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Post-Pandemic Reflections: Smart Cities

COVID-19 and its potential impact on the new ecosystem

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Contents

Smart cities
and pandemic resilience

In our first Thematic Insight on Smart Cities[1], we emphasized the human focus of the theme: specifically, the focus on improving livability for residents. The corona virus crisis has become a profound global test of this: whether smart city technology may prove able to mitigate the worst impacts of the COVID-19 outbreak.

As we outlined in that prior report, by definition, cities we would consider to be "smarter" are much more likely to have a preparedness plan, a resiliency plan, or an established crisis operations centre – especially one that is "connected" to a number of critical live data sources (sensors, cameras etc). Hong Kong's Smart City Blueprint – written in 2017 – outlines its mission to make the city more livable, sustainable, resilient and competitive, and includes several digitalization steps that other major cities are only now scrambling to consider in the midst of the current crisis.[2] In 2019, Seoul announced its plan to invest USD 1.2 billion into 18 strategic data and smart city projects, including over 50,000 Internet-of-Things (IoT) sensors. Infrared thermal screening has been commonplace at airports across China and Southeast Asia.

The experience with SARS helped shape this preparedness and foresight which allowed Hong Kong, Seoul, Singapore and Taipei, among other smart cities, to act more swiftly and effectively during the current crisis. We have seen that tracking, tracing and monitoring activity throughout cities appear to be important success factors during this pandemic. The ability to implement additional arrival screening, as well as enforce contact tracing quickly, for example, has helped keep Taiwan's mortality rate low. While other European countries are still debating which system to use even now, Singapore's contact-tracing app was built and rolled out in March. Smart cities are, by definition, more likely to have the tools, data and data analytics to act decisively.

1   "Smart Cities: Defining the trend, describing the transition", MSCI, April 2020

2   https://www.smartcity.gov.hk

Long-term urbanization **trend remains in place**

The rise of video telephony and cloud computing has enabled a more seamless working-from-home experience for many businesses in the global lockdowns. Does this mean there will be a reversal of the urbanization trend? Already in 2016, Bain & Company conjectured that a "declining cost of distance" might mean that individuals may "opt to live further from city centres, for example, as advances in transportation and connectivity allow them the abundant space of a rural town combined with many of the employment options, goods and services once available only in cities."[3]

However, despite these well-debated possibilities, the global rate of urbanization has not declined[4]. Will it do so after the crisis? Although city living does make social-distancing protocols a greater challenge (or even an impossibility), density itself is not necessarily more of a problem than it is an advantage. Greater urban density enables investments in sanitation and superior healthcare, as well as closer distances for care provision. Eva Kassens-Noor, professor of urban planning at Michigan State notes, "Rural populations have less means to contract it, but rural populations [also] have less means to treat it."[5]

After the corona virus crisis, this viewpoint would suggest that there will likely be greater differentiation in growth rates between cities that are merely aggregations of economic necessities and genuinely smart cities. The most successful cities are naturally those where

people choose to live, not solely because their job is there, but because their lives are there. Commenting on coronavirus-induced speculation around the end of urbanization, urbanist Richard Florida noted in Foreign Policy magazine, "Cities have been the epicenters of infectious disease since the time of Gilgamesh, and they have always bounced back—often stronger than before."[6]

3   https://www.bain.com/insights/spatial-economics-the-declining-cost-of-distance/

4   https://www.weforum.org/agenda/2019/09/mapped-the-dramatic-global-rise-of-urbanization-1950-2020/

5   https://www.citylab.com/life/2020/03/coronavirus-data-cities-rural-areas-pandemic-health-risks/607783/

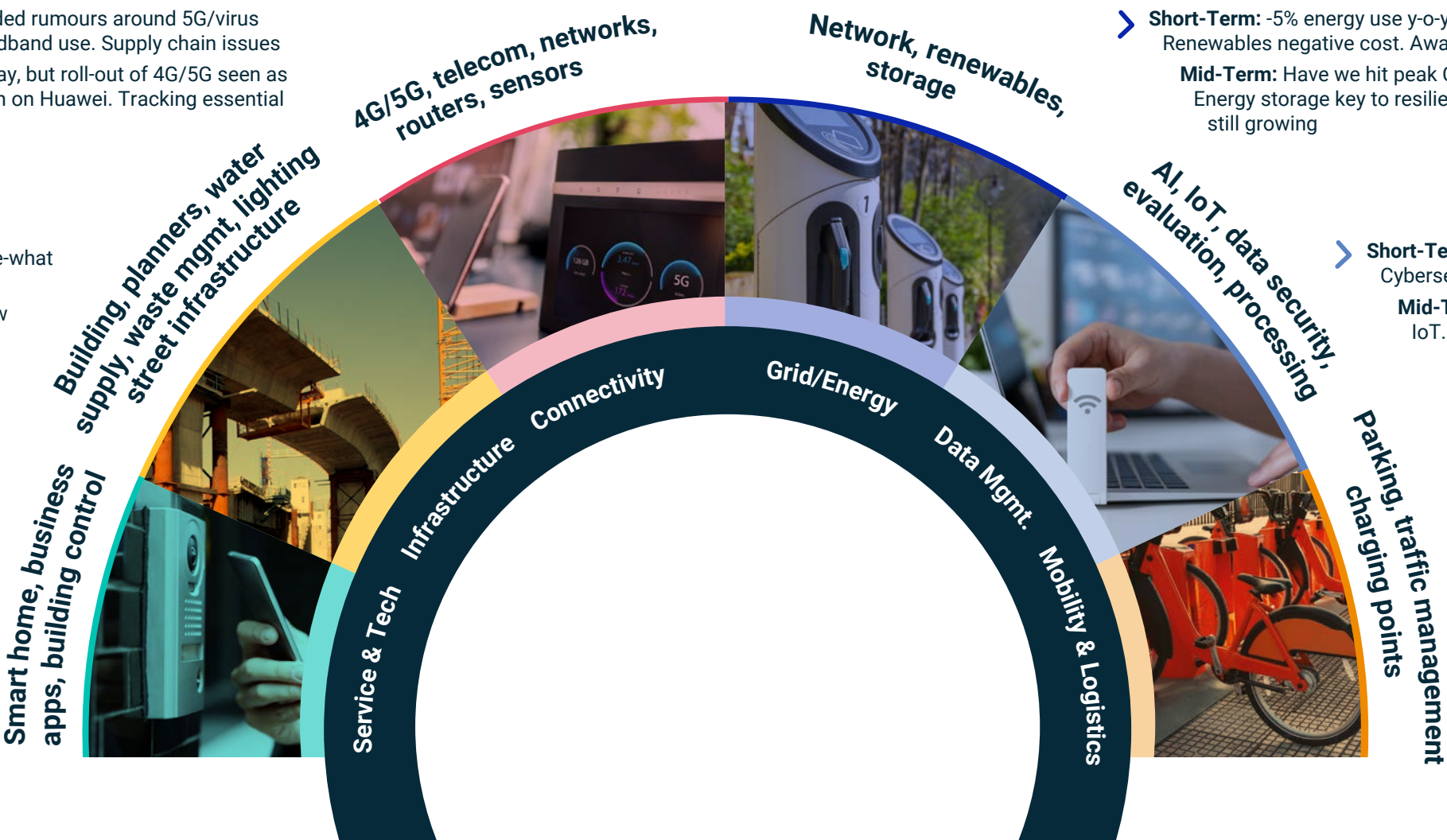6   https://foreignpolicy.com/2020/05/01/future-of-cities-urban-life-after-coronavirus-pandemic/

The **COVID-19** crisis and potential impacts resilience

Our detailed review of the potential impacts of the COVID-19 crisis on the smart city industry centers around six key industries:

» Infrastructure

» Connectivity

» Energy Grids

» Data Management

» Mobility & Logistics

» Services & Technology

Exhibit 1:
The COVID-19 crisis and Smart Cities – an overview
Source: Neckermann Strategic Advisors

Short-Term: Unfounded rumours around 5G/virus link. Increase in broadband use. Supply chain issues
Mid-Term: Temp delay, but roll-out of 4G/5G seen as key; questions remain on Huawei. Tracking essential

Short-Term: Essential industry some-what preserved; supply-chain issues
Mid-Term: Public investment to grow economy but risk of re-prioritisation

Short-Term: Highlights significance of tracking, tracing Incl. in offices. Seamlessness office – home needed
Mid-Term: Public investment? Crowd alert systems implemented. Temperature checks in buildings?

Short-Term: -5% energy use y-o-y, emissions. Renewables negative cost. Awareness of air quality.
Mid-Term: Have we hit peak CO2 emissions? Energy storage key to resilience, renewables still growing

Short-Term: Cloud, networks stable. Cybersecurity a key issue during WFH.
Mid-Term: Expect big govt investment in IoT. End of privacy (Patriot Act 2)?

Short Term: Over 80 cities with temporary bicycle lanes, parking suspensions – will it be sustainable?
Mid-Term: Reinventing the city: Will temporary bicycle lanes stick? Tension: national/city investment priorities

4G/5G, telecom, networks, routers, sensors

Network, renewables, storage

Building, planners, water supply, waste mgmt, lighting street infrastructure

AI, IoT, data security, evaluation, processing

Smart home, business apps, building control

Parking, traffic management charging points

Service & Tech   Infrastructure   Connectivity   Grid/Energy   Data Mgmt.   Mobility & Logistics

Infrastructure

In many countries, construction has been deemed an essential industry during the crisis, so short-term economic effects are not as deep as for other business sectors. Nevertheless, infrastructure projects at various stages may be faced with supply-chain issues, unavailability of staff and regulatory delays. A greater mid-term risk is likely to be the upcoming COVID-19 -induced recession, which could limit infrastructure investments. However, smart infrastructure projects may be prioritized: in a global infrastructure-industry survey with 13,000 respondents in March 2020, 55% noted social infrastructure (new hospitals and schools) and 48% noted clean water projects as among the top 3 priorities for post-covid investment.[7]

Connectivity

The COVID-19 crisis has accelerated the growth of broadband consumption with usage increasing up over 60% in some countries year-on-year as a result of the lockdown.[8] Web traffic was up 22% in the US[9], up 40% in Spain, and up 63% across Telecom Italia's fixed network[10]. Increased working from home has been a lower contributor to this than the sharp increase in streaming video and TV content outside work-hours.[11] The coronavirus crisis has also highlighted serious global inequality. Globally, 3.7 billion still have no internet access, making distance learning, home schooling and working from home virtually impossible.[12] In some optimistic scenarios, 5G roll-out could present, in the medium-term, leapfrogging opportunities, launching countries, including India, to speeds well above those usually seen in the western world.[13] While unfounded rumors, public activism and supply chain disruptions from China may hamper 5G roll-out in the short-term, smarter cities such as Singapore see no delay in its implementation.[14] Connectivity pioneer Qualcomm has even suggested, "it's just easier to deploy in this environment."[15]
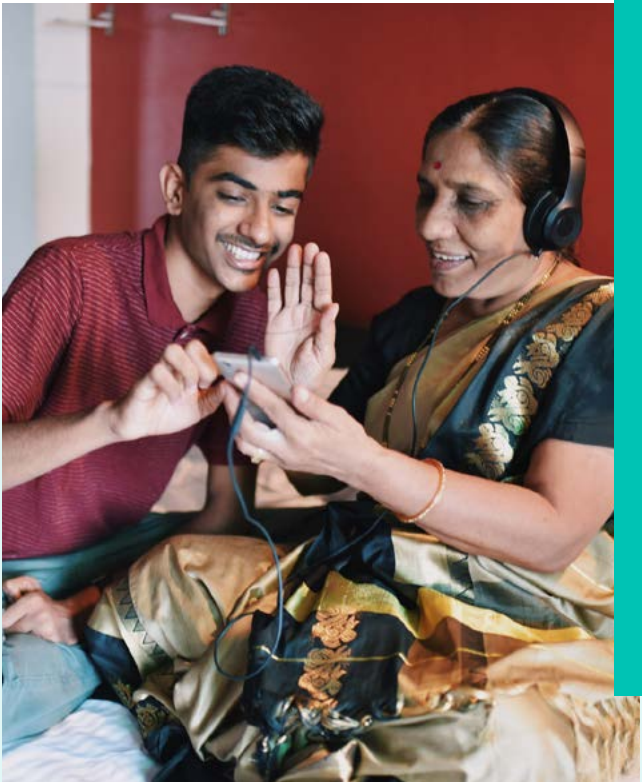
Energy Grids

Energy use across many sectors and most countries is down during the pandemic crisis: 2% in New York, and more than 15% across 15 US states as well as Italy[16]. As in the transport sector, discussed in more detail below, some political actors have advocated directing recovery funds to be aligned with sustainable finance objectives, for "the most ambitious climate recovery plan in the world."[17]

Data Management

The surges in internet use have also been mirrored by spikes in cyberattacks. Governments and institutions have been both targeted and suspected of blame.[18] Although challenged like many businesses by short-term client insolvencies and unemployment, cybersecurity solutions providers could be mid-term beneficiaries as companies enhance network access protocols and add VPN services. At the state and infrastructure levels, AI and machine learning will likely be matched with IoT for even closer social monitoring as pandemic warning and control systems are established.

7   https://www.environmentalleader.com/2020/03/coronavirus-to-cause-decrease-in-spending-on-infrastructure-and-water-projects-survey/

8   https://www.ispreview.co.uk/index.php/2020/04/covid-19-oecd-compare-exchange-traffic-between-countries.html

9   https://www.cnet.com/news/coronavirus-has-made-peak-internet-usage-into-the-new-normal/

10 https://www.zdnet.com/article/coronavirus-how-the-internet-is-coping-with-all-your-extra-traffic/

11 https://www.theregister.co.uk/2020/03/16/bt_broadband_network_wfh/

12 https://www.weforum.org/agenda/2020/04/coronavirus-covid-19-pandemic-digital-divide-internet-data-broadband-mobbile/

13 https://eandt.theiet.org/content/articles/2019/08/view-from-india-5g-promises-leapfrog-opportunities-for-india/

14 https://www.cnbc.com/2020/04/30/tech-singapore-5g-rollout-on-track-despite-coronavirus-crisis.html

15 https://www.barrons.com/articles/an-insider-says-the-5g-rollout-is-doing-just-fine-51589584136

16 https://grist.org/energy/how-coronavirus-is-changing-electricity-usage-in-3-charts/

17 https://www.theguardian.com/environment/2020/may/17/labour-to-plan-green-economic-rescue-from-coronavirus-crisis

18 https://www.zdnet.com/article/roundup-the-coronavirus-pandemic-delivers-an-array-of-cyber-security-challenges/

Mobility and Logistics

The over 90% reduction in public transport ridership (and revenues) has left a gaping hole in operators' budgets, which seem likely to impact investment and pricing in the mid-term.[19] The GBP 1.6bn UK government bailout of the London transport authority illustrates this pattern. On the other hand, the significant disruption in bike-sharing, scooter-sharing and ridesharing could result in short-term restructuring and hence stronger business models in the mid-term. Ridehailing (Uber, Lyft and competitors) have been accelerating roll-out of additional services, including food-delivery and last-mile logistics to capture some of the gains otherwise made by Amazon and Instacart.[20] Some of the growth in last-mile deliveries could become institutionalized due to behavior changes developed through long lockdowns and extended periods of modified social rules. Smart mobility initiatives that have been proposed, such as temporary bicycle lanes and expanded pedestrian walkways, would boost alternate modes of transport and mobility-as-a-service solutions: we discuss this in detail below.

Service & Technology

The pandemic induced recession may mean that smart home and smart office upgrades take a short-term backseat to safety-related hardware and apps. The 9/11 experience set off a flurry of investment into explosives-detection equipment. Will COVID-19 spark an industry around temperature control for visitors of public spaces, building entry controls requiring QR codes generated by travel apps, and new services around telehealth, contact-tracing, and social-distance monitoring? As of the end of April, US states aim to hire over 66,000 contact-tracing staff, with some estimates of this increasing to 300,000.[21]

19 https://www.bbc.co.uk/news/uk-england-london-52670539

20 https://www.theverge.com/2020/4/15/21222008/lyft-food-delivery-drivers-service-coronavirus-pandemic

21 https://www.npr.org/sections/health-shots/2020/04/28/846736937/we-asked-all-50-states-about-their-contact-tracing-capacity-heres-what-we-learne?t=1589789180756

Deep Dive 1:
Renewables and the price of oil

In the midst of the pandemic crisis, oil futures prices hit a new low by sinking below zero, a seeming existential challenge to the industry. However, whatever short-term state support may arise, these companies still face a clear, longer-term structural competitiveness deficit for fossil-fuels in relation to renewables. Michael Liebreich, founder of Bloomberg New Energy Finance, opined that we are approaching the turning point for the end of oil between 2025 and 2030: "I've always said the end-game for oil is not when it reaches $200/barrel, it's when it settles at $20/barrel."[22] The key rationale lies with the rise of better alternatives, including for transportation and power generation. Occurrences where the wholesale prices of

electricity generated from renewables fall below zero are quite commonplace, especially in Germany, Denmark, and the UK.[23]

Norway will phase out petrol and diesel cars by 2025; Sweden, Denmark, The Netherlands, India, and Ireland will do the same by 2030 while Scotland (2032), France (2040) and the rest of the UK (2040) will follow a little later. In reality, the bans will likely serve to focus the minds of producers on changing product mix sooner rather than running down the clock. On the demand side, electric vehicles consistently achieving a lower total-cost-of-ownership within the early 2020s could also be a compelling argument for consumers.

On the power production side, Europe is forecast to hit its target of generating over 20% of grid electricity by the end of 2020 while in the US, renewables are estimated to overtake coal power generation in the same time frame.[24] Globally, the UN noted that, "China, India, Japan, the Republic of Korea and Vietnam had the highest new solar capacity in 2019," while adding, "In some ways the COVID-19 crisis is the perfect opportunity for us to pause and to ramp up a just transition to carbon neutral economies, with all the benefits that we will have in terms of health (cleaner air) and mitigating costly climate change impacts."[25]

Nevertheless, the renewable energy industry has been hit by the COVID-19 crisis. On the supply side, solar, wind, and battery projects have been paused as the Chinese supply-chain has been disrupted. On the demand-side, a global drop in electricity demand has reduced the sense of urgency of building new capacity.[26] Overall however, the International Energy Agency also reported, "Renewables are the only energy source likely to experience demand growth across the remainder of 2020 regardless of the length of lockdown or strength of recovery."[27]

The mid- to longer-term perspective is clearer. Mandates, incentives and commitments globally support a transition to renewables. More than 70 cities worldwide have pledged to be "Carbon Neutral" by 2050, 63 have committed to a Net Zero Carbon Buildings Declaration, and 34 will only buy electric buses from 2025.[28] For industry players, it is no small thing when cities representing hundreds of millions of citizens and billions of dollars of budget make such commitments.[29]

22   https://www.forbes.com/sites/rrapier/2020/04/01/this-is-what-the-end-of-the-oil-age-looks-like/ and https://about.bnef.com/blog/liebreich-vicar-bray-sunset-ride-oil-gas-faces-decision/

23   https://www.cleanenergywire.org/factsheets/why-power-prices-turn-negative and https://www.ft.com/content/a531a788-860e-11ea-b872-8db45d5f6714

24   https://arstechnica.com/science/2020/05/2020-looks-like-the-year-us-renewables-first-out-produce-coal/

25   https://www.unenvironment.org/news-and-stories/story/uptick-renewable-electricity-generation-2019

26   https://www.greentechmedia.com/articles/read/for-clean-energy-industries-biggest-coronavirus-risk-may-be-a-damaged-economy

27   https://www.pv-magazine.com/2020/04/30/solar-wind-and-hydro-resilient-during-covid-19-crisis/

28   https://www.c40.org/other/city-commitments

29   https://sdg.iisd.org/news/77-countries-100-cities-commit-to-net-zero-carbon-emissions-by-2050-at-climate-summit/
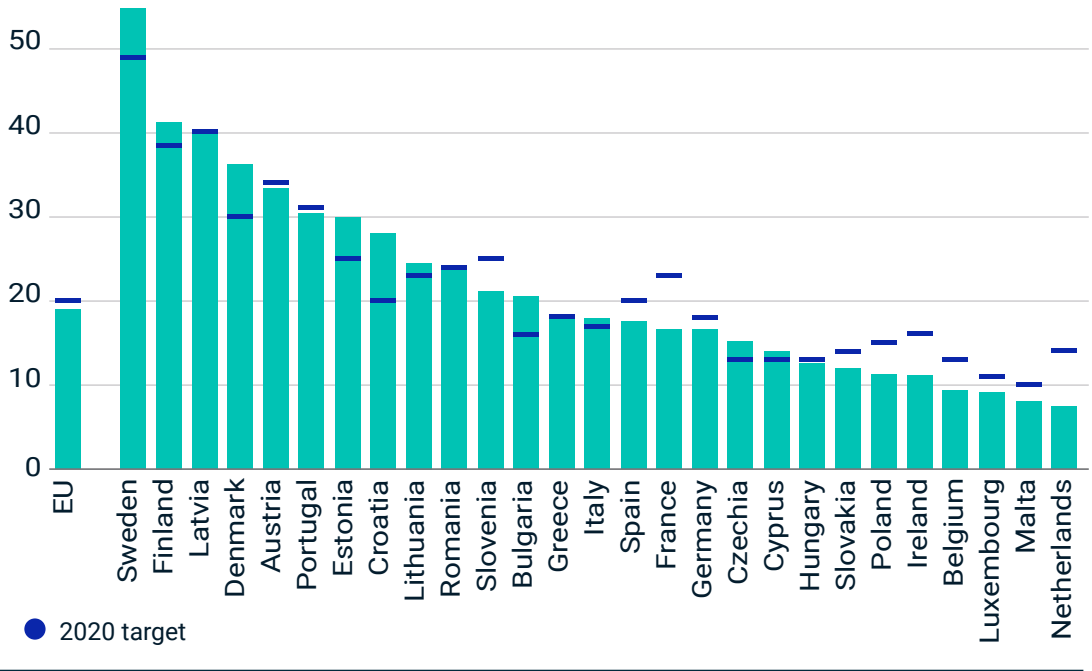
As for new power generation, the pandemic crisis has dented the growth of the energy storage industry, especially in the US. For example, members of the Energy Storage Association expect a drop in revenues for 2020 of 20%, due mainly to logistics and delays.[30] The Association's CEO noted, "These delays upend grid reliability and resilience efforts, just as we enter fire and hurricane season, and as states, towns, and utilities are beginning to incorporate energy storage systems as backup power to prevent power system disruptions for critical healthcare facilities." Delays could impact the entire value chain, down to lithium mining and cell production in China.[31]

More fundamentally, however, the global lockdowns have illustrated the need for resilience, which would be assisted by automated energy storage solutions. Utility Dive suggested, "Once the state has recovered from the effects of the pandemic, distributed storage and renewable resources could also be more in demand because they can be more automated than conventional power plants."[32]

U.S. electricity generation by fuel, all sectors
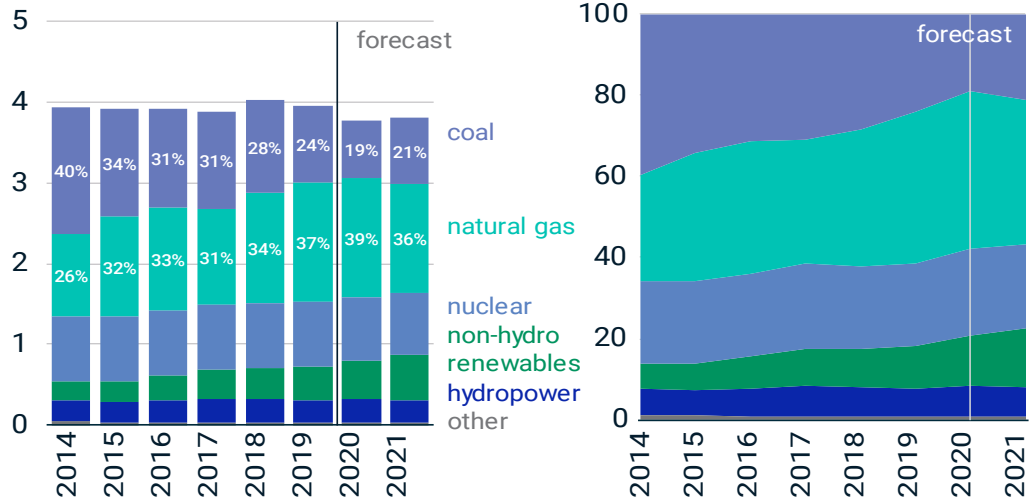
Note: Labels show percentage share of total generation provided by coal and natural gas.
Source: Short-Term Energy Outlook, May 2020

Exhibit 3:
Projected electricity generation by energy source, US

Source : U.S. Energy Information Administration (May 2020)]

Exhibit 2:
Share of energy from renewable sources, EU nations

Source: ec.europa.eu/eurostat

(2018, in % of gross final energy consumption)

● 2020 target

Deep Dive 2: Not
anti-car, but pro-city

The COVID-19 crisis has proved to be a catalyst for the acceleration of smarter mobility policies in cities. Cities across Europe and the Americas have recognized the need for transportation modes that enable social-distancing, preserve the clean air improvements experienced during lockdowns, while not adding traffic congestion. The result has been to enact temporary bicycle lanes and expanded pedestrian spaces in dozens of cities. For example, Bogotá added 22 km of new lanes to its already extensive 550 km network of bicycle lanes. Barcelona added 30,000 square-meters of public space for bicycles and pedestrians. Brussels added 40 km of new bicycle paths. These are a small selection from a city list curated by the Climate and Clean Air Coalition.[33] In Montreal, 320 kilometers of road-space will be dedicated to bicycles and pedestrians while Paris is aiming for a total of 650 km.[34,35]

30 https://www.power-eng.com/2020/04/14/energy-storage-deals-with-impacts-from-covid-19/

31 https://www.power-technology.com/comment/battery-production-china-coronavirus/

32 https://www.utilitydive.com/news/distributed-storage-could-see-growth-in-demand-amid-covid-19-pandemic-anal/574915/

33 https://www.ccacoalition.org/en/news/cities-champion-cycling-head-traffic-covid-19-restrictions-ease

34 https://www.lapresse.ca/covid-19/202005/15/01-5273724-montreal-annonce-un-plan-sans-precedent-pour-velos-et-pietons.php

35 https://www.weforum.org/agenda/2020/05/covid-19-usher-golden-age-cycling-coronavirus-pandemic-bike-cycle/

The reduction of city centre cars and the growth of cycling has been flagged for some material health benefits and not just for (subjectively) adding to livability. The lockdown in China was estimated to have saved some 77,000 lives in Beijing, Chengdu, Guangzhou, and Shanghai that would have been otherwise lost to air pollution.[36] Similarly, there were estimated to have been 11,000 fewer premature deaths due to air pollutant exposure across Europe, just in April 2020.[37] In many countries, reduced traffic has led to fewer road accidents.[38]

City planners are also accelerating moves to sustainable transport solutions by seeking to make many of these changes more permanent. The City of London has proposed one of Europe's largest pedestrianization projects. Although the project may have been planned well before 2020, Catherine McGuinness, the policy chief for the Corporation of London emphasized, "Coronavirus has given us an extra impetus."[39]

While the measures have been easily implemented on a temporary basis as part of emergency crisis powers, these initiatives are likely to meet more conventional resistance in a clear economic recovery phase. For over a century, more cars have been linearly associated with greater economic progress. Even now, tensions have emerged between city leaders and national governments on the topic. While the UK national government has recommended greater use of the car, London's mayor – like others[40]– remains firm in the belief that he should leverage the crisis to rebuild and recover under new terms. New plans for the financial centre as well as London under the StreetSpace policy have been announced.[41] As Deputy Mayor of Milan, Marco Granelli told the Guardian: "Of course, we want to reopen the economy, but we think we should do it on a different basis from before." Overall, it is plausible that alternate modes – and providers – of transportation seem likely to face a supportive environment longer-term.

36   http://www.g-feed.com/2020/03/covid-19-reduces-economic-activity.html

37   https://www.weforum.org/agenda/2020/05/covid-19-usher-golden-age-cycling-coronavirus-pandemic-bike-cycle/

38   https://etsc.eu/covid-19-huge-drop-in-traffic-in-europe-but-impact-on-road-deaths-unclear/

39   https://www.ft.com/content/9fbfcf58-c710-40b0-91ee-0811686fa391

40   https://www.theguardian.com/cities/pedestrianisation

41   https://tfl.gov.uk/travel-information/improvements-and-projects/streetspace-for-london and http://democracy.cityoflondon.gov.uk/documents/s133303/City%20Streets%20CV19%20recovery%20committee%20report%20PT%20140520%20FINAL.pdf

Security vs privacy debate **as a growth catalyst**

The Internet of Things and machine learning can be used together to monitor traffic and transportation, environmental and atmospheric data, as well as social activity.[43] Far from ex-post analyses, such monitoring technologies could even support the monitoring and enforcement of social-distancing in real-time.

Exhibit 4:
Using Machine Learning to Monitor Social Distancing
Source: Newcastle University (UK) Urban Observatory video posted to YouTube[44]
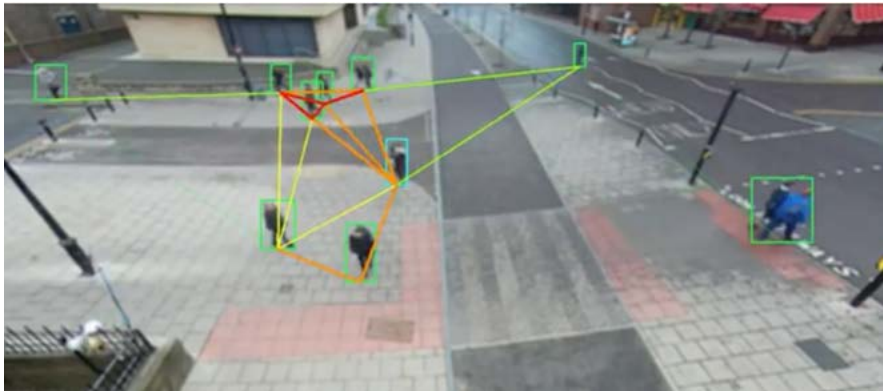
A Juniper Research study released during the crisis forecast that IoT platform revenue would grow by 20% in 2020, to USD 66 billion. Besides growth in industrial and public service applications, it suggested that the pandemic would "kickstart IoT adoption in healthcare."[45]

42   https://www.theguardian.com/world/2020/apr/21/milan-seeks-to-prevent-post-crisis-return-of-traffic-pollution

43   For example, in the UK, https://urbanobservatory.ac.uk/ and https://api.usb.urbanobservatory.ac.uk/live/

44   https://youtu.be/u_RJu1Dk-4Q

45   https://www.iot-now.com/2020/05/05/102609-iot-platform-revenue-to-grow-20-in-2020-despite-global-covid-19-pandemic/

In findings published in the Journal of Health Policy Technology, researchers from Bangladesh, Malaysia and Texas stated that, "an integrated digital disease surveillance system may be crucial to the control of this disease," and that "IoT based smart disease surveillance systems have the potential to be a major breakthrough in efforts to control the current pandemic. When AI and machine learning merge with distributed cloud, practical blockchain, system software automation and AI speech recognition, the health monitoring systems enable the creation of a reliable remote monitoring system between patient and doctor."[46]

During the COVID-19 crisis, travelers into certain cities, including Hong Kong, have to agree to use a tracking app and receive tracking bracelets to ensure quarantine and social-distancing rules are being adhered to.[47] Data privacy advocates have highlighted concerns with such controls coming from state agencies intersecting with existing concerns over "surveillance capitalism". An analysis piece on CNN expressed it like this: "9/11 saw much of our privacy swept aside.

Coronavirus could end it altogether."[48] Sacrificing privacy seems often done willingly for the sake of convenience (e.g. in the use of social media), but more grudgingly when safety, security and even a social good are concerned. However this tension plays out as lockdown restrictions loosen,[49] companies that provide data management and security solutions will be well orientated for such developments.

Exhibit 5:
Thermal scanning at airports

Source: Getty images

46 "Defending against the Novel Coronavirus (COVID-19) Outbreak: How Can the Internet of Things (IoT) help to save the World?" https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7175864/#
47 https://www.theguardian.com/world/2020/may/15/flying-long-haul-during-covid-19-air-travel-has-never-been-stranger
48 https://edition.cnn.com/2020/05/16/tech/surveillance-privacy-coronavirus-npw-intl/index.html
49 https://edition.cnn.com/2020/05/16/tech/surveillance-privacy-coronavirus-npw-intl/index.html

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Lukas Neckermann is the author of three books: "The Mobility Revolution" (2015), "Corporate Mobility Breakthrough 2020" (2017), and "Smart Cities, Smart Mobility: Transforming the Way We Live and Work" (2018).

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