

# **Dentons Global Smart Cities & Connected Communities Think Tank**

## Annual Report 2022

Grow | Protect | Operate | Finance

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Dentons' Global Smart Cities & Connected Communities Think Tank brings together the resources of the world's largest law firm with leaders of government, businesses, academia, innovators and stakeholders to craft innovative legal, economic and policy solutions to societal challenges in an era of accelerating technological change. Think Tank members work with city and community leaders to take advantage of technological developments to enable modernization and coordination of digital, physical and social infrastructure to make delivery of public, private and hybrid services more efficient, cost effective, secure, equitable and socially beneficial.

# Note from the Editors

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Our Think Tank was launched five years ago with a presentation at our first Smart Cities & Connected Communities Summit discussing how the world was on the cusp of a fourth industrial revolution. We were told to brace for an approaching wave of accelerating change propelled by rapid advances in technology and massive urbanization trends. Without a doubt, we are presently riding that wave.

Transformations that impact every facet of our cities and communities are taking place. Over just the past year, the world has made important strides to overcome some of the most significant disruptions encountered in recent history. We find ourselves adapting to a world where global pandemics and turbulent weather and a changing climate are the everyday backdrop against which we must carry on our activities. Geopolitical, social, and economic upheaval coincide with accelerating and often unexpected changes across technologies and institutions. It is a time of great uncertainty, but also of opportunity.

Our Think Tank members' collective efforts are assisting cities and communities across the globe to modernize digital, physical, and social infrastructure through thought-leadership, thus shaping creative solutions to the many challenges they face. Our experts probed innovations in infrastructure and the potential impacts of the U.S. infrastructure law. We explored equity and inclusion initiatives spanning diversity in the boardroom, access to broadband, and how physical spaces and institutions are designed and operated. Voices from across the energy industry shared insights into topics including modernization, efficiencies, hydrogen's future, and smart mobility. As ESG became part of our common vernacular and way of doing business, we examined new approaches to investments and policies.

These and so many other issues confronting the world are too complex and interconnected to address individually. They will only be solved through our ongoing collaboration and sharing of best practices. We hope this report and the voices of its contributors inspire new conversations and connections. We look forward to continuing the journey together toward achieving smart and connected cities and communities.

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# Message from the Co-Chairs



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The work of our Global Smart Cities and Connected Communities Think Tank is more important than ever before. Now in our fifth year, we find ourselves in a world of crises unimaginable even a few years ago. In 2020, the entire planet had an object lesson in just how interconnected we all are as the COVID-19 pandemic swept the globe. This pandemic simultaneously slowed and accelerated critical aspects in our connected cities and communities. The world shut down temporarily, and a massive transition of daily activities to a digital platform took place. With this transition, we caught a glimpse of the promises that technological transformations hold, but we also found ourselves confronted with tremendous disparities in access to technology not only across regions, but within individual communities.

We also became acutely aware of how vulnerable essential infrastructure is to cyberattacks and climate risk, with the cyber attack on the Colonial pipeline, hurricanes, winter storm Uri, wildfires and more. At the same time, frays in our social fabric too long ignored have begun to unravel. From the social justice movement following the murder of George Floyd to the January 6 attack on the US Capitol to the unprovoked invasion of the Ukraine, governance and legal structures are being stress-tested. These events and more all serve as wake-up calls that we no longer have the luxury of time in addressing these problems.

We created our Think Tank around the thesis that all metropolitan and community infrastructure needs to be modernized in order to meet the challenges of ever increasing urbanization, and that this can only be accomplished by harnessing technological advancements to modernize physical, digital and social infrastructure in an integrated, coordinated manner.

The Think Tank now has grown to include 18 pillars of inquiry with over 700 thought leaders from around the world. We have added new pillars and adjusted our approach as societal issues have evolved. This past year, we added education and hydrogen as pillars and expanded existing pillars to reflect emerging developments in ESG, equity, and inclusion, among others. Our structure has created a prism through which we may come at challenges from a variety of viewpoints. We have always described our method as integrated, but it has grown to also be kaleidoscopic, approaching each challenge from multiple and even unexpected angles. We look at enterprises and institutions through the lens of technology to understand changes in people; but we also view infrastructure through the lens of people and enterprises to understand their impact on technological changes.



We have teamed with other organizations such as the Keystone Policy Center's Key Conversations program and the Association of Blacks in Energy on webinars and events. The feedback we have received for these discussions has been exceptional, and we will continue partnering with like-minded entities to enrich our discussions and expand the reach of the Think Tank's work.

We have exciting plans in terms of Think Tank leadership. Over the next 12-18 months, we will add co-chairs and broaden activities on all levels. Each pillar will develop a mission statement and pillar members will collaborate to advance that mission with the support of the broader Think Tank and Editorial Board.

In the next few months, we will be hosting a major webinar on the current energy crisis and its implications in terms of the relationship between energy and geopolitics and the impact of both on our cities and communities. We will continue apace with discussions on hydrogen, ESG, cybersecurity and privacy and other topics. We will examine the impact of disruption on globalization, from realignment of global powers in key regions to supply chain and resource issues to fuel prices prompting massive shifts to electric vehicles. We will continue to focus on climate and the need to accelerate solutions to carbon emissions and advance investment in energy efficiency and conservation. We will also explore innovative approaches to buildings and spaces in the wake of the global pandemic, and we will examine new opportunities to take advantage of policy developments to modernize regulation and social infrastructure to catch up to technological changes.

We look forward to engaging with each of our Think Tank members on these and other critical issues confronting cities and communities as we work together to forge a smarter and more connected future.



# Pillars of Thought Leadership for a Successful Smart & Connected Communities Strategy

A successful smart cities and connected communities strategy will focus simultaneously and in an integrated manner on a number of key pillars. The Think Tank has organized its work into the following areas of thought leadership. We recognize that there is substantial overlap among these categories, and that at any given time, events may result in certain of these being given more focus. We also recognize that we are living in an era of accelerating change, and have sought to structure our pillars to be flexible to accommodate evolutions in priorities, technologies and approaches.



## GOVERNMENT LEADERSHIP AND PUBLIC POLICY

Developing engagement strategies at every level of government, including identifying and building relationships with decision-makers and people empowered to implement the necessary components of a Smart City, is essential to the success of a smart and connected community. Think tank leaders assist in tailoring best practices utilized by leading political subdivisions across the globe to the specific needs of a particular community and project.



## REGULATION

Regulations need to be designed effectively so as to lower development costs, speed technology deployment, and achieve efficient and equitable outcomes for communities. This can be done both proactively, in the early stages of Smart City implementation, and reactively, if legal or administrative structures are discovered that will present challenges at a later phase.



## ENERGY

Electric grid modernization is the touchstone of an effective and comprehensive smart city strategy. Without a modern, safe, reliable and resilient grid, implementation of smart technologies is limited. The Think Tank addresses modernizing of electric infrastructure and transitioning to a multi-directional grid with advanced clean technology solutions, including a broad array of distributed energy resources, integration of demand response and efficiency measures.



## ENVIRONMENTAL AND SOCIAL GOVERNANCE

Because companies are more agile than governments, they play a significant role in responding to changing societal priorities and demands. More and more, companies are called on by their customers, investors and employees to lead by example in areas where governments have been slower to take action. The ESG pillar aims to educate, guide, and advocate on behalf of communities and companies to advance environmental, social and governance goals in creating smart and connected cities and communities.



## TELECOMMUNICATIONS

Advanced telecommunications systems are needed to support smart technologies. The Think Tank works with stakeholders to evaluate and advocate policies that promote 5G deployment and the development of compatible firmware and hardware. Focus on facilitating multiple uses for smart infrastructure upgrades is essential so costs can be minimized and appropriately shared among a broad array of beneficiaries. Equitable access to telecommunications infrastructure also has tremendous benefits in terms of mobility of communities, as daily activities and essential services increasingly take place in a virtual environment.



## TRANSPORTATION AND MOBILITY

Mobility is key to quality of life. When infrastructure is powered by advanced technologies, cities will realize countless benefits from reduced emissions and congestion as clean vehicle and ride share use increases, to enhanced public safety, to economic development opportunities as underserved communities are connected with employers through efficient, data-driven mass transit. Think Tank leaders are abreast of the latest physical infrastructure and policy options to support technological advancements in transportation and mobility, deployment of electric and autonomous vehicles, updated traffic and transit systems, and digital and virtual mobility options for the modern economy.





## **WATER, WASTEWATER AND WASTE**

Water is essential to the well-being and functioning of any city or community. Water availability and quality are two of the greatest challenges that cities and communities will face moving into the future. Similarly, wastewater and waste are issues faced by every city and community worldwide. The Think Tank brings together technical, legal, and policy experts from government, industry, academia, and NGOs who are at the forefront of water resources planning to develop new approaches to address water, wastewater and waste issues.



## **HYDROGEN**

Hydrogen may be the fuel of a smart and connected future. Hydrogen has the potential to take energy markets to the next level by coupling gas and electricity, facilitating the integration of renewable energies and efficiently driving forward the decarbonization of CO<sub>2</sub>-intensive industries such as chemicals, petrochemicals and steel, as well as the mobility and heating sectors.



## **BUILDINGS, CITIES AND GREEN SPACE PLANNING**

Smart buildings and an integrated approach to planning are a foundational block of tomorrow's cleaner, healthier cities and communities. The Think Tank serves as a platform to help bring together municipalities, real estate developers, engineers, land use and other experts to create smart building and development strategies that encourage productivity and energy efficiency while promoting liveable and sustainable habitats for the future.



## **TECHNOLOGY AND INNOVATION**

Think Tank members actively work with communities in assessing infrastructure needs and creating feasible strategies to design and install the systems necessary to support smart technologies, while continuing to examine advances coming out of centers of innovation, such as the national laboratories, universities, and private enterprises.



## **NGOS AND UNIVERSITIES**

While developing smart cities plans, local governments should engage universities and NGOs to provide intellectual firepower and nurture public trust. At the same time, many universities are ideally scaled for utilization of smart infrastructure and can serve as models for communities in their regions, and numerous NGOs are already working with communities to identify and deploy solutions for a secure and equitable smart and connected future.



## **FINANCE, INVESTMENT AND ECONOMIC DEVELOPMENT**

Because of the varied benefits that will flow from Smart Cities— including improved environmental health, social, and economic-related outcomes — modernization initiatives may exceed the scope of traditional municipal infrastructure projects. Identification of optimum funding strategies and solutions from both existing and untapped sources of capital is a challenge that all communities face. The Think Tank explores how these challenges are being addressed in communities around the globe.



## CYBER AND PHYSICAL SECURITY AND PRIVACY

The creation of systems to protect privacy while allowing for deployment of advanced digital technologies, including frameworks and protocols for data gathering and use is of key concern to stakeholders at all levels. The Think Tank brings together leaders who are grappling with issues related to infrastructure security to address perennial and novel challenges faced by communities.



## CLIMATE, ENVIRONMENT, HEALTH AND SAFETY

The Think Tank brings together thought leaders working with cities and communities to ensure that environmental strategies support economic opportunity while sustaining natural resources and improving quality of life. Smart delivery of health and safety services, including maximizing the opportunities offered by the “Internet of Things” to enhance security, safety and operational efficiencies related to healthcare and public safety are important benefits brought by modernized infrastructure.



## CRISIS AND PANDEMIC RESPONSE

A smart and connected approach allows interdependent sector and stakeholder engagement to serve the citizens and economy holistically and optimally in times of crisis or uncertainty, bringing together critical infrastructure cross-sector partners such as utilities, telecommunications, first responders and health care workers, media and government agencies, educators and social workers, and many others to share best practices and devise collective responses. lessons learned and best practices.



## INCLUSION, EQUITY AND JUSTICE

The goal of leveraging technological developments to enhance physical infrastructure and improve delivery of services is to better the lives of all of the community’s inhabitants. Social infrastructure is inextricably intertwined with digital and physical infrastructure. The benefits of modernized infrastructure cannot be fully achieved without addressing systemic inequities that have long plagued our society. Earning the confidence and social license necessary to implement the projects and policies that will benefit the whole community requires not only an inclusive approach to stakeholder engagement, but sweeping changes to ensure that inclusion, equity, social justice and basic human rights are protected and advanced in step with the technological changes that are deployed.



## CONSUMER ENGAGEMENT, EDUCATION AND COMMUNITY SOCIAL INFRASTRUCTURE

Social infrastructure is every bit as critical as physical and digital infrastructure in any modernization initiative, but it is often given far less attention. The Think Tank brings together community leaders, interest groups, businesses, and residents to conduct education and outreach to ensure broad, productive public participation, understanding and buy-in to the benefits that a smart and connected community can offer, and to adapt initiatives to the diverse needs and desires of the community, including through K-12 educational programs and workforce development.



## GLOBAL BEST PRACTICES

Communities are constantly evolving worldwide. Because innovations developed in one country or region have international application, the Think Tank, with its unparalleled global reach, can play an important role in helping to integrate new developments and share best practices from across the globe.

# **2021-2022 Roundtable Recap**

**The COVID-19 pandemic disrupted the Think Tank's series of in-person roundtables and summits, but presented an opportunity to expand to bring in thought leaders from around the globe. Since the start of the pandemic, the Think Tank has hosted nearly three times as many panel discussions as we did in previous years. We have partnered with many of the organizations to which our members belong, enriching the on-going conversation with perspectives and connections not typically included in more traditional approaches to infrastructure modernization. Following are highlights from some of these discussions.**

## Topics and issues covered in recent Think Tank webinars

### **Decarbonization in the Biden Era – a Key Conversation** (co-hosted with the Keystone Policy Center)

A shifting political landscape and advancements in technology may present new opportunities to achieve reduced carbon emissions goals. This discussion examined the current climate policy landscape, recent developments, and discuss what can be expected in the new Biden administration

Link: <https://youtu.be/OSdbD3xWPLw>

### **US Policy Perspectives – Innovative and equitable approaches to urban infrastructure** (co-hosted with The Dentons Dialogue)

Following the unveiling of an over \$2 trillion infrastructure proposal that would make historic investments in clean energy, climate change and sustainability, panelists discussed political and practical challenges posed by a significant political divide and rapid growth in cities leading to greater demand for services. Innovations and technological advances will provide opportunities for cities and communities that are on the frontline in an era of COVID, crisis, cyberattacks and climate issues. Issues such as the need for proper communication among government and citizens to address trust, inequality, access and costs were discussed.

Link: [https://youtu.be/N\\_bmcBHkw3o](https://youtu.be/N_bmcBHkw3o)

### **US Policy Perspectives – Climate and Energy** (co-hosted with The Dentons Dialogue)

Series addressing recent climate and energy policy initiatives out of Washington were discussed by a panel of experts.

Link: <https://youtu.be/ZEFJJHNIRuI>

Link: <https://youtu.be/liUA1AZS5Yg>

### **Fireside Chat – Lewis Latimer, the original “hidden figure”** (co-hosted with Public Utilities Fortnightly)

Discussion with author and PUF Executive Editor Steve Mitnick about Lewis Latimer, the original “hidden figure,” working alongside Thomas Edison on some of the most impactful inventions of the modern era, and the challenges of being the sole African American at the apex of the nation’s commerce during the many setbacks on the road to racial equality.

Link: <https://youtu.be/3z2yp0yOpdo>



## **Consensus-Based Decarbonization Policy – a Key Conversation**

*(co-hosted with Great Plains Institute, and Keystone Policy Center)*

A multi-sector coalition of experts discussed comprehensive policy recommendations for bipartisan action to phase out carbon emissions throughout the economy.

Link: [https://youtu.be/\\_UeYZBSApjo](https://youtu.be/_UeYZBSApjo)

## **Cultivating Inclusion, Equity and Justice as an Essential Foundation for Modernizing our Cities and Communities**

Panelists reflected on actions that can be taken to build a culture of solidarity, embrace the benefits of diversity and advocate for meaningful change as a key to the success of our increasingly connected cities and communities

Link: <https://youtu.be/u0PhYDBNHdA>

## **Enhancing Asian American Diversity, Equity and Inclusion in the Energy and Environment Sectors: Stories from Mid-Career Professionals** *(co-hosted with Asian Americans in Energy, the Environment and Commerce (AE<sup>2</sup>C))*

In honor of Asian American Pacific Islander heritage month, this roundtable discussion focused on enhancing Asian American diversity, equity and inclusion in the energy and environment sector with mid-career professionals sharing impactful stories while discussing solutions for positive change.

Link: <https://youtu.be/oz3JwuzTxp4>

## **The Path to a Clean and Modern Energy Future** *(co-hosted with the Smart Electric Power Alliance)*

This panel of representatives of a diverse group of leading utilities discussed their path to a clean and modern grid, drawing upon insights from SEPA's Utility Transformation Challenge initiative. Con Edison, Austin Energy, and the Los Angeles Department of Water and Power, among others, described on-going decarbonization efforts, stakeholder engagement and challenges that need to be addressed.

Link: <https://youtu.be/4UPLd78QwuE>

## **Shaping the Global Hydrogen Economy**

Discussion featured experts on the role of hydrogen as a cornerstone in efforts to reduce global emissions and initiatives around the world to achieve a sustainable, zero-emission energy economy.

Link: <https://youtu.be/NSHgwsQ8e-A>

## **Women Leading Utilities – the Path to Today and Tomorrow** *(co-hosted with Public Utilities Fortnightly and the Women's Council on Energy and Environment)*

Discussion highlighted the contributions of the few women who have occupied the C-suite in US utility companies, and the many women who paved the way for them to break through that glass ceiling.

Link to the webinar: <https://youtu.be/li3PQc3yaaE>

Link to the book: [https://www.fortnightly.com/sites/default/files/article\\_uploads/Women\\_Leading\\_Utilities.pdf](https://www.fortnightly.com/sites/default/files/article_uploads/Women_Leading_Utilities.pdf)

## **Global Town Hall: The Pathway to Sustainability**

This lively and sobering conversation highlighted how far behind the world is on decarbonization and other measures to address climate change, with particular focus on the question of how we catapult forward on sustainability and improve resilience in an affordable manner. Thought leaders from the Latin American/Caribbean region, Africa, Europe and Rural America joined experts in US and global energy policy to discuss the urgent need for a new approach to infrastructure, energy systems and a changing climate.

Link: [https://youtu.be/w3\\_ifalq1SA](https://youtu.be/w3_ifalq1SA)

## **ESG in the Boardroom: A Conversation with Energy Leaders**

More and more, investors are scrutinizing the environmental and social impacts of how companies operate, which results in the need for governance policies, strategies and disclosures to drive better performance. Evolving out of the notion of “corporate social responsibility,” ESG has become a movement quickly rising to the top of corporate agendas.

Link: <https://youtu.be/d5MQNQgeMsQ>

## **COP26, Infrastructure, Build Back Better Act and other Hot Energy Topics - a Key Conversation**

*(co-hosted with the Keystone  
Policy Center)*

A dialogue among thought leaders, policymakers and utility and industry innovators on the need to think and act differently to meet ambitious near and medium-term climate goals in the US. Accelerated action and focus on both decarbonization and resilience is needed as we are a decade behind where we need to be.

Link: <https://www.youtube.com/watch?v=JNIZpXMCygl>

## **Implementation of the Infrastructure Bill**

US policy leaders share their experiences and views on the opportunities to upgrade and modernize electric infrastructure afforded by the Infrastructure and Jobs Act – how to align objectives, how to accelerate investment in infrastructure and how do we allow for innovation. The electric grid will be the platform for innovation for a clean, resilient and reliable future. How can we leverage it to achieve not only these but so many other goals for improving our lives.

Link: <https://www.youtube.com/watch?v=mXN3wTtgoas>



## **Hydrogen Is Getting Serious Traction**

As nations work to lower their carbon footprint and meet climate change goals, hydrogen is gaining traction as an important additional fuel to assist in the planet's quest for cleaner energy. Hydrogen has seen limited use in the commercial realm due to its high production, storage and transportation costs, as well as a lack of infrastructure to support its use. However, thanks to advances in technology, a growing demand for energy worldwide, and a new level of awareness about how our actions impact the planet, that's changing.

Link: [https://youtu.be/yo\\_lbWEG6Sk](https://youtu.be/yo_lbWEG6Sk)

## **Special Edition: Cybersecurity In A Turbulent World**

Panelists address cybersecurity concerns in context of current global conflicts. President Biden issued a warning on potential cyber-attacks. US cybersecurity agencies, the FBI, and the Department of Homeland Security have all shared high alerts covering cyber-attack threat levels, preparedness, and response. Hostile cyber warfare is one of the primary tools of the modern global military today. Historically speaking, nefarious state-sponsored cyber-activities have escalated when geo-political tensions are high. We do not know the form of attacks that will emerge, or those that may emerge successfully, but with a history of previous international attacks, we must have our eyes open.

Link: <https://vimeo.com/699566777/18c9bf8852>

## **Broadband Equity And Access**

As our daily activities become increasingly digitized, access to reliable, affordable and secure broadband networks has become essential. We are in the midst of a technological transformation that touches every aspect of our lives, but there are still significant challenges, and access remains out of reach for many. This panel took on issues of innovation, access and equity in a wireless world.

Link: <https://www.youtube.com/watch?v=uimdOE-LoH8>

## **What Do ESG, Talent And Cyber Have In Common?**

ESG, talent attraction and retention, and cybersecurity are all front-of-mind issues for companies. Increasingly, shareholders and customers are evaluating companies on employee recruitment, engagement and retention practices and trends; on preparation for threat of disruption from technological and cyber disruptions; and on ESG strategy and implementation.

Link: <https://www.youtube.com/watch?v=kZOyhqOlals&t=4s>



# Smart Communities and Smart Utilities in a Post-Pandemic World

Author: Barbara Tyran

Technology changes are enabling a global electricity transformation. Smarter energy infrastructure is a key platform for smart communities. As noted in the Edison Electric Institute's publication, "Smart Communities are Powered by Smart Connections," smart communities use data and technology to help drive efficiencies, improve sustainability, spur economic development, and enhance the quality of life for their citizens.

The relevance of 'smart' communities to achieve paradigm shift thinking becomes even more significant during a pandemic. What did 'smart communities' mean during COVID? How has the concept of 'smart' communities changed since March 2020?

## **Smart Communities and Utilities**

With the distribution grid already changing, and many citizens restricted at home and teleworking, utility load factors shifted. Residential load became relatively equivalent to typical weekend demand levels, while commercial/industrial loads operated at reduced levels. "Smart" communities adapted to and mitigated their responses to these challenges through a number of measures. Responding

to these new conditions, utilities and system operators reevaluated their business continuity strategies and contingency plans.

The electricity sector's public service mission has always guided its clear understanding that delivering reliable electric power is an essential service. Especially during the pandemic, when electronic communications bind the ultimate social fabric, interruptions would have had a hugely disruptive societal impact. The sector took important steps to protect employees' health, while ensuring reliable service, even during the most severe surges. Despite nearly 70% of the utility workforce working remotely, system operations remained successfully focused on the immediate challenges to maintain customer service.

As noted in an IEEE PES report, "Sharing Knowledge on the Electrical Energy Industry's First Response to COVID-19," the growing availability of Advanced Metering Infrastructure (AMI) enabled more granular reliability performance, which is particularly critical during stay-at-home conditions. With the approach of other physical limitations, such as hurricane, wildfire, flood and other natural disaster-related incidents, the need for a reliable grid only increased.

In addition to physical safety, cyber security threats continued as new challenges for reliable, safe delivery of electricity, as well as IT functionality. According to Dentons Flashpoint 5.8.20, Maze ransomware became one of the most prolific cyber threats worldwide and posed such a danger that the FBI issued a warning for U.S. companies. The Maze group demands Bitcoin ransom to unlock corporate accounts.

### **Smart Communities and Customers**

During this period of self-isolation, information technology was able to promote a “smarter community” through a number of services, including medical care (tele-health), child care/educational support, online exercise, entertainment; philanthropy, volunteer options, “track and trace” apps, and stay-at-home tips. Personal resilience and secure communications became extremely significant for successful quarantining and monitoring health restrictions. With millions of workers and students sequestered at home, the electric infrastructure became even more vital. Virtual conference platforms (Zoom, Google Meet, Teams) were increasingly used for business meetings and briefings, conferences, distance learning, as well as family and social gatherings. Emerging new societal needs

combined with the new technologies created a new concept of “Smart Community” during a time of remote access, providing a critical platform for achieving civil society.

### **Smart Communities During a Time of Return**

Risk management underpins our response to the uncertainties associated with the pandemic, with new threats emerging during these unprecedented times. Essential service providers may experience shortages of critical parts, due to constrained supply production or supply chain disruption. Home/business delivery systems are utilizing new technology platforms, with the “Smart Community” adopting ways to mitigate supply chain disruptions, such as deployment of under-utilized taxi and Uber/Lyft services, as well as Amazon delivery systems.

“Connected communities” have more capabilities, and therefore greater responsibility, to care for others during public health crises. As Smart Communities continue to grow, their integration of advanced technologies will reveal new opportunities to provide the strong foundation for a future economy and better quality of life.

### **About the Author:**

Barbara Tyran is Director, Macro Grid Initiative, at the American Council on Renewable Energy (ACORE). She is also Past President of the Board of Directors of the Women’s Council on Energy & the Environment (WCEE) and was General Chair of the IEEE Power & Energy Society 2021 General Meeting Local Organizing Committee, with over 38,000 members world-wide. For two decades, she was Director, Washington & State Relations, at the Electric Power Research Institute. Her prior background includes federal advocacy for utilities and management consulting for public/private/non-profit sector clients, with engagements involving strategic communications, policy analysis, and external relations strategy.

# The Grid, the Weather and the Glacial Path Toward Resilience

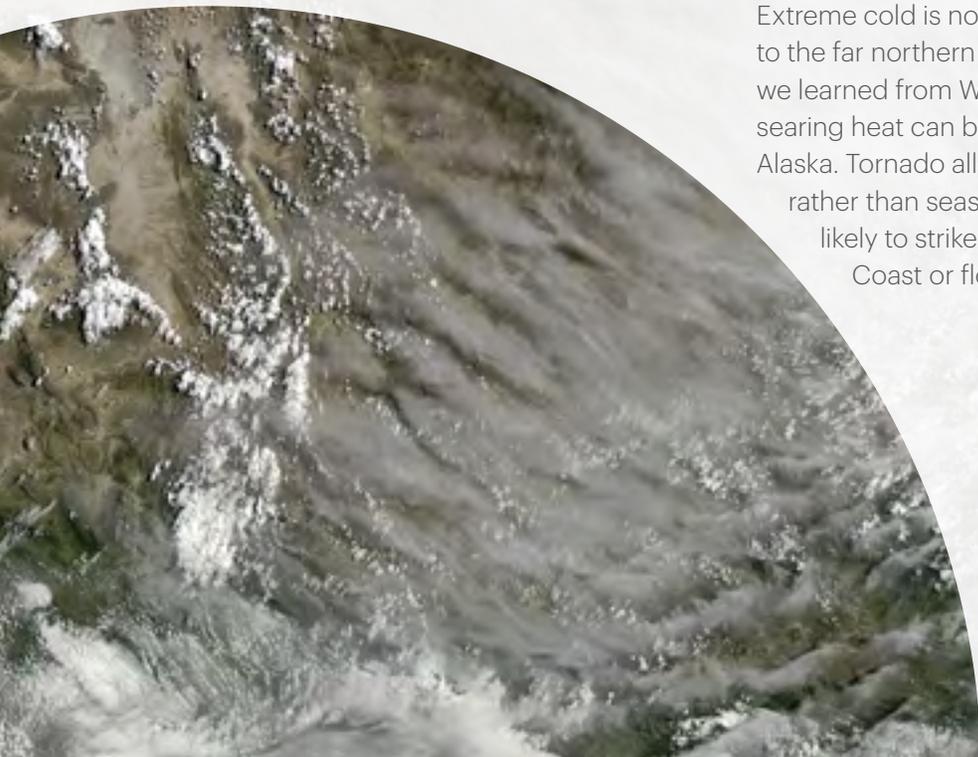
Authors: Clint Vince and Jennifer Morrissey

The last several years have conclusively taught us two things. First, we can no longer be surprised by extreme weather events in the US. And second, failure to rapidly and adequately shore up the resilience of our national electrical grid exacerbates the devastation caused by disruption.

Massive wildfires and drought are now the norm in the western states. Hurricanes strike the deep south with increased frequency and intensity. Extreme cold is no longer a phenomenon limited to the far northern regions of the country, as we learned from Winter Storm Uri last year, and searing heat can be experienced as far north as Alaska. Tornado alley is now on alert year-round, rather than seasonally. Severe flooding is as likely to strike New York City as it is the Gulf Coast or flood plains.

Not only do these events result in tremendous losses of life and property; they too often result in catastrophic electric grid disruptions causing outages and price spikes. Add to all this the toll brought by cyber intrusion, such as the ransomware attack on the Colonial Pipeline in the Mid-Atlantic, and it becomes painfully evident that our electrical infrastructure is highly vulnerable. More focus, and more investment, is needed in resilience.

This is a challenging proposition. Service interruptions are usually viewed in terms of reliability – how do we ensure that there is available supply to meet demand? However, in our increasingly interconnected world, reliability is only one piece of the puzzle, and an easier one to address at that. Resilience – the ability to mitigate, withstand and recover from disruption, is much harder. The notion of resilience is less tangible, and therefore it is difficult to measure. More problematic, resilience requires an integrated, interdependent and interdisciplinary approach to systems.



The electrical grid obviously is already somewhat interconnected, at least within regions. But experts are advocating for greater interconnection among regional electric grids. For example, Winter Storm Uri did not strike only South Texas. That cold snap impacted a huge geographic region, dropping snow on more than 70% of the continental US and bringing frigid temperatures to more than half of the states from Alaska to Texas. But Texas and parts of the Southwest Power Pool were especially hard hit because of limited interconnections with electrical grids in neighboring regions. Had there been additional interregional transmission interconnections, the Texas grid would not have been as isolated, as the neighboring grids did not lose power or experience the kinds of price spikes that occurred in Texas.

A more interconnected system adds benefits beyond simply connecting additional supply to a constrained region. It adds diversity in terms of weather effects and resources. It also can help alleviate interconnection queue backlogs and mitigate resource curtailment, among other things.

But transmission planning, siting, and construction is a slow process as projects are debated and vetted by multiple stakeholder groups and regulatory bodies all grappling with a wide range of issues and interests, including cost allocations and perceptions of public goods, NIMBYism, environmental impacts and land uses, among many others. Even once approved, transmission projects may face years of obstacles before ground is broken.

For example, a 102 mile transmission project identified in the MISO region in 2011 has only just begun construction following years of hold-ups from federal and state legal actions, and has been halted yet again because of concerns about federally protected waters along the route.

Another much-needed project in New York has undergone years of public and stakeholder engagement to vet the most efficient and cost-effective transmission upgrades to reduce congestion, improve reliability, and better access renewable resources.

These projects are typical of the process. The extent of the fragmentation of US energy grids illuminates the increasing risks of disruption to energy access as severe weather becomes more common, and highlights the attendant risks to individuals and businesses. Texas-based economic research firm The Perryman Group estimated following Winter Storm Uri that the storm cost Texas up to \$295 billion in damages, lost wages, and decreased economic output from shuttered businesses and factories.

The delays facing transmission projects reinforce the considerable effort to achieve consensus across multiple constituencies in this complex process, revealing why incremental project-by-project decisions don't always yield optimal results.

Moreover, improving grid resilience will require more than just transmission lines because today's grid is not simply an electricity delivery system. It is the backbone for just about all major infrastructure in the digital age. Advanced telecommunications is layered onto the electrical

grid, allowing it to be multi-directional and multi-functional, and, importantly, highly integrated and interdependent with other essential systems. These facets increase the benefits to investment in resilience by orders of magnitude, but it also adds risk if investment is slow, piecemeal and does not include simultaneous attention to other critical aspects, such as physical and cyber security, mobility, and equitable access to the interconnected systems.

In the meantime, businesses and individuals, all of whom are reliant on the nation's electrical grids, should take into account the slow pace of reform and keep abreast of severe weather events and invest, to whatever extent possible, in backup plans to maintain business continuity. More comprehensive assessments of the benefits of additional lines between the balkanized regions of the US transmission grid could deliver broader benefits resulting in greater grid resilience and reliability, but political momentum towards such a review seems stalled at the moment.

#### **ABOUT THE AUTHORS:**

Clint Vince is Chair of Dentons' U.S. Energy Practice and Co-Chair of Dentons' Global Energy Sector, and Jennifer Morrissey is Counsel in Dentons U.S. Energy Practice and Co-Editor-in-Chief of the Dentons Smart Cities and Connected Communities Think Tank.



# Autonomous Vehicles Are Here: Waymo and Cruise take the lead in the race toward deployment

By Eric Tanenblatt and Chan Creswell

There are those inside and outside of the autonomous technology sector who continue to speak about autonomous vehicles in the future-tense. They talk about autonomous vehicles becoming a reality “somewhere down the line” or Robotaxis crisscrossing cities “in 5 to 10 years.” In some circles “5 to 10 years” has turned into a joke, an always present and always unattainable timeline for autonomous vehicle deployment.

However, in just a few months, Waymo, a spinoff from Alphabet, will charge citizens of San Francisco for rides in autonomous vehicles across the city at any time on any day. Back in October, the California DMV issued permits to Waymo and Cruise, GM’s autonomous vehicle spinoff, to charge passengers for rides. On Monday, the California Public Utilities Commission (CPUC) completed the process by issuing both companies “Drivered Deployment” certificates allowing the companies to deploy their Robotaxis with a safety driver in the car. Cruise previously received permission to test their vehicles in San Francisco without a driver, although in that instance they cannot charge for rides.

The permits from CPUC are significant for both their practical implications and the message they convey about the autonomous sector at-large. For starters, residents in San Francisco, a city with history as an early adopter of technology, will continue to interact with AVs in-person during their normal daily routines. As consumers interact with this technology they will adjust, learn, and see the technology as a tool to enhance their life. The autonomous sector must provide opportunities to decrease the consumer fear and stigma behind driverless technology. Additionally, these permits stand as a testament to the world that Cruise and Waymo’s technology is safe for public use and provides value to consumers. California has a strict regulatory framework for autonomous vehicles and the CUPC’s approval shows that autonomous vehicles can withstand even the strictest scrutiny.

Lastly, these permits will allow both companies to commercialize their technology. While the AV industry is well funded, few projects are mature enough to begin creating revenue. Not only will these new permits allow Cruise and Waymo to

receive data about the way the public interacts with their vehicles, but they will also actually see tangible return on investment.

This news follows a petition from Cruise and GM to the National Highway Traffic and Safety Administration (NHTSA) to allow the Origin, their first vehicle build with autonomy in mind, to be built and deployed commercially in the US. The Origin is a zero-emission vehicle designed to operate as an autonomous Robotaxi. As such, the Origin is missing many of the devices normally found in a vehicle including wheels, pedals etc. The Origin does not need driver controls since it drives itself.

Cruise and Waymo are not alone in their quest to establish an autonomous fleet vehicle service. In Las Vegas, Motional, a joint autonomous vehicle venture between Hyundai and Aptiv, and Via, a transit software company, will launch their own Robotaxi shuttle service available 9 AM to 5 PM through Via's smartphone app. The rides will utilize pre-determined drop-off and pick-up locations and will have a safety driver. However, this announcement continues to show there is a desire and a growing market for autonomous vehicle services.

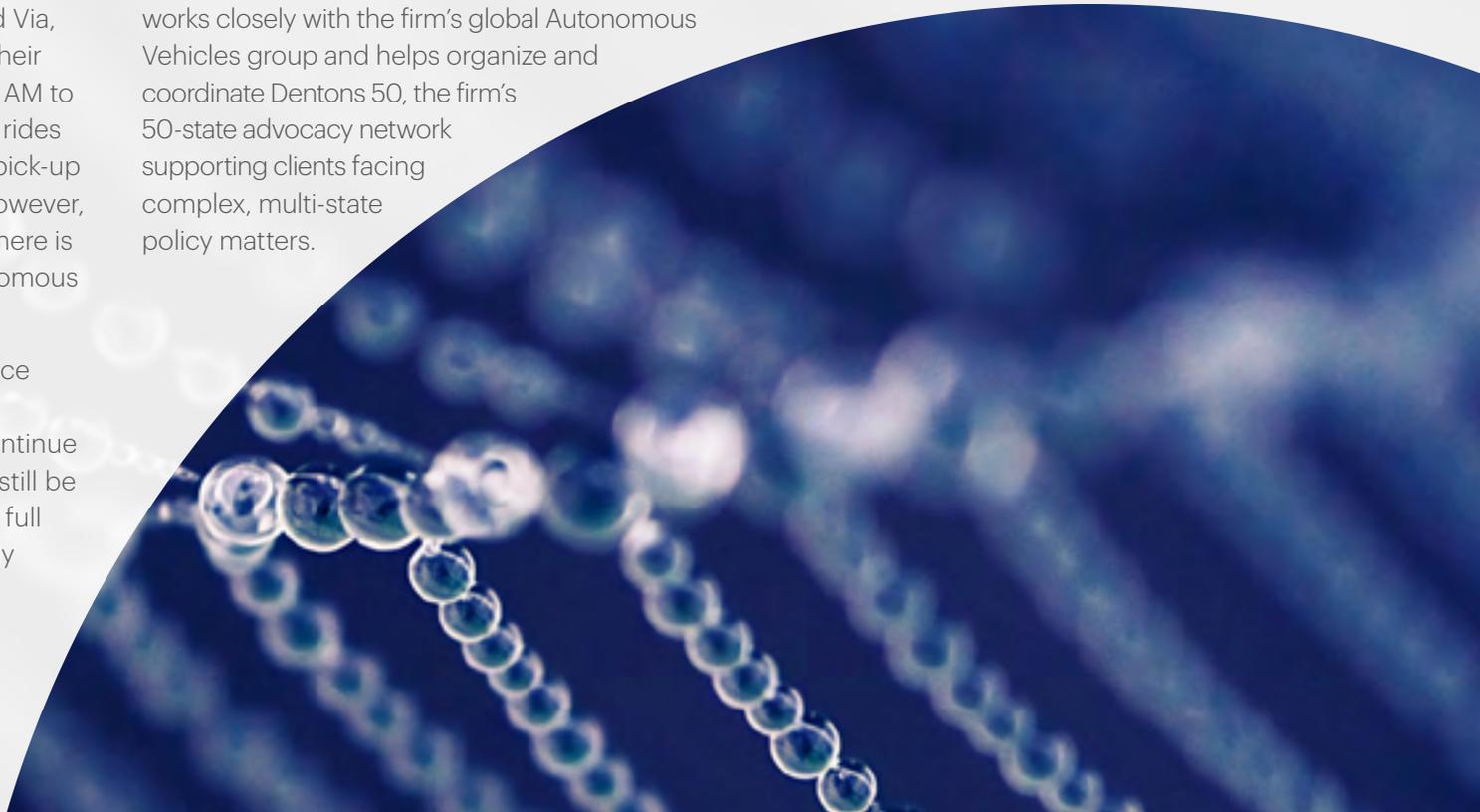
The autonomous sector continues to race toward history at an astonishing pace. Autonomous vehicle technology will continue to mature and Level 5 autonomy might still be years away. However, when we arrive at full autonomy, we might already be regularly riding in autonomous vehicles.

#### **ABOUT THE AUTHORS:**

Eric Tanenblatt is the Global Chair of Public Policy and Regulation of Dentons. He also leads the firm's US Public Policy Practice, leveraging his three decades of experience at the very highest levels of the federal and state governments. He has a passion for shepherding disruptive companies and industries through the complicated web of law and regulation, and often writes and speaks about the innovation economy. He leads Dentons' global autonomous vehicles team and authors a popular weekly digest tracking the most consequential regulatory, political, and technical developments in the world of automotive autonomy.

Chan Creswell is a Senior Public Policy Analyst with Dentons' Public Policy and Regulation practice. works closely with the firm's global Autonomous Vehicles group and helps organize and coordinate Dentons 50, the firm's 50-state advocacy network supporting clients facing complex, multi-state policy matters.

For more on autonomous vehicles, see <https://www.thedriverlesscommute.com/>



# Electric Power and the Pandemic: The Present and Future Role of Resilience

By Robert Chapman, Senior Vice President of Energy Delivery and Customer Solutions at the Electric Power Research Institute (EPRI)

As we each reflect on the dramatic events of the past two years, it's clear their repercussions will be enduring. To move forward, it's incumbent upon us to concede the shortcomings laid bare by COVID-19 and work diligently to address them. To quote Dentons' Global Chairman Joe Andrew, what lies ahead is not a "new normal," but rather a "new dynamic" of "constant, accelerating change" requiring frequent adaptation and constant resilience.

How we generate, deliver and use electricity will be a key aspect of this new dynamic. While U.S. electricity demand has declined, this trend has not been uniform across residential, commercial and industrial segments. The pandemic-induced scale-down of operations at commercial and industrial facilities and transition of millions of Americans to remote work affected energy use patterns significantly, which proved to be a much-needed clarion call for the industry.

The convergence in the last two years of changing customer usage patterns and expanding end-use electrification presents new challenges to integrated system planning and system operations that exacerbate incumbent challenges to grid reliability and resilience.

These emerging reliability and resiliency risks are driven by a changing climate and energy environment with the added burden of a deferred infrastructural maintenance backlog, as recent power system failures in California and Texas have shown. Add to these the mounting pressure from investors and state and federal policymakers to decarbonize the electric power system; and it is apparent the industry must quickly evolve.

Fortunately, this increasingly apparent necessity of system and community resiliency is something that scientists and engineers at the Electric Power Research Institute (EPRI) have been preparing for. The Institute has for decades been an independent leader in driving research that can inform the electric power



industry's efforts to decarbonize. Our work to advance innovative low- and zero-carbon energy technologies, efficiency solutions and durable system planning practices helps support the electricity sector's efforts to meet the evolving needs of our economy and withstand emerging climate challenges in a safe, reliable, affordable and equitable manner.

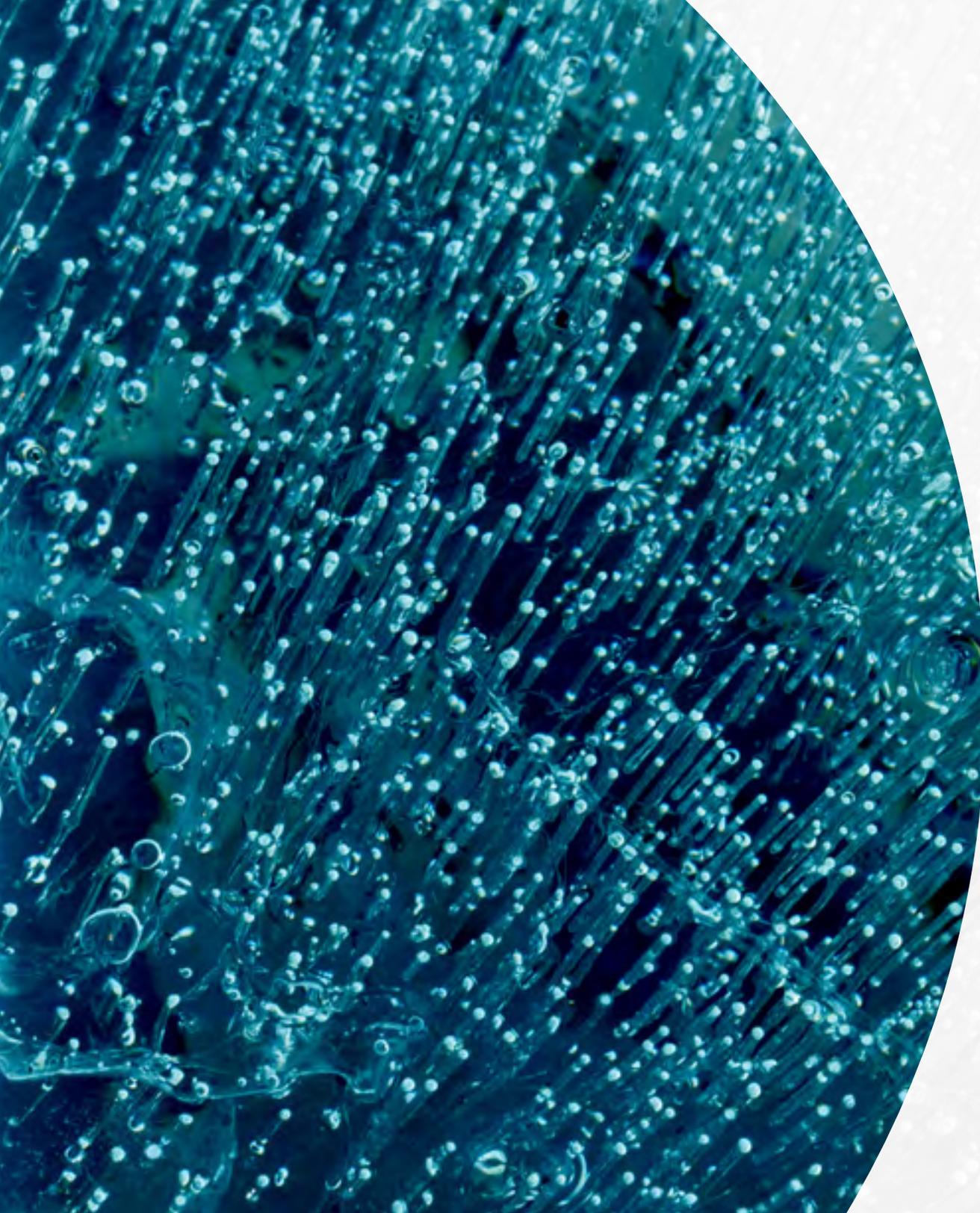
One EPRI RD&D project area made particularly relevant for the future is that of advanced energy communities (AECs). These demonstrations showcase integrate multiple customer-owned physical and virtual distributed energy resources (DERs) – including energy efficiency, demand response, customer storage and photovoltaic (PV) systems, as well as electrification technologies including electric vehicles, combined heat and power

(CHP) and district heating and cooling systems, within localized geographic areas. And as resilience becomes a greater need for our local communities, AECs also illustrate paths that incorporate both backup power solutions as well as better building design to provide a multi-layered strategy for customer resilience that includes weather and power resilience.

In short, DERs are an emerging resilience mechanism that's been enabled in recent years by both policy incentives, like performance incentive mechanisms (PIMs) at the state level, and mandates, like FERC Order No. 2222. Cost reductions driven by advancements in technology and load management strategies have also driven adoption of DERs. These AECs can be microcosms as well as components of Smart Cities, which Dentons describes as

communities where modern communications technologies are leveraged to orchestrate digital, physical and social infrastructure to better offer efficient, effective, and equitable service delivery for community members.

The elevated relevance of AECs to 21<sup>st</sup> century resilience planning was made clear in October 2020 when EPRI, along with research partner Meritage Homes, hosted then-U.S. Energy Secretary Dan Brouillette in Charlotte, North Carolina for a series of discussions and technology demonstrations, which culminated in his announcement that the DOE would be mobilizing \$65 million in funding to support the advancement of technologies that make residential and commercial buildings smarter, more grid-interactive and more efficient.



This opportunity for EPRI and similarly motivated organizations to deepen their investigations into the advantages of AECs speaks to the immediate and growing relevance of microgrids, DERs and other decentralized power sector assets to the transformation of our electricity system and, ultimately, the communities and economies they power.

Indeed, the diversity of advantages that AECs, especially those that draw power from connected community microgrids and implement deep building efficiency measures, afford local power networks and the persons and organizations that depend on them is well documented by EPRI research.

At the Reynolds Landing suburban community outside of Birmingham, Alabama for instance, EPRI collaborated with Alabama Power, DOE's Oak Ridge National Laboratory (ORNL), homebuilder Signature Homes and other partners to develop and deploy 62 all-electric, zero net energy (ZNE), grid-integrated homes complete with what was billed at the time as the Southeast's first community-scale microgrid.

The project's objective was to generate building and microgrid performance data needed to inform both the development of DER integration strategies for utilities like Alabama Power and the understanding of ZNE design and construction incentives for builders like Signature Homes.

The verdict? The project is a tremendous success. Not only are community residents seeing reductions in their power bills of greater than 35% compared to a standard home, but the microgrid has proven capable of islanding and reconnecting itself to the distribution grid in response to unforeseen disruptions.

Other EPRI projects, such as the retrofitting of the Fresno affordable housing community, Pleasant View, and the Los Angeles affordable housing development Mosaic Gardens at Willowbrook have produced troves of data demonstrating how AECs, through building efficiency, electrification and community solar, can be vehicles for driving equitable benefit from energy innovation in addition to serving as a resilience mechanism.

For instance, a community of 80 senior homes in Ontario, CA demonstrated a 40% reduction in greenhouse gas emissions from efficiency and electrification in addition to a 40% reduction from community solar. Beyond lower average monthly energy consumption for residents in these communities, the projects show that AECs can be cost-effectively deployed in affordable housing developments and, as a result, limit the need for such communities to incur new energy infrastructure costs such as transmission and distribution upgrades to support, for instance, electric vehicle charging infrastructure.

Utilities are using AECs to overcome barriers to adopting efficiency and other DERs by understanding the challenges of grid integration and of capturing consistent financial returns with new technologies. The experiences of the pandemic and the severe weather events that punctuated it have engendered an almost unprecedented focus on the elements of reliability and resilience across all strata of our economy and society; the electric power sector is no exception.

We expect to see the events of recent years continue to drive the conversation around grid resiliency, and with it, a revised approach to reliability and resilience among the C-Suite. This new approach will likely be one that incorporates the considerations for environmental and social sustainability increasingly preoccupying executives, investors, policymakers and consumers in this space into 21<sup>st</sup> century reliability and resilience planning. This, at least, will be paramount as industry stakeholders seek to meet mounting calls for accelerated decarbonization with a more customer-centric, resilient grid.

Though the challenges of the COVID-19 pandemic may have exposed electric power system challenges, what the body of EPRI research demonstrates is that we have already identified and demonstrated potential solutions. Investment in the deployment and integration of AECs, microgrids and similar DERs offer utilities an unmatched opportunity to mitigate their exposures to financial, climate, policy and even reputational risk while delivering untold benefits to the grid and those who depend on it.



# Biophilia and Urban Wellness

## Strategies for connecting nature and cities, and the corresponding benefits.

Authors: William Browning & Andrew Snowwhite

Biophilia is the innate human connection to nature, and cities around the world are discovering that it is more than just a feel-good notion. Creating experiences of nature in the urban environment has measurable physiological, psychological, and economic benefits. Streetscapes, parks, rooftops, and stormwater systems all offer opportunities for meaningful connections to nature.

Trees are a wonderful example; implementing strategies to preserve and increase the number of trees in a city has multiple benefits. In Washington, DC, the Casey Trees Endowment found that planting more street trees lowers heat island effect and helps reduce stormwater runoff. Street trees increase the willingness to pay for retail general by 25% and specialty retail by 15%. A public health study in Toronto found that having ten more trees per block on a street created a health benefit equivalent to increasing incomes by \$10,000 with an equivalency of people being seven years younger. In Barcelona, a study involving 2,600 elementary age school children concluded that separate from demographics, having more tree canopy in the school yard led to a measurable increase in cognitive development over the course of a year.

### The Power of Open Space

Creating, maintaining, and prioritizing parks and open spaces are important strategies for connecting to nature. In Japan, research into the experience of shinrin-yoku or “forest bathing” found participants had lower cortisol levels (a stress hormone) after walking or sitting in urban parks for 15 minutes versus walking or sitting on an urban street. In the Netherlands, a study of national health care system data found that independent of demographics, people living near parks and open space are healthier.

Parks are effective regardless of their size. In 1967, Paley Park in Manhattan at 30 feet by 90 feet was the first of what are now called “pocket parks.” The ivy walls and dappled light of the honey locust trees create a pleasant space, while the prominent water wall enlivens the park and masks street noise. On an even smaller scale, the “parklet” movement of converting street parking spaces into mini parks that started in San Francisco has now spread around the world. The parklets can be permanent or temporary, as in Vienna, Austria, where restaurants can rent adjacent parking spaces on their street to expand their summer dining space.

Utilizing abandoned infrastructure is another means to increase urban wellness, like the aging viaduct that was converted into the linear park La Promenade Plantee in Paris. That park inspired the conversion of a retired elevated freight line into the Highline in New York City. The Highline transformed the real estate market on the west side of Manhattan, provided a new recreation amenity to residents, and is now the second most visited attraction in the city. Vitoria Gasteiz in the Basque Country turned a series of railroad beds and stream corridors into a connected park system that runs through the fabric of the city. Similarly, the Beltline in Atlanta, Georgia will eventually connect a series of parks encircling the city. Conversions, if planned correctly, also support neighborhoods without causing historic inequality issues relating to housing and jobs. A large-scale open space community program led by The Trust for Public converted asphalt school yards into neighborhood parks at over 100 New York City schools!



**Above:** Paley Park is an amazing refuge space in the heart of Manhattan. The park is popular in all seasons and well into the night. Photo: William Browning

### Green Infrastructure

Green roofs reduce heat island and stormwater issues and if accessible are powerful biophilic design strategies. Some of the earliest research in biophilia indicated that a view to nature improves healing and reduces the length of hospitalization. Khoo Teck Puat Hospital in Singapore has a rainforest garden through the middle of the site, which is visible from patients' beds, and an organic garden on the roof of the clinical wing of the hospital. The garden is run by local residents and the food is used in the hospital kitchens and local homes. Rooftop farming is catching on in many places, such as the rice paddy on the Mori Roppongi Hills

Complex in Tokyo, and the commercial roof farms run by Brooklyn Grange in New York City. Not only is fresh and healthy food produced by and for locals while increasing available open spaces, but also carbon emissions and pollution issues relating to building cooling and transportation are mitigated.

Stormwater control systems are another opportunity to leverage biophilia. Portland, Oregon uses a network of rain gardens, green streets and parks to control stormwater. Tanner Springs Park in Portland's redeveloped Pearl District creates wildlife habitat, controls local stormwater, and serves as a popular park and gathering space in a dense urban area. The

City of Philadelphia determined that building a network of green roofs, rain gardens, and stormwater capture parks was less expensive than digging up the city to install a separated sewer system. In the town square in the medieval core of Hannoversche Munden, Germany, a sculptural water feature is used to control stormwater and create an interactive space for residents.

Using open spaces to protect and restore native biodiversity benefits human and natural residents and visitors. In Wellington, a central park was fenced to exclude cats, rats, and dogs to successfully restore habitat for extirpated native New Zealand bird species. Not only did this help increase bird populations, but it also provided urban birders a new observation hotspot. Wellington also cleaned its harbor to the point that it now supports a snorkeling and scuba trail that is accessible from walk-in points on the inner-city waterfront.

The idea of extending accessible open spaces to enhance human and ecosystem health is catching on in other parts of the world too. Palm Beach County in Florida created the Phil Foster Park snorkeling and diving trail, a series of underwater artificial structures that attract marine life and subsequently residents and tourists too. Similarly, an innovative Highline-type project is underway in Miami, Florida called "The Reef Line" that is creating a seven-mile-long underwater public sculpture park, snorkel trail, and artificial reef.



**Above:** The much-loved Tanner Springs Park in the heart of the Pearl District in Portland, Oregon has a large water feature that captures and cleans stormwater from the surrounding neighborhood. Photo: William Browning

**Below:** A rooftop community garden at Khoo Teck Puat Hospital in Singapore provides food and direct connection to nature. Photo: William Browning





**Above:** The landscaping on the of podium the ParkRoyal on Pickering a hotel in Singapore that includes a 1 km walking trail and extensive water features. Photo: Credit: William Browning

### City-Scale Biophilia

Some cities are taking a holistic approach to biophilia; Singapore has adopted the goal of being a “City in a Garden.” This effort has many components including converting concrete water ways into naturalized parks, establishing wildlife corridors through urban areas, and developing a system to measure and monitor biodiversity. The city also requires new multistory buildings to include a horizontal planted area that is larger than the footprint of the building. The concept is called Green Area Ratio, which is calculated like the more familiar zoning tool of Floor Area Ratio. The result is extraordinary buildings like the ParkRoyal on Pickering. A hotel and office building with a Green Area Ratio of 2.7, it set a new design standard for the brand and the city. The hotel building now supports a higher level of biodiversity than the adjoining park!

The planned community of Reston, Virginia was designed with biophilia as a core tenant of the masterplan. This is a strategy that should be considered for any new urban development, especially new cities. Reston’s founder Robert E. Simon, Jr. codified this concept in the late 1960s in one of his “Seven Goals”: “That beauty – structural and natural – is a necessity of the good life and should be fostered.” Fifty years later this vision ensured that 11.4% of Reston’s 7,000 acres is meadows, wetlands, and urban forests and that tree canopy covers over 50% of the total area. Over 55 miles of paths connect Reston’s natural spaces to its residential, commercial, and recreational areas. Nature,

and its ease of accessibility, is a key reason that it is now one of the most vibrant suburbs of Washington, DC, which is reflected in its thriving residential and commercial real estate markets.

Clearly, there are numerous benefits from integrating biophilia in urban settings, and everyday cities and communities are developing and implementing new programs and best-practices. The [Biophilic Cities Network](#) is a wonderful resource for learning more about what cities around the world are doing to connect their citizens to nature. Biophilia also is a valuable tool at all scales from individual rooms to entire buildings, as described in the new book: [Nature Inside, A Biophilic Design Guide](#).

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**Above:** Statue of Robert E. Simon at Reston's Lake Anne Village Center. Completed in 1967, it was the area of Reston to open and is now on the National Register of Historic Places. Photo: Andrew Snowhite

# AI Risk, Regulation and “Algoethics” – the urgent need for businesses to develop AI strategies

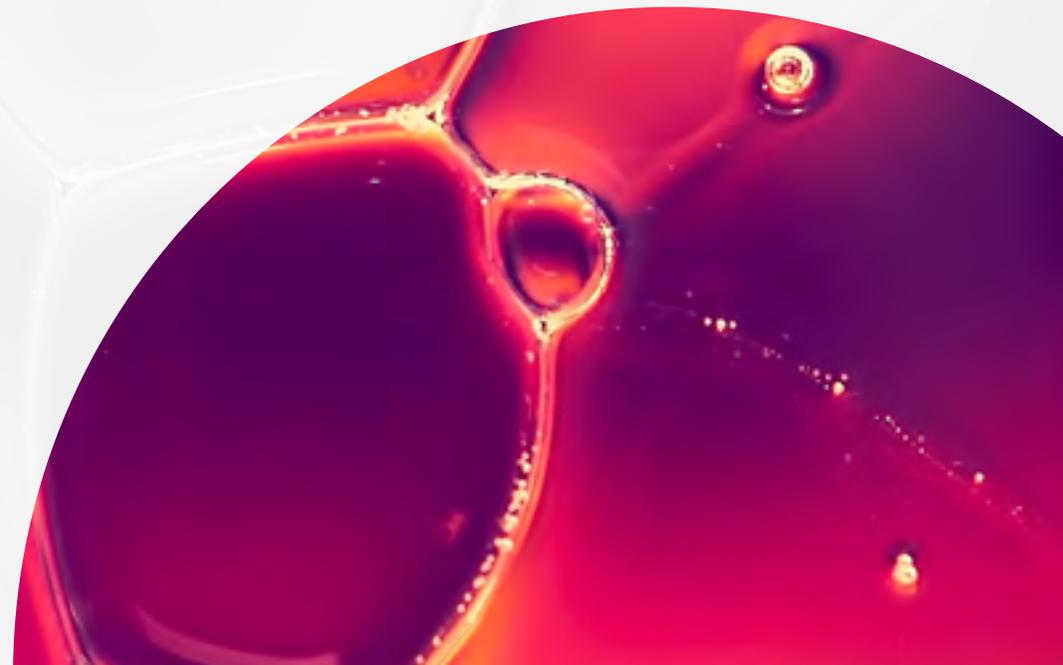
By Giangiacomo Olivi and Jennifer Morrissey

Global business leaders harbor major concerns over the decisions and omissions made by Artificial Intelligence (AI) systems - despite the fact that 60% of companies now use them. Last fall, Dentons conducted a broad survey, polling over 800 global business leaders and entities on their organizations' use of AI, as well as on the risks and opportunities presented by AI technologies. The results of the survey reveal that businesses around the world recognize the many benefits of AI, such as saving time by automating processes, generating data-driven business information for decision making and reducing human error in processing, while also surfacing the following areas of concern:

- 81% cited personal data protection as a significant concern, yet only 55% of businesses actually have data protection policies for both personal and non-personal data in place.
- Only 19% of businesses have a strategy or roadmap for AI, meaning that it is being implemented without proper consideration of the risks, the relevant legislation or the internal controls required to ensure it is well-governed.
- 80% of business leaders report uncertainty over where liability sits for the decisions as well as omissions made by AI systems.
- 57% harbor concerns about the potential for discrimination arising from the actions of AI systems.

- Depending on the area of law, between 55% and 75% are unaware of relevant AI legislation in their country, and 63% do not know which public body regulates the area.
- Businesses are urgently looking to regulators to provide protection mechanisms on the use of AI in relation to privacy (61%), consumer protection (52%), criminal liability (46%) and intellectual property (45%).

AI has become part of everyday life and businesses are riding a wave of optimism as they pursue growth strategies that incorporate the implementation of these fast-developing technologies. In the business world it is now commonplace for AI, and its partner machine learning, to play a pivotal role in helping businesses gain new insights from their data, make decisions and automate processes.



The majority of businesses are still in the initial stages of their AI journey. They recognize the potential benefits that AI offers but have not yet fully realized the potential application for their business. Fewer than 20% of businesses have developed an AI strategy.

Global business leaders are beginning to ask serious questions about where the responsibility for good governance, regulation and compliance sits. Government regulators, too, are beginning to take note, although focus thus far has been limited primarily to frameworks or high-level strategies aimed at the creation of global standards.

Organizations have a tremendous opportunity right now to help shape the regulatory landscape that will impact their businesses rather than waiting for policy to be set. In light of the speed at which technology is developing and rapid changes in markets, the sooner businesses engage in dialogue with policymakers, the more workable and beneficial the emerging regulatory landscape will be, and the better prepared organizations and regulators alike will be to avoid or mitigate risks associated with AI.

Businesses need to conduct their internal AI risk assessments and to develop workable roadmaps for tailored AI strategies. At the same time, we urgently need to start a dialogue on the controls needed to protect businesses, customers, shareholders and communities.

Among other things, strategies need to be developed in alignment with company missions and compliance obligations, but we also need a system of “algorithethics” so that the right checks and balances can be put in place to balance business objectives with a focus on people and evolving moral considerations.

The AI landscape is changing at an accelerating pace. Organizations must get out in front of the issues that AI raises, or risk being overtaken by them, which could lead to inefficiencies, increased costs, and lost opportunities.

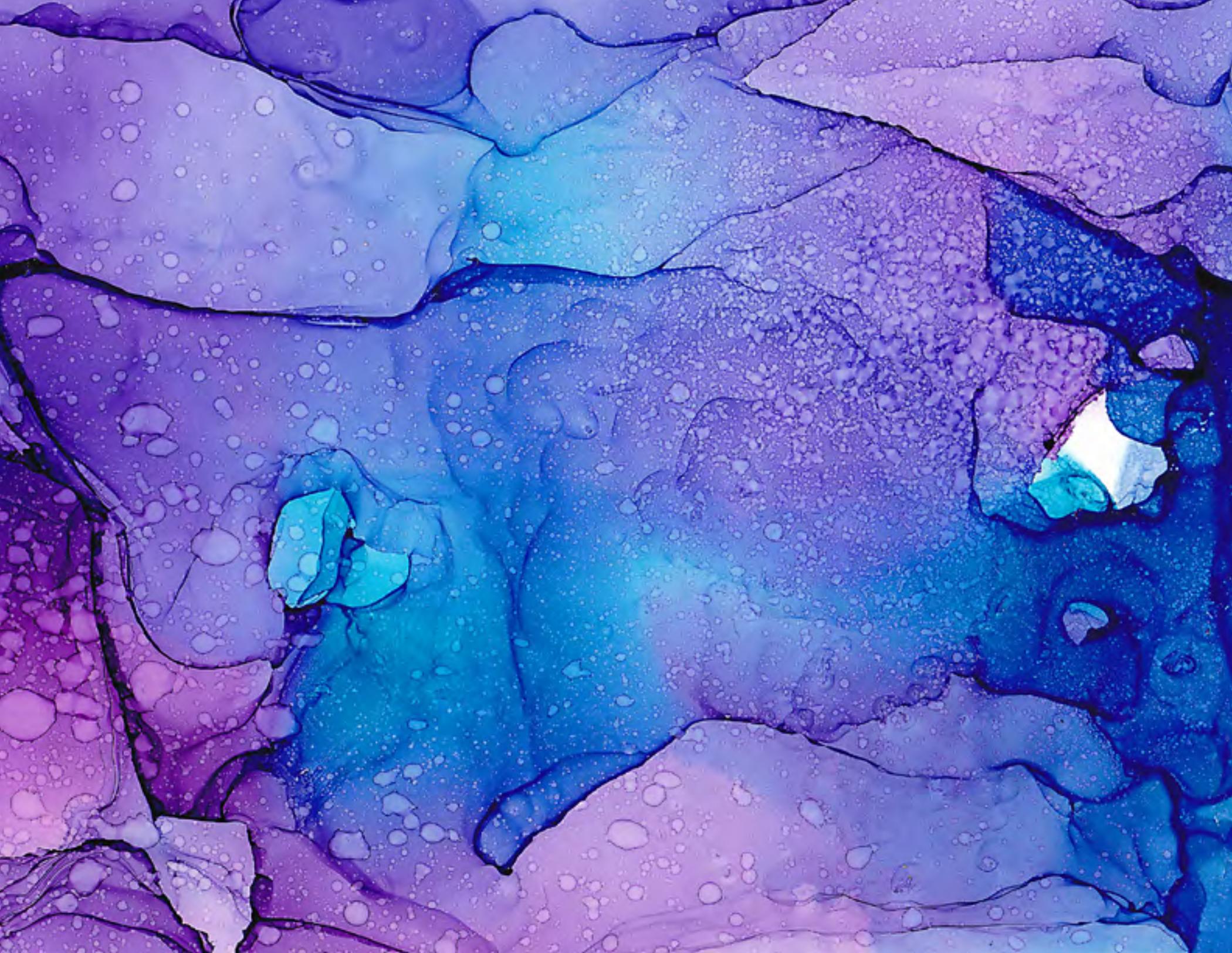
Dentons’ Artificial Intelligence Guide presents insights on the legal and regulatory issues that businesses using AI will need to grapple with, and includes discussion of steps that organizations can take to develop sound AI strategies. These discussions are supplemented with snapshots of government strategies and regulatory developments in Europe, Canada, China, India, Israel and the United States. The AI report is a collection of articles by AI team members across the Dentons platform. The full report is available at:

<https://insights.dentons.com/344/23400/uploads/final---embargoed-until-10-jan---ai-guide-2022---brand-67749-v15.f?intlaContactId=TzZf%2bKnWRtHxllD%2fD%2fEQ3Q%3d%3d&intExternalSystemId=8>



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# Connections and Insights

We invited Think Tank members to respond to a series of questions about current trends related to smart and connected communities and to share their insights on what they think the future holds.

## Has your concept of a “smart” or “connected” city or community changed in response to the COVID-19 pandemic?

The pandemic has further emphasized that the terms “smart” and “connected” not only relate to technical innovations, but also to the human infrastructure that supports and powers our cities and communities. This includes how we design and operate places and spaces to create and foster a sense of community, quality of life, personal connections, and wellbeing. Similarly, the concepts of “smart” and “connected” also must be applied to nature, including a focus on nature-based solutions, green infrastructure, and biophilia.

To be “smart,” all these factors need to be considered through a systems-based and integrated approach (e.g., the Circular Cities concept). Doing so will strengthen cities and communities’ social and environmental foundations and create new layers of resiliency.

Additionally, the pandemic has further illuminated the inequities between cities. This includes cities and populations that are underserved or vulnerable, as well as differences between cities across world. As such, the concepts of “smart” and “connected” need to be considered and adapted appropriately to align with the realities of each city’s location and resources. This is particularly true in emerging economies that continue to be disproportionately impacted by COVID-19.

**Andrew Snowwhite** | *Senior Strategy & Sustainability Advisor, NewCities; Advisor, WELL City Advisory, International WELL Building Institute; LEED for Cities & Communities, U.S. Green Building Council; Chief Strategy & Sustainability Officer, Snowwhite Strategies*

My concept of a smart city has changed because of the pandemic for three reasons. First, is digitalization, which has shown us that the historic definition of a community now extends beyond local physical boundaries or a place where we either go to or from for work. Going forward a connected city allows citizens a hybrid lifestyle that doesn't always require commuting, thus reducing traffic congestion and stresses on city infrastructure.

Second, our perception of travel has changed regarding how communities of the future are planned and built. As we continue to embrace outdoor living and the use of open space, or reclaimed street space, cities may become even more assertive as well as flexible in their transit, commuting, and street planning. From a citizen perspective, the pandemic has accelerated trends in micro-mobility and alternative forms of commuting.

Last, connected technology has enabled people within the same environment to collaborate or co-create solutions that will make cities more productive in ways we haven't seen before. This includes enhanced neighborhood engagement and increased interactions between citizens, resulting in a more vibrant and inclusive city life. People can now build relationships virtually over lengthy periods of time even before they ever meet in person, driving new levels of engagement and connectiveness.

**Lawrence Jones** | *Vice President, International Programs at Edison Electric Institute; Global Board of Directors, World Resources Institute; Senior Fellow, Institute for Sustainable Energy at Boston University; Senior Associate, Energy and National Security, Center for Strategic and International Studies & Communities, U.S. Green Building Council; Chief Strategy & Sustainability Officer, Snowwhite Strategies*

I think rather than "changed," "accelerated" is probably the word I would use. The pandemic has accelerated established trends by pushing more workers remote and connecting them through sensors, networks, and analytics that make a city "smart." This acceleration opens up a larger attack surface, creating both opportunity as well as consequence.

**Charles Harry** | *Director, Center for the Governance of Technology and Systems, Maryland Global Initiative for Cybersecurity and Associate Research Professor, University of Maryland; CEO and Co-Founder, Decision Point Analytics*



**What new technology or policy related to infrastructure modernization/ smart and connected communities are you most excited about as you look to the immediate future?**

There is a lot to be excited about as it relates to new technologies and policies. I'm very interested in the amount of attention and investment going toward mobility and novel transportation infrastructure in cities. This is especially true for the electrification ecosystem that we are now seeing across vehicles, scooters, and charging infrastructure. Similarly, lighting innovations such as intelligent lighting are increasing safety and efficiency. Whereas in the past a city might illuminate every roadway or alleyway, we can now use technology to determine specific time use and brightness, depending on the season or a specific street's nighttime usage. This results in minimizing light pollution and energy consumption. Cities also are modernizing their waste management systems with connected technologies and more sophisticated management centers. Wastebaskets with sensors can alert city services only when they need to be emptied, which revolutionizes how city planners schedule pickups, and thus every element of the waste management infrastructure chain.

**Lawrence Jones** | *Vice President, International Programs at Edison Electric Institute; Global Board of Directors, World Resources Institute; Senior Fellow, Institute for Sustainable Energy at Boston University; Senior Associate, Energy and National Security, Center for Strategic and International Studies*

There has never been a more exciting time for transmission – from both a technology and policy perspective. As the US transitions to a lower-carbon electricity future, today’s electric grid is increasingly being asked to integrate new energy users with a growing diversity of generation resources—both large and small, central and distributed. At the same time, there is the increasing frequency and severity of extreme weather events impacting grid operators and regulators across the country who are faced with difficult decisions on how to ensure cost-effective, reliable, and increasingly clean energy delivery.

Investment in more interregional transmission through a U.S. Macro Grid that better connects our largest population centers with our lowest-cost renewable resources will enhance grid reliability, save consumers billions of dollars, deliver significant job creation, and dramatically reduce carbon emissions.

By utilizing neighboring electricity supplies, we increase resilience and threat mitigation, and move power supplies from where they are available to where they are needed. Power system operators confirm that a larger geographic footprint decreases energy supply/demand variability and improves system performance.

Large-scale transmission combined with a large-scale buildout of our abundant domestic renewable energy resources could reduce consumer electric bills by over \$100 billion cumulatively, decreasing the average electric bill rate by more than one-third. <https://cleanenergygrid.org/why-transmission-matters/#benefits>. The NREL Interconnections Seam study found the benefits of a macro grid connecting the Eastern and Western Interconnections to be almost three times the cost, allowing nearly 40 GW of power to move back and forth on a daily basis. <https://www.nrel.gov/analysis/seams.html>

As documented in many studies, including a FERC-NERC investigation, the localized nature of extreme weather underscores the important role of interregional cooperation and access to diverse electricity supplies. As an example, each additional gigawatt of transmission capacity connecting ERCOT with neighboring states in the Southeast could have saved \$1 billion in damages and provided energy to 200,000 homes during February’s winter storm. These analyses illustrate the benefits of interregional transmission access which can serve as a “lifeline” during periods of interruption by providing improved grid reliability and consumer savings.

From a policy and regulatory perspective, the timing is excellent for renewed interest in transmission technology. The Infrastructure Investment and Jobs Act contained language creating a new Grid Deployment Authority to build a resilient, clean, 21st century electric grid. In 2021, FERC announced an Advanced Notice of Proposed Rulemaking on Transmission, including examination of cost allocation, transmission planning, and generator interconnection. Finally, the Build Back Better Act includes provisions that would provide an investment tax credit for transmission, as well as additional federal assistance to states. These federal policy and regulatory developments recognize electricity transmission as an important component of our economic vitality.

Like the interstate highway system to protect national security and facilitate interregional trade, there is clear national interest in ensuring the power grid is strong and secure. An integrated macro grid transmission network can deliver benefits every day by diversifying supply, reducing cost, and increasing resilience. There has never been a better time.

**Barbara Tyran** | *Director, Macro Grid Initiative, at the American Council on Renewable Energy (ACORE); former Director, Washington & State Relations at EPRI; Past President of the Board of Directors of the Women’s Council on Energy & the Environment (WCEE)*



I think the integration of smart signaling with automated driving is really exciting. There are huge potentials for the reduction of traffic, fatalities, and even opens up the possibility of rides on demand. In some cases, cities and states are already experimenting with this technology. It opens up the potential for reducing blacktop and integrating more open spaces within these urban centers.

**Charles Harry** | *Director, Center for the Governance of Technology and Systems, Maryland Global Initiative for Cybersecurity and Associate Research Professor, University of Maryland; CEO and Co-Founder, Decision Point Analytics*



# How can the promise of smart cities have a scalable and tangible positive impact on our underserved and underrepresented communities, and how can we better engage these communities in the infrastructure modernization discussion?

Smart city infrastructure if properly managed and deployed can reduce inherent inequities to many citizens. The ability to deliver transport and educational services more broadly and cheaply provides a foundation to parts of society that historically have suffered disproportionately. Engagement with local communities in the planning process will help ensure these new services meet the needs of the citizens. Part of that outreach will be education. Specifically what these technologies are and how it directly impacts their daily lives. Being specific and demonstrating value at the micro will help spur adoption and create the macro benefits city leaders are attempting to achieve.

**Charles Harry** | *Director, Center for the Governance of Technology and Systems, Maryland Global Initiative for Cybersecurity and Associate Research Professor, University of Maryland; CEO and Co-Founder, Decision Point Analytics*

With the current “ESG” (environmental, social and governance) policy conversation, companies are poised to play an important role in stakeholder engagement not only to better serve the communities in which they operate and do business, not only in terms of delivery of their own products but in terms of social justice, equity, environmental quality and sustainability. From major global enterprises to small local businesses, companies are presently experiencing the impact of a significant mindset shift about the role that companies should play in society. The 50-year-old notion that a corporation’s responsibility is to increase profits for its shareholders is being replaced with focus on the role that companies can and should play in environmental, social and governance policy. Companies now are being challenged to articulate corporate purpose and values that encompass the views not only of shareholders, but of a broad array of stakeholders—investors, employees, customers, suppliers, communities and beyond – on non-monetary factors such as impact, sustainability and ethics. These stakeholders are now demanding that companies owe a duty to the public and to society. The shift began with focus on “corporate social responsibility.” For some companies, this included earnest efforts to reduce environmental footprints, to increase philanthropy and to improve transparency. Companies now are facing mounting demands on corporate behavior driven largely by increased climate change disruption, a global pandemic, and intensifying social justice disparities. A new generation of stakeholders now weigh intangible ESG criteria equally with financial criteria in making their investment, employment and purchasing decisions. This new generation is seeking accountability, transparency and good citizenship in addition to, and as part of, a company’s value proposition.

Of course, the drive to be a positive force in society is not incompatible with more traditional views. The fact that the measure of value, in part, is intangible does not mean that the value cannot be recognized. Indeed, regulators and the markets today take the position that many ESG-related representations made in public disclosures are material. Companies frequently take intangibles into consideration in assessing value – customer goodwill, reputation, intellectual property, brand recognition, to name a few. All of these contribute to the ultimate bottom line that is the basis for building and measuring the long-term value of a company. As Indra Nooyi, former CEO of PepsiCo, recently explained, “social responsibility” in the corporate context, is not about depriving shareholders of money earned by the company, but rather “[i]t’s about how we make money a different way”.\*

\* <https://www.nytimes.com/interactive/2021/10/04/magazine/indra-nooyi-interview.html>

**Gail Liono** | Senior Counsel at Dentons; Fellow of the ESG Center of the Conference Board; Adjunct Professor at Georgetown University



Want to learn more about ESG? Visit Dentons ESG Webinar Hub at <https://www.dentons.com/en/services-and-solutions/environmental-social-and-governance/esg-webinar-hub>

**Articles of interest:**

top 5 takeaways from Dentons Global ESG Virtual Roundtable <https://www.dentons.com/en/insights/articles/2021/october/25/top-5-takeaways-from-our-esg-virtual-roundtable>

ESG Financing – Back to Basics <https://www.dentons.com/en/insights/articles/2022/may/1/esg-financing-and-what-it-means-for-the-middle-market>

**What are the most important security trends to consider as our cities and communities become more connected and more reliant on smart technologies? And what questions in this area are we failing to ask, or what issues are we not devoting enough focus to?**

The introduction of IoT sensors or other devices opens up the potential for hackers to conduct attacks that generate substantial societal impacts. As the growth of interconnected devices accelerates our ability to manage the complexity will be challenged. While many market solutions attempt to emphasize this, humans need to adapt in our governance structures to account for systemic risk. Colonial pipeline is a good example of what will continue to be a problem in the 21st century.

**Charles Harry** | *Director, Center for the Governance of Technology and Systems, Maryland Global Initiative for Cybersecurity and Associate Research Professor, University of Maryland; CEO and Co-Founder, Decision Point Analytics*

I believe there are three interrelated and looming challenges for the security of our critical infrastructure as we become more reliant on digitized smart technology.

The first is the integrity of the devices themselves that are and will increasingly be integrated to our infrastructure especially to systems such as our electric, gas, water, and wastewater systems. There are currently no universal device standards for the manufacture or assembly of digitized devices. The buyers and sellers, many of who operate worldwide, as well as regulators should seek consensus on the device standards as well as regimes for testing and verification of device integrity and even publish approved and disapproved lists of critical components.

The second area of focus will need to be the establishment of agreed upon protocols for security regarding aggregated energy resources. These new aggregated resources could include multiple dispatched distributed energy resources, electric vehicles which will put electric back onto the grid, and other such local generation. These “virtual power plants” will need to operate by distributed energy management systems (DERMs) which are really still only in their formative stages. We will need to ensure the security of those systems and can accurately manage this new interactive power flow to ensure that they are secure from threats.

The last is to consider continuity of service in the face of what might be a realized failure or breach of these smart technologies. Resilience is defined as the ability to withstand a threat, but if realized to respond and recover. To be resilient, we should plan for the failure or breach of these technologies and determine how to respond and recover - even with alternatives such as manual back up operations.

The opportunities and advantages of these emerging smart technologies are great. However, we should be realistic and pragmatic about the security of them and be diligent about the potential threat that comes with them as well.

**Richard Mroz** | *Managing Director, Resolute Strategies; Senior Director, Archer Public Affairs; Senior Advisor, Protect Our Power; Corporate Fellow, Global Resilience Institute*



For the latest news on privacy and cybersecurity law and policy, visit Dentons Privacy and Cybersecurity Hub at <https://www.privacyandcybersecuritylaw.com/>

Cyber security is key, and unfortunately too many cities today lack the skills and resources - human, technology, and financial - to ensure their digital systems are protected. Likewise, physical security is an ongoing concern, which can be assisted by technology. However, as more sensors are put in place and more data is collected, cities need to ensure surveillance is done in a way that is not invasive to the lives of the people they are trying to protect. This also goes for how the data assets and information are managed. From a security perspective it also is important to consider the virtual crime that may be planned or conducted and how it impacts not only citizens, but business and government. All this needs to be taken into account by policy makers as they craft smart and adaptive regulation.

**Lawrence Jones** | *Vice President, International Programs at Edison Electric Institute; Global Board of Directors, World Resources Institute; Senior Fellow, Institute for Sustainable Energy at Boston University; Senior Associate, Energy and National Security, Center for Strategic and International Studies*





**What aspect of smart cities can have the greatest impact on accelerating the energy transition?**

Increasing resource efficiency is one of the most significant ways cities can accelerate the energy transition while also lowering costs and reducing emissions. One aspect of this that I find very interesting is the impact on job creation. As cities become smarter and more connected there will be new human resource opportunities created, especially related to hybrid/virtual work and associated reductions in time spent commuting and thus energy requirements. This means that city employees might not live in the city or even within the same state, but can still provide the required services, or even new services. For example, aside from a police officer physically patrolling a street, complementing sensor technology or drone data may be monitored by employees located well beyond a city's physical borders. Therefore, as cities become smarter, they can also create new jobs, increase security, and facilitate the energy transition.

**Lawrence Jones** | *Vice President, International Programs at Edison Electric Institute; Global Board of Directors, World Resources Institute; Senior Fellow, Institute for Sustainable Energy at Boston University; Senior Associate, Energy and National Security, Center for Strategic and International Studies*

**Cities are critical to climate. What role do they play in meeting the COP26 commitments? Can cities and communities realistically take meaningful steps to address climate change, or is their role limited to resilience measures and mitigating the impacts of a changing climate?**



For more COP26, see Reflections on Glasgow at <https://www.dentons.com/en/about-dentons/news-events-and-awards/events/2021/november/23/reflections-on-glasgow-cop26>

Dentons “Takeaways and ‘What Nexts’ for In-House Legal” at <https://www.canadaregulatoryreview.com/cop26-the-takeaways-and-what-nexts-for-in-house-legal/>

Cities must take a leadership position in meeting COP26 commitments and driving the world toward a net-zero future. The good news is that progress already is being made. For example, over 1000 cities and local governments, representing over 720 million people, already signed on to the Cities Race to Zero campaign. This initiative from C40, ICLEI, the Global Covenant of Mayors, CDP, UCLG, WRI, and WWF exemplifies the power of collaboration and stakeholder alignment to drive change. Similarly, hundreds of cities worldwide are now using the U.S. Green Building Council's LEED for Cities and Communities program to increase and track environmental and social sustainability across their planning and operations.

For these types of proactive programs to be effective, cities need the participation and support of all stakeholders, including the private sector and citizens. More so, cross-city collaboration is critical, as is supporting emerging and frontier cities, especially those in the Global South. This includes sharing knowledge, resources, and best practices. Success at a global scale can only be achieved together.

The prospect of adding billions of new urbanites to our cities, or to new cities, sounds daunting. However, it also provides an opportunity to create net zero buildings and communities from their inception. Cities and their partners can accelerate this by leveraging incentives and ESG funding or enacting green building and planning policies.

Additionally, cities and communities can't look at climate change in a silo or purely as a carbon issue. Other key considerations that are inextricably connected to climate must be prioritized and integrated into net zero initiatives including water, waste, mobility, habitats, and biodiversity.

An integrated approach of bold action and innovation, coupled with resiliency and mitigation, creates an opportunity for cities to lead the charge toward a net zero world.

**Andrew Snowwhite** | *Senior Strategy & Sustainability Advisor, NewCities; Advisor, WELL City Advisory, International WELL Building Institute; LEED for Cities & Communities, U.S. Green Building Council; Chief Strategy & Sustainability Officer, Snowwhite Strategies*

# How would you describe the nexus of smart cities and the circular economy today? Where should it be headed?

Cities, and their success, are a product of the ebb and flow of resources, both natural and human. These resources move about and are consumed in different ways. Some are tangible and measurable, moving via pipes or transmission lines, or cars and trains. Others flow in the form of ideas, in new innovations or scientific breakthroughs. Additional resources are imbedded in items, such as food or clothing. And while residents and policymakers may be able to control or influence certain resources (traffic or electricity), there are few if any available mechanisms to regulate the flow of others (precipitation or wind).

Smart city leaders are beginning to recognize and understand the interconnectedness of these components, and the importance of how they work together in a system. Once that occurs, city leaders can (and are starting to) begin to map out their own circular economy plans by defining specific, measurable goals, followed by actionable plans with multi-stakeholder buy-in. This requires a combination of smart technology, policy, collaboration, and innovation. Concepts such as the Circular Cities Actions Framework or Donut Economics are available to guide cities as they transition to a circular economy.

Looking to the future, there are now examples of cities around the world that are leading the way and serving as important benchmarks. Many cities are starting with circular projects: Malmö in Sweden implemented a circular procurement framework, with a focus on furniture; Accra, Ghana instituted an informal e-waste recycling pilot program; and Curitiba in Brazil built a more sustainable community via transit-oriented planning. Amsterdam has taken the boldest action to date by embracing a holistic approach to the circular economy and implementing city-wide Donut-related policies and infrastructure projects. Hopefully these pioneering cities will inspire others to implement circular concepts as fundamental components of their smart and sustainable strategies.

**Andrew Snowwhite** | *Senior Strategy & Sustainability Advisor, NewCities; Advisor, WELL City Advisory, International WELL Building Institute; LEED for Cities & Communities, U.S. Green Building Council; Chief Strategy & Sustainability Officer, Snowwhite Strategies*

# STUDENT NOTE:

## **The Future Workspace: Artificial Intelligence, Digital Security, and Opportunities for Emerging Professionals**

**Noah Schwartz & Alex Smith**

Research Fellows for the Dentons Global Smart Cities  
& Connected Communities Think Tank

Winter 2022

The present generation of graduates moving into employment markets will find a more technologically integrated environment than any generation preceding it. AI, blockchain, cybersecurity and privacy technologies will mesh together over the next demi-decade or so to form the basis of future workspace and the platform on which our daily activities is set. An appreciation of these trends will help workers and employers alike take advantage of the expected significant shifts in the employment landscape.

In terms of efficiency at the individual company level, AI will simultaneously allow for increased productivity, a reduction in employees, and an overall depreciation cost of machines. This year already, there has been a 31% increase in artificial intelligence systems spending, for a total of about 49.2 billion dollars worldwide.[1] We predict that the net impact of this trend on the workforce will be positive. Companies will become more efficient by integrating AI into processes to perform everyday tasks rapidly and efficiently.[2]

Although artificial intelligence machines may take the place of employees as certain functions the old paradigm are eliminated, there will be a high demand for employers with new or different skills to not only create these machines but also to ensure that they run smoothly. One of the many pros of artificial intelligence is that it has the potential to reduce the amount of



human error that can occur while creating or fixing a product. An artificial intelligence robot can also work twenty-four hours a day nonstop, which decreases the employee salary budget as base salaries and overtime costs are reduced tremendously. This could lead to increased pay and better conditions for employees who are focused on other functions within the company.[3]

Of course, AI doesn't eliminate costs altogether. First, AI requires continuous investment. The initial investment may be substantial. Second, unlike humans, machines depreciate. Also, in order to keep the machines functioning at high quality, companies will have to invest a great deal of money on periodic updates. There also could be a substantial wave of initial costs to address a surge of unemployment as AI takes over many of the everyday roles that humans usually occupy, and retraining of the workforce to fill the many new roles that will emerge. This is one area where recent graduates entering the workforce for the first time may have an advantage. They already possess many of the technical skills that will be needed as the transition occurs.

With automation comes cybersecurity and privacy concerns. Already, protection of digital infrastructure and systems is one of the fastest-growing career opportunities for new and transitioning professionals. AI is a useful tool in cybersecurity and privacy protection. AI can make the protection of databases more efficient, particularly by spotting cyber threats and possible malicious activities. By using sophisticated algorithms, artificial intelligence systems are being trained to detect malware, run pattern recognition, and detect even the minutest behaviors of malware or ransomware attacks before it enters the system.[4]

But there still is high demand for humans in the process. In addition to the obvious need for workers with technical skills to develop and monitor the deployment of technology, there is a great need for people who can prioritize roll-out, develop sensible policies, integrate advanced technologies into existing systems in a secure manner, work to educate leaders, consumers and other stakeholders, and serve as the interface between people and machine.

Distributed ledger technologies (DLT), such as "blockchain," promise to revolutionize aspects of daily life from how we design and move through our communities, exchange goods and services, work, and communicate in an increasingly digitized world. In the simplest of terms, blockchain is a data protection technology that encrypts data across an entire network of users instead of storing data on a single main database or local machine. Think of it as a communication chain where each link holds a piece of information that is needed to validate the message. In more technical terms, blockchain works through 'nodes', or individual participant machines, that validate changes to the blockchain and are rewarded "...for proof of work, typically in cryptocurrency" thus providing a crucial security check for the transactions that move through it.[5] DLT has the potential to provide transparent yet secure provision of services, increase efficiency and reduce overall management costs by eliminating transaction intermediaries. DLT applications can bring benefits to everything from commercial transactions and contracts to urban planning and design and city management activities to individual interactions with government agencies and other bureaucratic entities.[6]

A salient example where these new technologies might be applied is the potential for ‘open microgrids’ in which consumers with energy production capability can sell surplus electricity to peers, minimizing environmental impact and replacing intermediary management of distribution networks.[7] Another application might be the reduction of local carbon impact by monitoring automobile use through sensors and automatically offering tax discounts to encourage use of public transport. Even something as mundane as trash collection could be affected, with efficiency improvements on pickup routes.

Predictive smart analysis powered by AI and distributed ledger technology can automate repetitive and burdensome tasks that until now have required human intermediation. Importantly, however, robots are designed to repeat programmed tasks. They lack the fundamental human creativity and inspiration that drives progress. Continued improvements will require a hand in hand approach between robots and humans. What this means for emerging professionals is that there will be a huge demand for technological skills – those with educational studies in fields such as computer science, autonomy engineers or machine learning research engineers – will have an advantage. But there still will be a need for flexibility and creative problem-solving, as many

positions and needs cannot be automated. The next generation of employees should examine workflows and challenges and seek to find ways to utilize artificial intelligence as a tool, not a replacement.

The takeaway for recent and future graduates is that a host of opportunities are afforded by these new, game-changing technologies as companies, and even cities and communities, around the globe grapple with how best to leverage them.

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1. <https://www.business2community.com/leadership/3-ways-managers-can-get-ahead-of-artificial-intelligence-02321997>
2. <https://www.mckinsey.com/business-functions/mckinsey-analytics/our-insights/getting-to-know-and-manage-your-biggest-ai-risks>
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