	Selective restarting, and potential acceleration, of some programmes taking advantage of network availability at low demand	Maintaining, or bringing forward, programmes to provide economic stimulus and support businesses and jobs	Reprioritisation of projects and activities to maximise benefits relative to costs, repurpose places and infrastructure with focus on sustainable economic growth, equity and wellbeing
Positive Impacts	Monitor and document unplanned positive outcomes of pandemic such as air quality, noise, carbon, biodiversity, congestion, road accidents, active modes and re-engagement of people with local areas and communities	Repurposing and deregulation of transport assets and spaces where demand has changed to allow localised re-opening of activity at reduced impact (e.g. pedestrianes, priority areas, pop-up cycle lan promotion of EVs)	Rapid planning of measures to support safe walking and cycling, access to public transport, micromobility, management of traffic, attractive and accessible public realm and promotion of new transport energy (e.g. EVs)	Recognition of transport & supply chain management as essential service Scenario planning to understand demand forecasts, engineering and operations under conditions of uncertainty Acceleration of automation, new technologies, data platforms & service models Priority firmly on targets for genuine decarbonisation, net zero and sustainability

Changing the Agenda

Most importantly, governments and transport organisations must not lose sight of the importance of decarbonising the transport system, diversifying sources of energy, promoting healthy and cohesive communities, supporting individual wellbeing and addressing the Climate Emergency. They must also seek to take concrete actions to maintain (or restore) some of the positive impacts of the Pandemic, at the same time as reviving socio-economic interaction and reinforcing system resilience.

In the specific context of the GCC, this must also be done within the context of the post-oil agenda, embracing and pursuing economic diversification, promoting social inclusion, broadening skills and education and shifting investment, jobs and business models from the public to a growing, and appropriately regulated, private sector.

This agenda predates COVID-19, but the pandemic represents a pivotal moment when rapid reform and economic and social transformation is both necessary and feasible. The opportunity must be grasped now.

2020 has already been extremely challenging, particularly in the light of the economic crash, the realities of social distancing and the experience of many of working from home under various domestic circumstances. However, now is the time, and the opportunity, to re-shape the transport system for a prosperous, sustainable and equitable future and leave a positive legacy of future generations.

Logic Mapping of COVID-19 Reopening and Recovery on the Transport Sector

Trigger	1st Order Impacts	2nd and 3rd Order Impacts	Outcomes	Implications

Post-COVID-19 Sustainable Transport and Economic Recovery Strategy
- Assessing Scenarios, Data & Evidence
- Moving Beyond Tactical Responses
- Meeting the Pressing Challenges
- Realising the Positive Opportunities
  Ensuring Resilience to the Next Crisis

COVID-19 Re-Opening and Recovery Strategy

Easing Public Lockdown

Public Trust & Confidence

Reduction in Number/Rate of Cases & Deaths

Health, Safety & Bio-Security

Digital Services Retained & Refined

Remote Working / Home Delivery Practices Refined

General Travel Restarts with Precautions

Operational Staff Safe & Protected

Reduced Need to Travel

Increase in Demand for Private Road Transport

Constrained Increase in PT Demand with Shift to Active Modes

Partial Access to Work, Services, Opportunities

Resumption of Transport Networks & Operations

Effectiveness, Integrity of Supply Chain Reinforced

Worsening Air Quality & Environment

Increase in Road Traffic Accidents

Return of Traffic, Congestion & Delays

Basic Revenues & Commercial Viability

Gradual Return of Business Activity & Employment

Transport Infrastructure & Services Maintained, Essential Goods & Workers Kept Moving

Impacts on Wider Social and Economic Activity

Implications for GDP, Confidence and Prosperity

4. RE-OPENING SAFELY MUST BUILD ON SHARED EXPERIENCE AND ADDRESS IMMEDIATE OPERATIONAL CHALLENGES

Since the first cases of COVID-19 in the GCC in late January 2020, we have tracked the progression of the Pandemic, it's impacts and responses by Governments, public agencies and private enterprises. This continues as different countries within the Region move through varying stages of easing their lockdowns and travel restrictions and seek to re-open economic and social activity domestically and internationally.

We also continue to gather evidence through our regional and worldwide offices and via our participation in global transport bodies such as PIARC and the Association of European Transport. We are collating, as well as influencing, the practices which are emerging, examining the key issues, what seems to work effectively and what remains problematic and challenging. The situation is remains fluid, but some clear lessons are evident.

Key Issues and Challenges

Our first White Paper identified ten key issues for transport organisations globally arising from COVID-19. Updating these issues in light of more recent experience, there are a number of key lessons for successful management of the Pandemic as well for re-opening of economic and social activity now taking place.

> Tracking changes in transport demand, with some recovery as lockdowns are eased, together with associated implications (e.g. changes in congestion, fare revenues, road traffic accidents, air quality);

> Monitoring, and in some cases encouraging, shifts in user demand across modes and networks, including appropriate advice in the safe use of public transport and allowing for potential increases in walking, cycling and micromobility in urban centres and local neighbourhoods;

> Keeping key road and transport networks and facilities open, accessible and operational, including maintaining movement of essential goods and workers, restoring access to the general public and non-essential businesses, and adjusting regulations/fees to restore confidence and support business;

> Ensuring the health & safety of transport employees and customers, especially those in operational settings, including workable solutions around social distancing, sanitisation and use of PPE;

> Ensuring the health & safety of transport employees and customers, especially those in operational settings, including workable solutions around social distancing, sanitisation and use of PPE;

> Connecting, managing and maintaining effectiveness of office-based staff Working from Home, including organisational management, ICT, team collaboration and leadership;

> Continuing, postponing, or bringing forward infrastructure construction and maintenance activities;
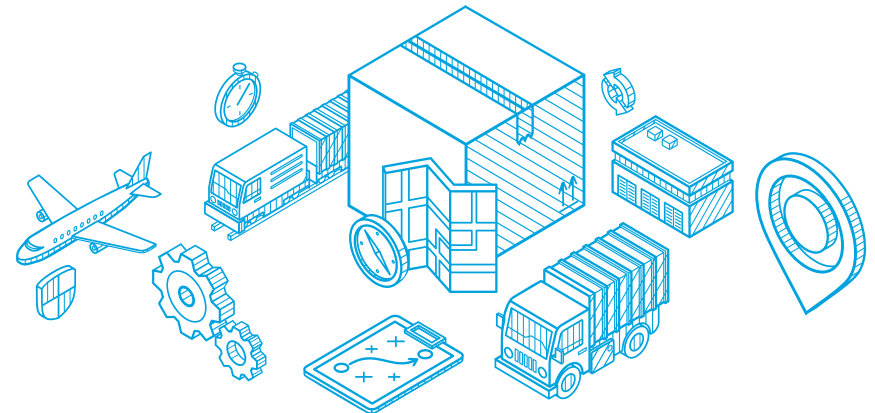
› Personal mobility management, including technology solutions and COVID-19 testing, as transport networks and services re-open or with the potential for localised lockdowns and restrictions;

› Relations of public agencies with the private sector supply chain, including contract management and variation, maintaining project schedules and outputs, and continued support for SMEs;

› Cybersecurity, including an increase in hacking, phishing and other threats, with new remote working platforms and processes especially vulnerable until protections are put in place; and

› Financial sustainability at a time when assets must be maintained, operational costs have risen, but revenues remain below pre-pandemic levels. With surface transport employing an estimated 60 million people worldwide, jobs must be protected or rapidly redeployed to new roles and assignments under existing, consolidated or new business models.

Certain modes and environments present particular challenges in re-opening. For example, despite unclear evidence of public transport being a vector of COVID-19 transmission, in some cases Governments continue to advise against its use, undermining passenger confidence, flattening the resumption of demand, threatening the survival of operators and potentially pushing customers towards car use and increased road traffic. At the same time, requirements for social distancing and capacity constraints on buses and trains have clear implications for cost recovery and commercial viability. Similarly, re-opening of international aviation is subject to the complexities of bilateral agreements, differing health compliance and quarantine regimes as well as passenger screening, social distancing and protection at airports and on aircraft.

It is important that the safe, financially and economically viable re-opening of transport infrastructure and services is informed by data and evidence, sharing of best practice and making trade-offs between the risks of COVID-19 transmission and supporting a sustained economic recovery aligned with wider policy goals.

Regional Case Study – Dubai and the United Arab Emirates

National Overview

The first case of COVID-19 in the UAE was recorded on 29th January 2020, the first case in the GCC. With infections spreading, a National Sterilisation Programme was announced on the 22nd March followed by several weeks during which travel and personal mobility was severely restricted; leaving home was allowed only with a Movement Permit issued by the Police. Emirates gradually re-opened at different rates from late May onwards, but with continued restrictions on inter-city movements, social distancing in public areas, mandatory wearing of face masks and bans on large gatherings. As of 6th September, UAE has recorded 73,984 cases and 388 deaths, a relatively low mortality rate of 0.5%

The UAE and Emirate Governments are credited with moving firmly and decisively to tackle COVID-19 in terms of containment, mitigation and treatment. This includes undertaking almost 6 million COVID-19 tests, equivalent to half of the population. These actions are acknowledged as achieving good management of the Pandemic locally and ensuring the health and safety of citizens, residents and visitors. Nevertheless, there has been a severe economic impact, and loss of businesses and jobs, especially in sectors such as tourism, aviation, entertainment and hospitality which form important activities in many parts of the UAE. The Government is now actively developing a post-COVID-19 national development strategy to ensure sustainable recovery, growth and stability across all sectors as the country approaches its 50th anniversary in 2021.

Dubai's Transport Sector Response

In Dubai, the response of the transport sector to COVID-19 has been spearheaded by the Roads and Transport Authority (RTA), reporting to the higher-level Supreme Committee for Crisis and Disaster Management. From the outset, the Authority has had the following objectives across all transport modes, including roads, public transport and the regulation of general and freight traffic:

> Safeguard employees, passengers and the general public;

> Maintain availability of the transport network and the delivery of essential transport services to the public; and

> Working in collaboration with other Government agencies to contain and manage the pandemic.

In meeting these objectives, the RTA has continued to deliver transport services, adapting its management approaches dynamically to the changing public health situation, changing processes and procedures in line with lockdown measures, and deploying technology and innovative practices to ensure safety and maintain public trust and confidence. With the exception of a short period when metro, tram and maritime services were suspended, and inter-emirate services, transport networks have remained open and operational, supporting movement of essential workers, goods and materials.

Dubai can claim a number of specific innovations in response to COVID-19. These include enhanced sanitisation of infrastructure and assets, use of PPE by operational staff and the successful re-assignment of office-based Government employees to work from home. Trials have been carried out of UV disinfection of taxis, switching to cashless forms of fare payment, personal disinfection kiosks and the deployment of thermal and facial recognition cameras to monitor passenger and staff health. Social distancing has been implemented on public transport and in taxis and ride-hailing vehicles, supported by public awareness and communications, signage, modification of regulations and enhanced enforcement. Taxis and ride-hailing vehicles have been switched from the carriage of passengers to the delivery of medicines, food and other essentials and for a period at the beginning of the pandemic taxi fares were discounted by 20% for trips by health workers and patients to hospitals and clinics across Dubai.

Looking to the Future

The RTA and other agencies of Dubai Government continue to assess the challenges of the COVID-19 Pandemic and the longer-term implications for the transport sector in the future. With the re-opening of business activity, the end of restrictions on personal mobility and efforts to stimulate the economy, the demand for transport across the Emirate is gradually recovering, together with a return of familiar problems such as congestion and pollution. However, transport services remain under operational and financial pressure and a focus is being put in a number of areas which will be significant moving forward:

> Restoring and maintaining public trust and confidence to use public and shared transport services, including under short-term conditions of continued social distancing, capacity management and enhanced sanitisation;

> Future design and operation of mass transit, including the Dubai Metro and potential future Small Transit Systems and first-last mile connections;

> Assessing the potential for transport technologies to improve system resilience, including a possible acceleration in the deployment of Connected and Autonomous Vehicles, under Dubai's existing Self-Driving Transport Strategy; and

> An increase in online and cashless transactions, with working from home and e-deliveries undergoing a step-change during the Pandemic, and representing a potential long-term behavioural shift.

Dubai has also announced plans to become a bicycle-friendly city, reflecting shifts in user behaviour and preferences seen Worldwide during lockdown, with changes to traffic laws, regulations, infrastructure design and operation now being considered. The focus on active travel modes is part of a wider agenda for assessing and improving the wellbeing and quality of life across Dubai, promoting physical and mental health and securing sustainable urban mobility in line with air quality, noise and carbon objectives.

International Case Study: Supporting Sustainable Infrastructure and Services in Australia

The first case of COVID-19 in Australia was recorded on 25th January 2020. Initial efforts in February to April to contain infections through travel restrictions, social distancing and cancellation of public events appeared to be successful, but the country has seen a recent resurgence of cases, especially in the most populous state of Victoria. As of 6th September, Australia has recorded around 26,279 confirmed COVID-19 cases and 421 deaths.

In the transport sector, Australia has taken a number of notable initiatives to contain Coronavirus, maintain the safe operation of the transport system and also look towards medium-term economic recovery.

Management of Public Transport During the Pandemic

Public transport services continue in most States, but at reduced demand of up to 50% since early 2020, with social distancing in place as well as enhanced sanitisation, contactless ticketing & other operational adaptations. Transport for New South Wales has implemented on-vehicle monitoring linked to an app to regulate social distancing on buses. It has also worked with Sydney Trains on a system which allows boarding and alighting counts which can be reported live to the Operations Centre. In addition, Sydney Trains' staff monitor passenger movements via 11,000 CCTV cameras. Built-in axel sensors fitted to certain train classes provide real-time train loading information which is made available to staff and customers to assist with social distancing.

Buses in Melbourne have trialled all door boarding to help customers maintain social distancing, protect drivers and reduce bus dwell times. Following the successful trial, the process will be rolled-out across all buses. In addition, to support all door boarding, cash transactions on buses will be replaced by smart tickets.

Supporting Active Modes

Cities across Australia have seen large increases in cycling for utility and leisure since February, with a doubling of trips on some routes in Melbourne & Perth, increases of 80% in Brisbane and between 25 – 60% in Sydney. Local authorities have responded by fast tracking active travel as part of a new "tactical urbanism approach" including:

> 12 km of rapid pop-up cycle lanes in the CBD and plans for 40 km of permanent bicycle lanes across Melbourne over the next two years, including through restricting on-street parking and re-allocating road space to cycling;

> 10 km of temporary bicycle lanes in the City of Sydney;

> In Brisbane, the City Council has announced a joint committee with the State Government to tackle "missing links" between cycling tracks and to improve active mode connectivity; and

> In New Zealand, the Innovating Streets for People pilot fund will provide councils with 90% funding assistance to adapt streets to support active and safe transport needs. Projects could include piloting new walking or cycling facilities, pop-up community-led street events, trialing low-traffic neighbourhoods, or reallocating more street space for people.

Fast-Tracking Infrastructure Investment as an Economic Stimulus

Through its JobMaker Plan, the Federal Government aims to fast-track investment in critical infrastructure projects across Australia. This includes the 1,700 Km Inland Rail project from Melbourne to Brisbane which will connect farms, mines, cities and ports to global markets and create 16,000 direct and indirect jobs at the peak of construction. In addition, the Government has committed $1.5 billion to commence local priority projects, of which $1 billion is shovel-ready, identified by States & Territories. Half of this programme is reserved for road safety works, as well as other interventions which tackle congestion and provide enhanced network resilience.

At State level, as part of the Victorian Government's COVID-19 economic recovery, $328 million will be invested into roads, public transport, jetties and piers with a focus on critical maintenance and upgrades, supporting more than 600 jobs. In Western Australia, the equivalent ambition is for the creation of 1,000 jobs at construction stage. Meanwhile, the Queensland Government has announced a $400 million Unite and Recover for Queensland roads stimulus package to support businesses, contractors and jobs in the State.

International Case Study: Deploying Technology to Manage COVID-19 in Asia

Despite the origins of COVID-19 in Wuhan and Hubei Province, China, the incidence of Coronavirus cases and deaths in East and South East Asia has been relatively low compared to Europe and the Americas. This partially reflects the Region's previous experience of pandemics such as SARS and rapid Government action in implementing effective track and trace systems, strict lockdown measures and monitoring of domestic and international travel. Nevertheless, cities such as Singapore, Hong Kong and Seoul have been severely impacted economically and socially and have turned to technology to help enforce social distancing, monitor the movement of people and ensure the integrity and sanitisation of transport infrastructure.

Singapore

The Singapore Government trialled a robotic dog, SPOT, in public parks to help promote social distancing. Developed by Boston Dynamics, this four-legged, 25-kg robot is equipped with safety sensors, a camera, and a speaker that "barks" pre-recorded warning message when it comes across someone who may not be practising safe distancing. Similar robots are used at Singapore's largest COVID isolation facility, located at Changi Exhibition Centre, to serve meals and medications.

Seoul, South Korea

As a part of the Smart Shelter project, South Korea has developed advanced bus shelters with temperature-checking doors and ultra-violet disinfection lamps, offering protection from monsoon rains, summer heat and COVID-19. Ten advanced facilities have been installed in a north-eastern district of Seoul on a trial basis and if successful they will be rolled out more widely in order to restore confidence in public transport.

To enter the shelter, passengers must stand in front of an automated thermal-imaging camera, and the door will only open if their temperature is below 37.5 Degrees Celsius. These bus stops are equipped with a real time bus arrival time display, free Wi-Fi, and hand sanitiser dispensers.

Hong Kong

In partnership with a local biotechnology firm, Hong Kong MTR has introduced automated "vaporised hydrogen peroxide robots" to disinfect train carriages, as well as at stations visited by people diagnosed with COVID-19.

These robots emit disinfectants into small gaps that are hard to reach by cleaners, and each robot can sanitise an eight carriage train during the non-revenue engineering hours at night.

The robots are part of a wider strategy of preventative measures to restrict transmission of COVID-19 on the MTR, including more frequent disinfection of passenger facilities and touchpoints, enhanced ventilation at stations, installation of hand sanitisers and mandatory wearing of face masks.

Hong Kong International Airport is the first in the World to trial a full-body disinfection channel facility. Users have their temperature checked before entering an enclosed kiosk for 40-seconds disinfection. The facility is kept under negative pressure to prevent cross-contamination with the outside environment. The kiosk is equipped with anti-microbial coating and is capable of remotely killing viruses on human skin and clothing using photocatalysis, "nano needles", and sanitizer spray. The trial, initially with immigration and health officials working at the airport, has been subsequently expanded to include flight crew, and the Airport Authority is considering whether to expand this facility to cover general passengers in long term.

Beijing

The introduction of social distancing measures within metro stations means that passengers have to queue outside at busy times. Although metro ridership has returned to around 25% of pre-COVID levels, it was reported that commuters have had to wait for 30 minutes before they reach the turnstiles. In response, the authorities have trailed an online reservation system where passengers can book a specific 10-minute entry time and shorten their queue by an approved-QR code. This code is also linked to an individual's COVID-19 risk profile as red, amber or green which informs their activities in public spaces and services.

Separately, Beijing Metro now publishes real-time occupancy of the rail network via its journey planner app as well as on Baidu Map. Occupancy is based on weight sensors installed within carriages, and is shown on the map interface using an red-amber-green system. This allows passengers to understand crowding under conditions of social distancing and manage their journeys.

International Case Study: United Kingdom

The first confirmed COVID-19 cases in the UK were in late January 2020, although there were unconfirmed reports of an as-yet unknown illness in December 2019 following the return of business travellers from Wuhan. Cases rose rapidly during February and March, with progressively stronger advice from the UK Government against social interaction during March. This culminated in a formal lockdown, with emergency powers unseen seen since World War II, instructed by the Government on 23rd March.

There has been considerable debate about the speed of the Government response in the UK, which has one of the world's highest death rates. Research has shown that certain groups have been particularly vulnerable, including people with underlying health conditions and Black and Minority Ethnic communities. This has triggered wide-ranging discussions about social justice issues, including treatment of older people in care homes, poor air quality and the impacts of obesogenic lifestyles on people's resilience to the virus. This has created a determination that the UK must 'build back better' emerging from the pandemic.

A Gear Change for Walking and Cycling

There were large reductions in traffic during lockdown, with radical changes in the way that streets were used. Many people reported the benefits of quieter streets for active journeys, with large increases in the numbers of people walking and cycling. The UK Prime Minister, himself hospitalised by COVID-19, recognised the importance of active travel in helping to improve people's fitness and resilience to future health emergencies. The UK Government launched its new strategy for walking and cycling in late July, with the intention of building on the behaviour changes during lockdown to deliver a step-change in active travel across England.

Gear Change sets out the Government's vision for a large increase in walking and cycling to help improve the nation's health, tackle air quality problems, reduce carbon emissions and support economic recovery. It sets out design principles for protected bike lanes and low traffic neighbourhoods, measures to support e-bikes, deliveries by cargo bikes and updates to the Highway Code. Perhaps most importantly, it proposes a new Inspectorate – Active Travel England – to audit design and champion the needs of pedestrians and cyclists.

E-scooter Trials

In common with other countries, the UK has challenges with limited public transport capacity due to the need for social distancing. To help mitigate this challenge, the Department for Transport is fast-tracking micromobility trials of rental e-scooters, which are already common in the rest of Europe. Legislation was enacted in July 2020 to enable these trials. E-scooters are considered to have a similar road presence to cycles and electrically assisted cycles, but are treated as motor vehicles in UK law. E-scooter rental operators are required to have insurance in place under the trials and users must have a valid driving licence.

Trials have commenced in the Tees Valley, starting with 50 e-scooters in Middlesbrough operated by Ginger, a new UK company, with the e-scooters unlocked using an app. Milton Keynes and Cambridge have also announced the launch of schemes with Lime and Voi. Concerns have been raised about impacts on pedestrians, particularly older generations and people with disabilities. There have also been reports of young people misusing the e-scooters, which demonstrates the importance of proper consideration of how schemes will be used, and enhanced controls are now being been applied in the hire system.

Transport Decarbonisation Plan

In June 2019 the UK became the first major economy to pass a law requiring Net Zero greenhouse gas emissions by 2050. The scale of the challenge demands a step-change in both the breadth and depth of ambition to reduce transport emissions. In March 2020, the UK Government set out its route map for Decarbonising Transport. It presents the scale of the challenge in reducing transport emissions and the current gap between the 'Business as Usual' and trajectory to Net Zero.

The document also highlights the unprecedented scale of mode shift to walking, cycling and public transport needed to meet the ambition. All vehicles will need to be zero emission, with the sale of fossil-fuelled vehicles to be banned by 2035, and freight delivered through sustainable systems. Government will work with local areas to develop solutions that work for different types of place, with industrial policy to focus on supporting the low-carbon mobility sector as a central focus of the Green Recovery.

Build, Build, Build (Building Back Better)

The UK Government has identified the role of the construction sector in supporting rapid economic recovery from COVID-19, with a strong focus on accelerating 'shovel-ready' infrastructure. The Prime Minister has reiterated 'build, build, build' as an economic stimulus but there must remain a clear business case. Transport investment has historically focused on supporting economic growth by reducing travel costs, tackling crowding and 'unlocking' land for new development. But there is now recognition in the UK that 2020 has been a turning point: in the resilience of healthcare systems, future economic direction, social inclusion and the journey to net zero carbon emissions. This is set to result in profound changes in mobility and future investments in the transport system, so that the UK can 'build back better' to address the major challenges to be faced over the coming two decades.

5. WHILST FOCUSED ON SHORT-TERM CHALLENGES, WE MUST START PLANNING NOW FOR A TRULY SUSTAINABLE RECOVERY

The World Just Changed

Even before COVID-19, the paradigm which has shaped transport planning for decades was under pressure. A focus on road-based private transport, with infrastructure provided through public sector budgets, was increasingly seen as untenable in the face of growing urbanisation, congestion, environmental degradation, declining natural resources, pressure on Government budgets and an unsustainable contribution to climate change. At the same time, disruptive transport technology, smart transit systems, electric powertrains and shared service models have been emerging within a new digital paradigm able to provide efficient access and satisfy user expectations, with fewer externalities and closer to carrying capacity of natural ecosystems.

COVID-19, and its associated socio-economic crisis, has introduced a massive shock into a system which was therefore already vulnerable to change. Yet those who have repeatedly warned about unsustainable loss of habitat, resource exhaustion, pollution and climate change have achieved nothing like the speed and scale of action taken to limit the spread of Coronavirus. However, whilst concerted action on COVID-19 has lowered carbon emissions and other impacts dramatically during lockdown, with a major rebound in environmental systems evident around the World, it has also shown how economically and socially damaging an unplanned response can be, compared to a steady, ordered transition phased over years rather than weeks.

In emerging from the crisis, therefore, whilst the focus should rightly be on short-term operational measures to reconnect people, places and things, we should aim to ultimately organise our transport system in a better way, geared towards a positive vision of the future. This will require different thinking – the challenges of the 21st Century can no longer be met by using the outdated approaches and tools of the 20th.

Using new diagnostic tools, data platforms and forms of analysis, we need to reframe our ideas of the future of transport in the GCC and worldwide. COVID-19 offers a moment of crisis when, with everything up in the air, we have the opportunity to reshape things as we would like them to be rather than falling back as before. With less to lose, we have the opportunity to conceive better options towards more sustainable outcomes and actively make the decision to implement them.

Building Blocks for the Future of Transport

Looking at the future of transport after COVID-19 is resolved, there is significant uncertainty. Despite some imaginative and headline-grabbing initiatives in the last six months, the crisis years of 2020-2021 are likely to be hard for many public and private players. Impacts will be fluid, unpredictable and complex.

With recovery to 2025 and beyond, there are grounds for some optimism that previous trends, for example around technology and new service models, will eventually re-assert themselves and indeed many will accelerate as regulators, industry and consumers look towards cleaner environments, decarbonisation of transport, flexible and personalised digital services on demand, as well as fostering innovation as a source of competitive advantage and wealth creation. This is likely to take place within an substantially shaken-out, consolidated and stronger supplier market, with policy and regulatory objectives also likely to include building in resilience to future pandemics and other crises.

Looking beyond the immediate crisis, our reimagined approach therefore brings together a broader agenda combining three pillars of spatial proximity (land use), physical mobility (transport) and digital connectivity (telecommunications) and comprise a number of cross-cutting building blocks, most of them already commenced, and which will likely continue. There are eight building blocks which we summarise below.
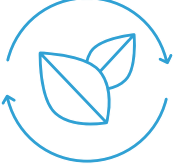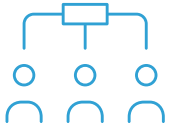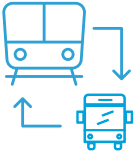
The building blocks have global relevance and applicability, although the precise context, problem definition, terminology, policies priorities and translation into action will vary by country, city and region.

The fundamental choice for policy makers already seems clear. Do we come out of COVID-19 by falling back on old ways, abandoning new opportunities, and focusing on legacy infrastructure and services? Or do we maintain, or better still redouble, our efforts to forge a new paradigm which propels us to a vision of a more sustainable, equitable and resilient mobility system and experience? The answer is self-evident; the best way to predict the future is to create it.

Building Blocks for the Future of Transport

Connect People, Services and Opportunities Digitally

Commit the Whole Transport Sector towards Credible Net Zero

Embed Sustainability and Social Inclusion within Accelerated Infrastructure

Expand Definitions and Action on Transport Health, Safety & Wellbeing

Optimise Asset and, Supply Chain Performance and Resilience

Enable and Reconfigure Future Mobility Technologies and Services

Reaffirm Public Transport as the Backbone of Mobility

Deliver Smart Governance, Regulation and Collaboration

Building Block	Description
Embed Sustainability and Social Inclusion within Accelerated Infrastructure	Whilst much has been made of accelerating infrastructure investment post-COVID as an economic stimulus, and the planning, regulatory and financial preconditions to facilitate this, there is an opportunity to "build back better" in terms of the transport assets and facilities delivered, jobs created, communities assisted and the resulting services. This could include, for example, progressing "tactical urbanism " with active travel, micromobility and transit facilities providing local accessibility, expanding charging networks to support the shift to Electric Vehicles, and fast-tracking measures which improve road safety, manage traffic, and make urban neighbourhoods more liveable, attractive and prosperous. This offers an opportunity for radical action on land use, transport and digital integration, supporting being part of, concepts such as the 15-Minute City as a mechanism to repurpose urban infrastructure, provide equitable access to jobs and services and inclusively rebuild places and communities hit hard by the Pandemic.
Connect People, Services and Opportunities Digitally	Many organisations and individuals have found Working from Home during lockdown to be a positive experience in terms of lifestyle, connecting locally and spending more time with family. With up to three-quarters of organisations considering continuing remote working practices in some shape or form after COVID-19, there are signs that this, as well as e-learning and online shopping, may remain as permanent behavioural changes. This will have significant implications for the scale and distribution of commercial real estate, and the demand for physical mobility and transport services, including e- deliveries. Organisational processes, structures, technology, culture, leadership and management of teams will also have to adapt in appropriate ways to take full advantage of new ways of working. Cybersecurity will be needed to protect more widely distributed people, systems and data.
Enable and Reconfigure Future Mobility Technologies and Services	Investment in research and development for Connected and Autonomous Vehicles, Micromobility, E-Mobility and Shared Mobility may be curtailed in the short-term, as firms focus on survival, basic products and services and short-term cash flow. However, the Pandemic has thrown up numerous examples of technological innovation and forced many to think outside the box to ensure business continuity and effective service delivery. In the longer-term, COVID-19 creates multiple added incentives to replace or protect human interactions through technology. Accelerated technology development, testing and deployment might be expected as the sector consolidates around a smaller number of strong players with the commercial strategies, data and resources to drive new products. It will be important that regulators encourage and enable innovation as part of the long-term economic recovery and competitive advantage, and ensure that private returns are balanced with public value, rather than continuing to support incumbents and legacy business models unconditionally.
Reaffirm Public Transport as the Backbone of Mobility	Public transport has been acutely impacted by COVID-19, needing to maintain essential services and keep cities moving whilst facing a cliff-edge in passenger demand, farebox revenue and passenger confidence. Looking beyond the Crisis, transit needs to regain its central role in supporting local economies, creating jobs, providing social cohesion and promoting environmental sustainability. Without effective transit, many cities face an imminent traffic emergency; and lockdown will be followed by gridlock. Investment, technology and innovation is needed to restore public trust, understand and meet customer needs, evolve more resilient funding and business models and integrate with other service providers. The latter includes shared mobility players, including through the next generation of Mobility as a Service and equivalent models.

Building Block	Description
Expand Definitions and Action on Transport Health, Safety and Wellbeing	Historically, transport planners and engineers have focused on the overriding priority of road safety, a pandemic which outstrips COVID-19 in killing 1.2 million people a year. Priority has also rightly been placed on preventing accidents and crime against passengers and staff on public transport, and protecting operational integrity of transport systems. As COVID-19 recedes, a broader emphasis on sanitisation and hygiene is likely to remain, not least to restore and maintain public trust in transport services. This will drive new forms of body scanning, system monitoring, track and trace, infrastructure and vehicle cleaning procedures. Action could also be accelerated on contactless/ cashless transactions, themselves part of e-enabled personalised mobility services, as well as more emphasis being placed on physical and mental wellbeing through active travel, public realm design and management, and prioritising clean air.
Commit the Whole Transport Sector towards Credible Net Zero	COVID-19 lockdowns have lowered global carbon emissions dramatically, but the Climate Emergency preceded, and will long outlast, the Pandemic. With emissions rebounding on re-opening, there is a need, and a window of opportunity, to highlight tangible actions (e.g. Avoid – Shift – Improve) which deliver the Paris Accord and accelerate the transition toward credible Net Zero, challenging and raising the ambition of targets already set by international frameworks and national governments. This is likely to favour more emphasis on sustainable transport modes, the management of travel demand and a transformational shift to electric powertrains, alternative fuels and behavioural change. Electrification must be supported by the greening of power generation and distribution. Action could be brought forward on existing commitments for land transport as well as extended to drive more substantial and credible responses within the aviation and maritime sectors.
Optimise Asset and, Supply Chain Performance and Resilience	In many countries, the transport system, as a critical link in the supply chain, has proved to be remarkably resilient during COVID-19 lockdowns, travel restrictions and border closures. In others, operational practices, regulations, institutional capacity and financial strength have been exposed, whilst extreme weather, seismic events and other disasters have impacted alongside the Pandemic. Looking ahead, more could be done, to assure asset and supply chain integrity and optimisation, last-mile movement (including e-deliveries) and deployment of automated delivery, remote operation and autonomous driving. In future, transport infrastructure, assets and services, generating and informed by enhanced data analytics, will need to be more adaptable and resilient to pandemics and other shocks through design, operation, management and resourcing. As we come out of this crisis, we already need to be preparing for the next.
Deliver Smart Governance, Regulation and Collaboration	Many of the practical collaborations forged during COVID-19 should be maintained, including between and within Government agencies, and the public and private sectors. The mandate, operating models and funding of organisations, as well as the basis for setting and implementing regulations, covering costs and meeting performance standards, must be reviewed in light of a more uncertain, complex and multi-faceted business environment, changing customer expectations and evolving stakeholder interests. As COVID-19 has shown, flexibility and agility in translating strategic vision into action on the ground, sharing good practice and demonstrating what works, will be key. With public sector budgets under more pressure than ever before, there is a renewed opportunity for the private sector to drive investment, infrastructure and service delivery, within a supportive enabling environment of policy, regulation, public value and oversight defined by Government.

Focus Area: The Future of Aviation

COVID-19 Impacts

Aviation has arguably been the transport sector most impacted by COVID-19. As international borders closed, by late April 2020, the majority of the World's airlines had parked around 60 per cent of their aircraft fleets and cut capacity by more than 80 per cent as passenger demand fell by over 90 per cent across the globe. Whilst some demand has returned with the easing of lockdown, the number of scheduled flights worldwide was still down by 48 percent at the beginning of August, compared to a year earlier, and the International Air Transport Association (IATA) forecasts a 55 per cent fall in Revenue Passenger Kilometres for the year. Other Industry analysts are more pessimistic, estimating falls of 65 – 75 per cent. By some estimates, the industry, which employs 12 million people worldwide, is set to lose over US$ 314 billion in passenger revenue by the end of the year.

The industry predicts a long and challenging road to recovery; IATA projects that passenger air travel will not fully recover to 2019 levels until 2023. Under these conditions, COVID-19 is likely to drive a structural change across the sector, with the potential for permanent changes in passenger expectations and preferences, significant industry consolidation and an unprecedented level of Government intervention to protect businesses and jobs. However, this will also provide an opportunity to prepare for a more environmentally-friendly and low-carbon emission future, a challenge which the sector has been struggling with for some time.

Making Commitments to Net Zero

Hitherto, securing reductions in aviation sector emissions has been largely voluntarily and based on carbon off-setting or incremental improvements to ground infrastructure and operations, such as procurement of Electric Vehicle fleets and charging stations. Currently, only three airports in Europe are Net Zero, all in Sweden. Hamburg has set this goal for 2022, whilst Amsterdam-Schiphol, Eindhoven, Copenhagen and Norwegian operator Avinor, are aiming for 2030. International Airlines Group, which owns British Airways, has set out to achieve Net Zero for carbon emissions under its control by 2050.

Looking ahead, almost 200 European airports have entered an agreement to comply with the Paris Accord, thereby committing to becoming emission-free by 2050. NetZero2050 also raises the stakes on airlines as carbon neutral operators can no longer purchase offset credits to reach net zero status and more direct action is therefore required. However, in the short-term, accelerating projects which reduce carbon emissions (and reduce long-term operating costs) will be extremely challenging, as airline and airport revenues have fallen dramatically and the priority of most organisations is conserve cash and ensure business integrity. As an example, E-Fan X, a joint effort between Airbus and Rolls-Royce to develop an experimental hybrid-electric aircraft, has been cancelled. As the sector recovers, it will be possible for progress to resume, but this will require a long-term vision to proceed, regulatory and customer pressure, and a focus on the programmes that will provide best value.
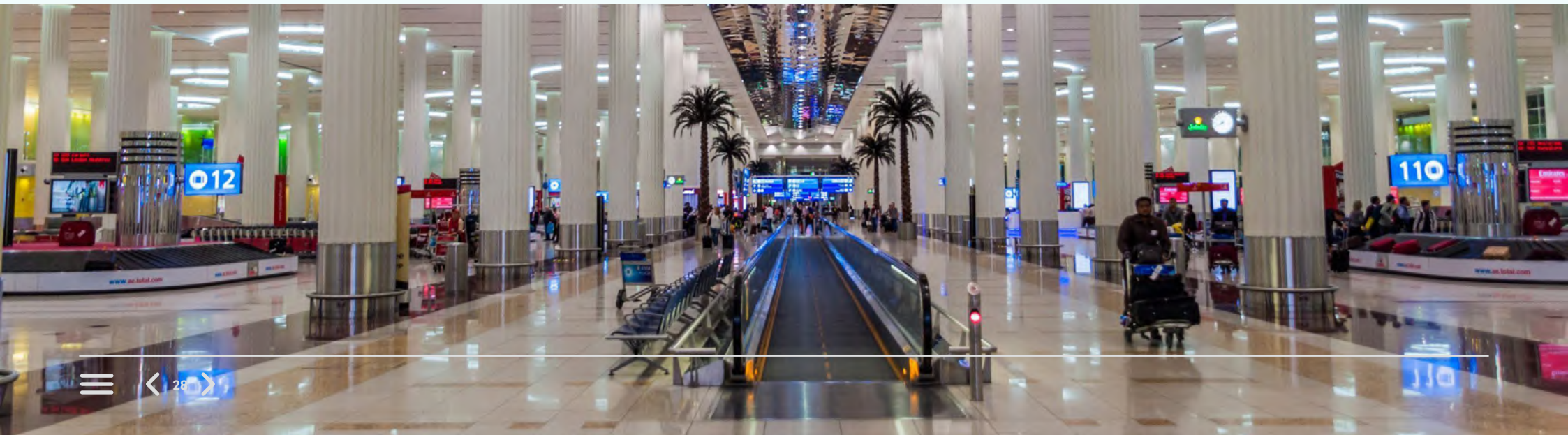
The main approach of airlines to addressing carbon emissions, offsetting, may buy time for other solutions to come forward. Government bail-out conditions will drive certain initiatives, possibly smarter network planning considerations or switching passengers to other less emitting transport modes. For example, the French Government bail-out of Air France - KLM came attached with conditions to reduce carbon emissions, including the reduction and ultimate elimination of domestic air routes operated in competition with TGV High-Speed Rail.

There may also be an acceleration of early retirements of older and less fuel efficient airliners. Fuel burn per passenger-kilometre has already dropped by half since 1990, according to IATA, and the current crisis could provide airlines with a chance to emphasize their fuel-efficiency programmes. Replacing older aircraft with new models, such as the Airbus 350 and 320 Neo, is estimated to deliver an estimated 15 percent reduction in fuel consumption.

Such efforts will be important in improving the aviation sector's carbon performance in the short-term. It is unlikely to be politically credible to return to pre-COVID levels of demand in 2023 or 2024 unless airports and airlines can demonstrate short-term emissions savings and a clear commitment to medium- and long-term decarbonisation in all aspects.

Longer-Term Solutions

Other longer-term technical solutions are currently being considered including Sustainable Aviation Fuels, battery-based electric (and hybrid-electric) aircraft, and hydrogen propulsion. Alternative forms of propulsion could one day replace conventional turbine-powered planes, especially smaller aircraft on shorter flights.

However, the difficulties involved in new aircraft energy sources are significant, for example in terms of weight and volume, knock-on effects on passenger or cargo space, and the infrastructure and charging or fuelling requirements at airports. Nevertheless, with a suitable regulatory framework, strong collaboration between governments, technology players and suppliers, and continued strong customer preferences in favour of environmentally-friendly flying, it should be possible to make progress.

Beyond airports, air traffic management providers will be key players in achieving Net Zero, through better coordination, making more efficient use of available airspace, both in terms of altitude and route optimization, contributing to overall reduction in emissions can be provided.

A Note on Data Used in this White Paper

COVID-19

The country data relative to confirmed number of cases and deaths is obtained from the Our World in Data dataset, which compiles the data from the European Centre for Disease Prevention and Control (ECDC) and is updated daily.

This dataset also includes a Government Response Stringency Index, based on 17 indicators of government responses such as containment and closure policies, school closures and restrictions in movement, economic policies, and health system policies such as the COVID-19 testing regime or emergency investments into healthcare. This index is calculated by the Blavatnik School of Government.

Testing data is obtained from the Worldometers site.

Sources:

https://github.com/owid/covid-19-data/tree/master/public/data
https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker
https://srv1.worldometers.info/coronavirus/

Google Community Mobility Reports

The Google Community Mobility Reports aim to provide insights into what has changed in response to policies aimed at combating COVID-19. The reports are based on data from users who have turned on the Location History setting, and chart movement trends over time by geography, across different categories of places

For the residential category, the index value measures the change in duration of permanence, while for the remaining categories the index value measures a change in total visitors.

The values charted report the difference in comparison with the baseline day, which represents a normal value for that day of the week. The baseline day is the median value from the 5 week period Jan 3 – Feb 6, 2020.

Source:

https://www.google.com/covid19/mobility/

Apple Maps Mobility Trends Reports

The data provided by Apple shows a relative volume of directions requests per country/region, sub-region or city compared to a baseline volume on 13 January 2020.

Apple provides data for walking, transit and driving requests. In many countries/regions, sub-regions and cities, relative volume has increased since 13 January, consistent with normal, seasonal usage of Apple Maps.

Source:

https://www.apple.com/covid19/mobility

Tomtom Congestion Index

The Tomtom Congestion Index provides average congestion levels for each day and each week in 2020. The data shown charts the relative difference of average congestion levels in 2020 from standard congestion levels in 2019. Daily and weekly differences are based on weighted averages derived from hourly data.

Source:

https://www.tomtom.com/en_gb/traffic-index/

PIARC COVID-19 Response Team

Some of the insights on the impacts and responses to COVID-19 from the roads and transport sector are derived from a series of over 20 webinars organised by the World Road Association, PIARC, through its COVID-19 Response Team.

Source:

https://www.piarc.org/en/News-Agenda-PIARC/Coronavirus-PIARC-and-Covid-19

WE ARE IN THIS TOGETHER – OUR EXPERTS ARE HERE TO HELP

We remain focused on COVID-19, its impacts on the transport sector and how organisations in the public and private sectors are formulating their responses. We place these responses not only in the here and now, but how they should inform a sustainable economic recovery and meaningful long-term steps towards a reimagined future for people and communities across the World.

We use our experience to:

› Provide bespoke diagnostics of transport infrastructure networks, services, organisations and places;

› Use new data platforms, technologies and sources to inform new insights and understand what, how and why;

› Develop tailored solutions that meet specific challenges, realise available opportunities and manage known and unknown risks;

› Advance long-term strategies, whilst remaining agile and prioritising short-term tactical solutions whilst remaining consistent with the ultimate vision;

› Raise our level of ambition, whilst remaining cognisant of, and seeking to address, the practical constraints;

› Assign actions, roles and responsibilities to the most appropriate players, position them within the planning and delivery cycle and enable collaboration towards shared agendas; and

› Ensure that plans can be monitored and performance managed to demonstrate and produce the desired outcomes.

To achieve these results, we deploy industry-leading advisers and teams to our clients with the following skills and experience:

› Policy, strategy and regulation;

› Scenario analysis and planning for uncertainty;

› Transport demand (and revenue) forecasting and modelling;

› Accessibility planning, including digital connectivity and services;

› New transport technology, mobility solutions and service models;

› Infrastructure design, engineering and asset management;

› Operational, resilience and business continuity planning;

› Environmental, sustainability and decarbonisation (Net Zero);

› Digital transformation;

› Organisational planning, workplace strategy, manpower planning and capacity building;

› Change management; and

› Financial, commercial and contractual planning and execution.

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Other Thought Leadership on COVID-19 and Transport

COVID-19 and Transport, White Paper I

COVID-19 is unlikely to vanish as quickly as it arrived; there may be several months ahead where we need to manage residual infectivity as the economy, and the transport system, restarts. After this current wave of global infection, a second or even a third wave cannot yet be ruled out. We will need robust, yet practical, processes, procedures and technologies to be ready and be able to respond effectively. It is also inevitable that some of the impacts of COVID-19 will be permanent and transformational. A "new normal" will emerge. This could be positive as well as negative, but how the future shapes up depend on how we approach the task.

Read more

Re-thinking transport business cases in a post-COVID world

Prior to the COVID pandemic, TfL had a significant number of projects under way that were predicated on a well understood assessment of passenger demand forecasting and modelling; what will the network need to address the congestion and capacity issues associated with future predictions of growth to the 5 million daily passenger journeys that the network currently supports? Investment decisions and priorities were founded on business cases that optimised the improvements to journey time and associated social benefits with capital expenditure. transport systems.

Read more

Reopen, Recover, Reimagine – Transport's roadmap out of lockdown

The Covid-19 pandemic has resulted in global challenges on a scale that we have never previously encountered, straining healthcare systems, restricting travel and creating deep economic impacts, compounded by loss of life and impacts on our social and mental wellbeing. With an overall 80-90% reduction in travel demand, traffic-free streets, difficulties in moving while maintaining social distancing and public transport operating dramatically reduced services, this has also presented fresh challenges for our transport systems.

Read more

Transport after Covid-19: what customers want now and how to respond

Businesses are already consolidating their assets and we are highly likely to see office and retail closures as many high street businesses find that they cannot survive the pandemic effect. Office-based workers face the likelihood of home-working as the norm, with visits to office hubs in larger UK cities the occasional exception to the rule of virtual engagement with clients and colleagues; and students will be following suit, as schools and universities enact Covid teaching programs with reduced capacity and more reliance on the remote classroom. Consumer behaviors are also starkly changed by Covid-19.

Read more

About Atkins

Atkins (www.atkinsglobal.com) is one of the world's most respected design, engineering and project management consultancies, employing over 18,300 people across the UK, North America, Middle East and Africa, Asia Pacific and Europe. We build long-term trusted partnerships to create a world where lives are enriched through the implementation of our ideas. You can view Atkins' recent projects here.

About Atkins Acuity

Acuity is the end-to-end advisory business from Atkins. Atkins Acuity combines management consulting, financing and technical capabilities to help clients solve complex front- end problems in the built environment. We help to successfully deliver our clients' big ambitions for infrastructure and energy, worldwide. We use a results-driven and engineering-led approach, to make our partnerships higher value and more rewarding. Together, our core areas of expertise enable us to deliver seamless, results-driven advisory solutions.

About SNC-Lavalin

Founded in 1911, SNC-Lavalin is a fully integrated professional services and project management company with offices around the world. SNC-Lavalin connects people, technology and data to help shape and deliver world-leading concepts and projects, while offering comprehensive innovative solutions across the asset lifecycle. Our expertise is wide-ranging — consulting & advisory, intelligent networks & cybersecurity, design & engineering, procurement, project & construction management, operations & maintenance, decommissioning and sustaining capital – and delivered to clients in four strategic sectors: EDPM (engineering, design and project management), Infrastructure, Nuclear and Resources, supported by Capital.

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