DENTONS

Dentons Global Smart Cities & Connected Communities Think Tank

Annual Report 2023

Grow | Protect | Operate | Finance

August 2023

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 cutting edge 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

We inaugurated the Dentons Global Smart Cities & Connected Communities Think Tank in 2017 with a goal of facilitating discussions among global thought leaders about the implications for our cities and communities – and their inhabitants – of the dawning "fourth industrial revolution". We spoke of a confluence of trends in technology and urban migration, and the need to modernize our physical, digital and social infrastructure to accommodate and benefit from these trends. We noted the accelerating pace of change that would affect every aspect of our daily lives.

Few of us could have imagined the magnitude of change and disruption, both positive and negative, that has occurred over just the six short years since we began our work. We stand today in a different world. A global pandemic, ever-evolving shifts in the political landscape, technological advances that have exceeded all expectations in terms of scale and pace, and a climate crisis that threatens our planet have simultaneously changed the backdrop against which our activities are carried out and brought into sharp focus the challenges we need to overcome.

The work of the Think Tank is more important now than ever before. Even a cursory glance at the issues and themes we have taken up over the past year clearly highlights our foundational premise that, in an era of rapid technological change, social infrastructure is a critical component of the modernization discussion. Nearly half of the Think Tank webinars over the past year focused on issues of equity and inclusion, social justice, governance, and the impacts of technological and systemic change on people. We examined growing malaise resulting from a massive global deficit of trust in leadership. We explored difficult conversations surrounding policy shifts with ripple effects throughout the economy, some of which are bringing long-overdue change in terms of equity and opportunity, and others that have the potential to further marginalize groups or regions that are already economically disadvantaged.

We also made other key strides. For example, we celebrated individuals who put the common good ahead of personal needs by responding to disruptions and damage to critical infrastructure caused by increasingly turbulent weather. We learned that the weather now shares the top spot along with cyber intrusion on the lists of what keeps executives in the critical infrastructure sectors up at night. We looked at emerging solutions to the energy and climate crises with discussions about hydrogen, decarbonization and financing challenges for cleantech. And we continued to share updates about cutting edge trends that make our cities and communities more sustainable, efficient and secure.

We are pleased to share this report with you, and look forward to continued engagement with all of our Think Tank members.

Jennifer Morrissey, Counsel at Dentons

Linda Willard, Counsel at Dentons

Rudy Beese, Partner at Dentons

Andrew Snowhite, VP of Sustainability & Strategy at NewCities and Snowhite Strategies

Barbara Tyran, Director of the Macro Grid Initiative at American Council on Renewable Energy (ACORE)

Robin Cantor, Managing Director at Berkley Research Group (BRG)

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Message from the Co-Chairs

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We created our Global Smart Cities & Connected Communities 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 simultaneously modernize physical, digital and social infrastructure in an integrated, coordinated, equitable, and secure manner.

Over the past year, as the world emerged from the COVID-19 pandemic and sought to return to normal activities, we witnessed the intensification of a number of challenges, crises and megatrends that are forcing cities, communities and regions to adapt with speed and agility. A confluence of events — including a global energy crisis spurred by the brutal Russian invasion of Ukraine, global supply chain issues, shortages of water and critical minerals, the increased urgency to address the climate crisis, political uncertainty, and the rapid adoption of game-changing advanced technologies (including the application of AI) even before we fully grasp their implications, are having a transformative effect on the fabric of life as we know it. The opportunities and - the risks are dizzying.

The Think Tank has grown to over 750 thought leaders from around the world grappling with the issues facing cities and communities everywhere. We have continued our partnership with prestigious organizations such as the Keystone Policy Center's Key Conversations program and the American Association of Blacks in Energy. We have expanded the reach of the Think Tank's work by bringing together visionaries from government, industry, academia, and nonprofits, for discussions covering all 18 of the Think Tank's pillars in our webinar series. With each panel discussion, we seek to take on important challenges facing our cities and communities, and approach them from angles that are under-explored and that reflect the many points of views of the wide variety of stakeholders on each issue.

This year, we hosted a discussion 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 discussed hydrogen, ESG, cybersecurity, advances in mobility, and investment in cleantech and decarbonization. Our Editorial Board took on a new role over the past year, collaborating a driver for the webinar series and serving a liaison for each of the pillars to connect members and to advance the mission of each pillar.

Going forward, we will continue to examine the disruption of globalization and jagged transition to geopolitics and regionalism. We will continue to focus on climate and the need to accelerate solutions to carbon emissions, and we will advance investment in energy efficiency, conservation and other demand-side measures. We will also explore innovative approaches to buildings and spaces in the wake of the global pandemic and in light of continued massive urban migration trends. Additionally, we will continue our discussions of policy developments needed to modernize regulation and social infrastructure, in order to keep pace with technological changes and to usher in dramatic improvements in equitable treatment and inclusion for all inhabitants of our connected cities and communities.

We look forward to engaging with each of our Think Tank members on these and other critical issues.

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 evolving, and necessarily intersecting, areas of thought leadership addressing the challenges and implications of infrastructure modernization faced by the cities and communities in which we lead our daily lives. We recognize that we are living in an era of accelerating change and have sought to structure our pillars to be nimble to accommodate shifts 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.

This pillar will focus on identifying and tailoring best practices for policy-makers grappling with modernizing regulation and processes to promote smart, sustainable, secure and equitable growth in their communities.

REGULATION

Regulations need to be designed effectively so as to minimize development costs, expedite 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 emerge that may present challenges at a later phase.

The Regulation Pillar is dedicated to discussing the many ways in which regulations can bolster, or stymie, the development of Smart Cities worldwide. This pillar will focus on how regulations can be implemented in a manner that minimizes administrative and legal hurdles and promotes rapid adoption of beneficial technologies.

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.

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 the modernization 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.

The Energy Pillar is dedicated to supporting cities and communities around the world in providing affordable, reliable, and sustainable power and fuel resources on an equitable basis. We invite industry leaders, policymakers, and innovators to join our forum as we seek solutions to the challenges facing the energy industry and reimagine the energy economy.

TELECOMMUNICATIONS

Advanced telecommunications systems are needed to support smart technologies. The Think Tank works with stakeholders to evaluate and advocate policies that promote the deployment of

advanced technologies and the development of compatible firmware and hardware. Focus on facilitating multiple uses for smart infrastructure upgrades is essential to minimizing costs and ensuring that costs are 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.

The mission of the Telecommunications Pillar is to promote the layering of advanced telecommunications onto the modernized grid as the backbone infrastructure for a smart and connected community to ensure cost-effective, equitable and secure access to essential services.

TRANSPORTATION AND MOBILITY

When transportation and mobility 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 and economic development opportunities as underserved communities are connected with employers through efficient, data-driven mass transit.

Because mobility, both physical and virtual, is key to quality of life in cities and communities, this Pillar will keep abreast of the latest physical infrastructure and policy options to support technological advancements in transportation and mobility for the modern economy, including deployment of electric and autonomous vehicles, updated traffic and transit systems, and digital and virtual mobility options.

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.

The Water, Wastewater, and Waste Pillar will explore and discuss solutions for cities and communities to enhance the abundance and quality of water, to support education and deployment of advanced water technologies, and to mitigate the negative impacts of waste and wastewater.

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 CO2-intensive industries such as chemicals, petrochemicals and steel, as well as the mobility and heating sectors.

The mission of the Hydrogen Pillar is to learn about and track the development of hydrogen as a clean, reliable, secure, and potentially affordable energy source. This Pillar will focus on how the creation of clean hydrogen hubs in smart cities and communities can advance decarbonization, create jobs and utilize economies of scale to meet the growing demands of electrification.

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 mission of the Buildings, Cities and Green Space Planning Pillar is to encourage an integrated approach to planning sustainable and equitable communities and community spaces. We bring together municipalities, real estate developers, engineers, land use experts and other stakeholders to develop strategies to encourage productivity, energy efficiency and livability in sustainable, safe and affordable communities.

TECHNOLOGY AND INNOVATION

The Technology and Innovation Pillar aims to build bridges to connect advances coming from centers of innovation, such as national laboratories, universities and private enterprises, with cities and communities seeking feasible strategies to design and install systems to support their infrastructure needs and to explore new approaches to both recent and long-standing challenges.

NGOS AND UNIVERSITIES

The NGOs and Universities Pillar taps into these organizations to provide intellectual firepower, to nurture public trust in the development of smarter and more connected communities, and to collaborate and learn from the scale models for utilization of smart infrastructure that they are uniquely positioned to provide.

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. The Think Tank explores how these challenges are being addressed in communities around the globe.

This Pillar is dedicated to identifying optimum funding strategies and solutions from both existing and untapped sources of capital to accelerate the development of Smart Cities. This Pillar is designed to facilitate conversations among industry thought leaders, policy makers and finance professionals on how best to achieve the expected benefits that will flow from Smart Cities, including improved environmental health, social justice and positive economic outcomes for communities worldwide.

CYBER AND PHYSICAL SECURITY AND PRIVACY

This Pillar will advance the creation of systems to protect privacy while allowing for deployment of advanced digital technologies, including frameworks and protocols for data gathering and use. This Pillar will also promote educational resources and lessons learned to help cities and communities prepare for, protect against and mitigate cyber and physical disruptions to critical infrastructure systems.

CLIMATE, ENVIRONMENT, HEALTH AND SAFETY

The Climate, Environment, Health and Safety Pillar is dedicated to bringing together leaders in cities and communities to ensure that environmental strategies support economic opportunity while sustaining natural resources and improving quality of life. Additionally, the Pillar examines smart delivery of health and safety services, including by maximizing the opportunities offered by the "Internet of Things" to enhance security, safety and operational efficiencies related to healthcare and public safety.

CRISIS AND PANDEMIC RESPONSE

A smart and connected approach allows interdependent sector and stakeholder engagement to serve the citizens and economy, both holistically and optimally, in times of crisis or uncertainty, by 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 devise collective responses based on lessons learned and best practices in preparation for future disruptions.

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.

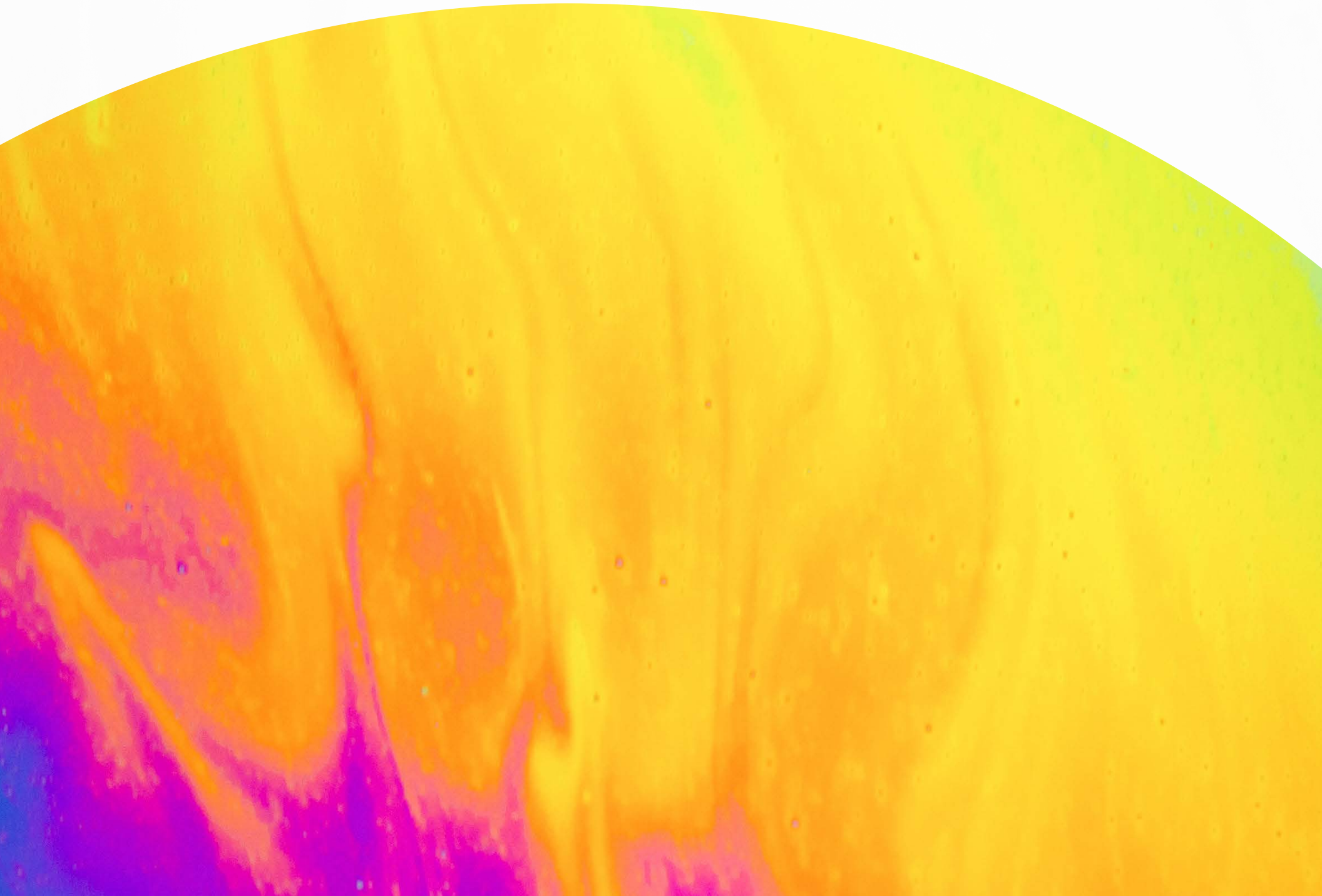
The mission of the Inclusion, Equity and Justice Pillar is to explore how cities and communities are addressing systemic inequities in order to earn the confidence and social license necessary to implement an inclusive approach to infrastructure modernization projects and policies that will benefit the whole community so that equity, social justice and human rights are protected and advance in step with sweeping technological changes.

ENGAGEMENT, EDUCATION AND COMMUNITY SOCIAL INFRASTRUCTURE

Social infrastructure is every bit as critical as physical and digital infrastructure are in any modernization initiative, but it is often given far less attention. This Pillar will bring together community leaders, interest groups, businesses and residents to conduct education and outreach to ensure broad, informed 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 educations programs and workforce development.

GLOBAL BEST PRACTICES

Communities are constantly evolving worldwide. Innovations developed in one country or region have international applications, 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 that have application for cities and communities in other locations.



Connections and Insights

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

What policy challenges are you seeing in Canada that will have ramifications for efforts to modernize physical and social infrastructure?

In Canada, a serious situation is unfolding. The former Bank of Canada governor, David Dodge, has raised an alarm regarding a potential inflation risk that, if not managed carefully, could precipitate an economic crisis. Complicating the inflation issue, the federal government increased the benchmark for national carbon pricing by 30 percent in April. At the same time, regardless of whether carbon pricing complicates the inflation issue, the urgency to address environmental challenges remains unrelenting. This past spring, Canadian wildfires have ravaged an area larger than five million football fields. The scale of this devastation is ten times greater than the annual average over the past decade, and this was as of mid-June.

The threat of inflation calls for immediate attention. If inflation is not properly controlled, Canada could find itself dealing with economic difficulties akin to those experienced in the 1970s and 80s. During that time, the Bank of Canada significantly increased interest rates, with rates exceeding twenty percent in 1981. This drastic measure managed to suppress the persistent inflationary pressures that had troubled the nation for almost a decade. However, it also led to enduring economic hardships from which many individuals never managed to fully recover.

As of June 2023, the Bank of Canada has already increased the bank rate to 5 percent and stands ready to raise it further if necessary. Canadians are highly vulnerable to interest rate hikes, with household debt relative to disposable income standing at 184.5 percent in the first quarter of 2023, a rate significantly higher than the corresponding figure in the United States, which is approximately 102 percent.

In April 2023, the national benchmark for carbon pricing in Canada hit CAD 65 per tonne. The plan is to continue to increase the benchmark by CAD 15 per tonne each year until it reaches CAD 170 per tonne by 2030. Various sectors, such as energy production, transportation, manufacturing, agriculture, heavy industry, construction, and forestry, will pass cost increases down to their consumers. This price pressure is necessary to instigate change — it is the very purpose of carbon pricing, prompting consumers to adapt to avoid the cost of carbon.

To clarify, the need to address climate change has never been more urgent. The reports from UN Climate Change Conferences have consistently emphasized the need to limit global warming to below 1.5°C above pre-industrial levels. Recently, the UK's national weather service has forecasted a 50-50 chance of global warming exceeding this threshold each year from 2022 to 2026. This is far from good news.

Managing inflation while advancing decarbonization demands a level of strategic planning that may potentially surpass the existing capabilities of Canadian governance. Regardless of how these competing policy challenges are managed, the outcome will certainly dictate the speed and direction of infrastructure modernization in the upcoming years.

Dr. Fenner Stewart | *Associate Professor of Law*
University of Calgary

What has been the most exciting development in grid modernization in the past 12 months and what do you see as the greatest hurdle we will need to overcome in the immediate future?

Without a doubt, the most exciting development in the past 12 months has been the utility industry's broad recognition that modern grids require modern communications—and the widespread action individual utilities are taking to incorporate private LTE in their grid modernization plans. A good indicator of the industry's focus is the annual DistribuTECH event, and the agenda last February in San Diego which made clear that private LTE is now a subject of major interest and excitement among utility decision-makers — it was a main track topic and the focus of over a dozen sessions.

The spiking interest makes plenty of sense. Climate change is driving regulatory decarbonization mandates as well as voluntary commitments, the federal government is making billions of dollars available for grid modernization investments, and malicious actors continue to launch sophisticated cyberattacks against our critical infrastructure. Add to these factors the nationwide availability of low-band broadband spectrum and the expanding universe of smart, private LTE-enabled applications for modern grid safety, reliability, efficiency and resilience, and you have both the immediate need and the ready solutions that energize broad technological adoption. From the Utility Broadband Alliance and EEI to EPRI and Gridwise, the industry is coming together behind private LTE, a trend also borne out in Anterix's own Utility Strategic Advisory Board and Active Ecosystem Program.

As for the greatest immediate hurdle, it's moving fast enough to successfully meet the time-sensitive challenges described above. Utility decarbonization targets kick in broadly in 2035, with some starting as early as 2030. That means a very fast transition to cleaner energy resources, particularly distributed energy resources (DERs) like wind and solar. Increasing those widely distributed, frequently intermittent DERs—which can quickly morph from energy provider to energy consumer—in turn requires a modernized grid that can integrate them. That grid will require robust, secure, private broadband communications to enable those new applications, the technologies that make the modern grid smart. So, though decarbonization targets may be seven or even 12 years out, nationwide deployment of the foundational private broadband networks necessary to meet them must happen much, much sooner.

Alice Moy-Gonzales | *SVP of Strategic Development at Anterix*

As we emerge from the global pandemic, what challenges are cities and communities experiencing in addressing the massive homelessness crisis? Are there systemic changes or initiatives that are being undertaken that have potential for success?

One of the major challenges for cities and communities attempting to address the massive homelessness crisis is the lack of resources, including and especially the lack of affordable housing. In one report from the County of Los Angeles, there is a shortage of 500,000 affordable housing units. This reality leaves many people either unhoused or one paycheck away from being homeless. In the meantime, many high end apartments are left empty every day.

At ***Alexandria House***, a long-term shelter for single women and women with children who are homeless due to domestic violence, intergenerational poverty and/or emergency situations that make it impossible to continue to pay rent, participants in the program do everything "right" — become financially and emotionally stable—and still cannot find or afford decent affordable housing. There are initiatives in place that would help remedy this situation. One of these requirements is that new housing developers designate at least 10 percent of the units for middle or low income families or pay a fee to support affordable housing. However there is no enforcement of this 2022 requirement. In the meantime, there are not enough other resources—shelter beds, decent paying jobs, and other wrap around services—that would guarantee an end to this humanitarian crisis called "homelessness."

Judy Vaughan | *Alexandria House, Founding Director*

When thinking about the ever-accelerating pace of technological advancements, how can we ensure that municipal leaders and other stakeholders are asking the right questions so that their constituents are able to take, implement, trust, and truly benefit from it?

Cities, municipalities, and communities across the globe are continuously seeking to deploy advanced technologies such as Artificial Intelligence, Cloud Computing, Cyber-Physical Systems (CPS) and Internet of Things (IoT) to improve quality of life and, ultimately, benefit humanity. However, with so many options to consider, the key is to map a specific requirement with a specific capability and then conduct the necessary due diligence prior to investment.

Our ubiquitously connected world has become increasingly dependent on the Internet fabric as a platform to innovate, communicate, and collaborate. An ever-evolving network of networks, the Internet is an ecosystem comprising the systems, technologies, and capabilities that our cities, communities, and municipalities rely on every day. Underpinning our humanity is critical infrastructure, which, according to the U.S. Department of Homeland Security are those whose assets, systems, and networks, whether physical or virtual, are considered so vital to the United States that their incapacitation or destruction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof. Moreover, the fifty-five (55) national critical functions (NCF) of government and the private sector are so vital to the United States that their disruption, corruption, or dysfunction would have a debilitating effect on security, national economic security, national public health or safety, or any combination thereof.

The public and private sectors share a symbiotic relationship; one that is necessary to enable effective operations, workforce development, and technological modernization. However, well-intentioned efforts to collaborate across Public, Private, Academic, and Entrepreneurial sectors tend to focus on a buy-sell paradigm versus a seeker-solver opportunity. It is a participatory process which encourages the partnership of various stakeholders (public, private, community, civic, and business leaders) to create a strategic vision and feasible action plans for internal, long-term change and to spur public private sector investment and innovation to widen and fortify the pathway to thriving and inclusive communities.

Asking the "right" question(s) starts with doing your homework, which requires a diverse assemblage of talent, experience, and passion. It takes a village. A connected, secure, resilient future is achievable and can only be realized if participatory, collaborative, and transparent discourse is embraced.

Pete Tseronis | *President and CEO, Dots and Bridges LLC*

What developments or changes are you witnessing in executive leadership that will impact, positively or negatively, efforts to achieve more equitable and sustainable outcomes in workplace environments, education and in our communities? What are the drivers behind these changes? What challenges do they present?

One of the most important changes I am seeing in my work with executives, especially over the last five years, is the emergence of a shared belief that companies' relationships with people and communities should be an integral part of strategy. Few companies are living under the illusion that the only purpose of the firm is merely to earn superior shareholder returns. That frame is being understood to be too narrow and, from an investor's point of view, undifferentiated. Executives are embracing—whether in healthcare, financial services or industrial goods—that while the economic logic of financial returns is critical for survival, "institutional logic," that is, the ability to create conditions with society and people that enable the firm to flourish, is vital if it is to deliver long-term sustainable outcomes.

This trend is no doubt being driven by many factors; however, a critical, recent trigger seems to be the change in the balance of power in the market for creative talent, some of which is driven in turn, by demographics, technology and the pandemic.

A deeper, more fundamental driver, however, is somewhat ironically, globalization. As economies grew and became more and more intertwined, it became more and more apparent to leaders that no country, company or individual exists in isolation from the societal, economic, environmental or cultural system in which it operates. Gone are the days when "externalities" of firms, that is, the costs generated by a firm that are not borne by the firm (such as carbon footprints, widening wealth gaps, pollution, etc.) are considered footnotes in economics textbooks.

One of the greatest challenges facing executives today is integrating and embedding this thinking into their organizations against a backdrop of ever-increasing pressure to deliver short-term financial returns. Being able to do that and orient an entire employee base to purpose and meaning is difficult but vital if firms are to last.

Michael Chavez | *Global Managing Director, Duke Corporate Education and Co-author of Rehumanizing Leadership: Putting Purpose Back into Business*

What can we expect to see in the area of urban planning and development over the next year that will have the greatest impact on efforts to help cities become smarter, better connected, more sustainable, and equitable? What has been the most surprising development in this area since we began to emerge from the pandemic?

Over the next year, we can expect to see ongoing focus on connected and walkable communities (15-minute city concept), a focus on sustainability, transit oriented communities, improved and preserved infrastructure, housing affordability and housing availability. The continued balancing of hybrid and remote work will continue to reshape communities and urban spaces.

One of the key trends we can expect is the rapid integration of smart technology into urban infrastructure. Cities will increasingly look to leverage the power of technology such as AI, data analytics and the Internet of Things, to create interconnected systems that enhance efficiency and improve the quality of life for residents. For example, the widespread deployment of smart sensors to monitor and manage resources such as servicing both water and waste. This data-driven approach will include focus on the development of smart transportation systems, efficient energy grids, smart buildings and overall sustainability through connectivity.

Another crucial aspect will be the focus on sustainable infrastructure. As cities tackle the challenges of climate change, aging infrastructure and environmental degradation, there will be a greater emphasis on developing eco-friendly and climate-resilient urban spaces. We can expect the proliferation of green spaces and parks, the integration of renewable energy sources, and the promotion of sustainable and active transportation options such as cycling and electric vehicles.

I anticipate the increased focus on community driven planning, specifically the creation of complete communities will be at the forefront of urban planning and development. The pandemic has shed light on the social and economic disparities within our cities. Efforts will continue to be made regarding affordable housing through mixed-use and other forms of development, accessible public transportation, broadband and equal access to essential services such as healthcare and education. Community engagement and participatory planning processes will play a crucial role in empowering marginalized communities and making cities more equitable in terms of access to resources and services.

Katarzyna Sliwa | *Partner at Dentons and National Practice Group Co-Leader, Real Estate (Canada) and Co-chair, Dentons Smart Cities and Smart Communities Think Tank, Canada*

2022-2023 Roundtable Recap

The Think Tank's Roundtables over the past year have focused on major disruptions that are significantly impacting the future of our cities and communities. From social changes to practical applications of game-changing technologies to corporate governance and global crises, our panels of experts grappled with innovation and turbulence that is shaping modernization efforts around the globe.

Following are summaries of the discussions, along with links to the recordings and certain related materials.

The Rapidly Evolving Landscape of ESG

The ***ESG Pillar*** of the Think Tank co-hosted a series of three discussions exploring the effects of the rapidly evolving landscape of ESG (Environment, Social and Governance) on companies and their approaches to everything they do. Most recently, the Think Tank ESG Pillar joined the Keystone Policy Center for a discussion on the increasingly challenging landscape faced by companies in taking positions on social and political issues in "To Speak Or Not To Speak – That Is The Question: How Companies Can Navigate Challenging Social And Political Issues." Competing demands from stakeholders, ranging from investors to consumers to employees, unions, suppliers — regulators and elected officials, to name just a few — coupled with a legal and regulatory landscape that is a moving target, are causing company leaders to have to walk a careful line to balance disclosure obligations and company missions.

Mike McNamara, Partner and former CEO, Dentons US LLP; Sharon Barner, Vice President, Chief Administrative Officer & Corporate Secretary, Cummins Inc.; Paula Gold-Williams, Chair of the Board, Keystone Policy Center and Paul Washington, Executive Director, ESG Center of The Conference Board, took on these crosscurrents on a panel that examined issues through a variety of lenses ranging from a broad international perspective to highly localized concerns. Companies are grappling simultaneously with the lingering effects of the COVID-19 pandemic, war in Ukraine and other global instability, health benefits, political activity, racial justice and equity and other ESG issues.

Panelist Paul Washington noted that in the United States, roughly 78 percent of companies describe today's environment as politically divided and challenging to navigate, with approximately 42 percent expecting the political climate for companies to become even more divisive in the next few years. This degree of social and political volatility has companies concerned about growing opposition to ESG initiatives from governmental bodies and business customers. Panelists Sharon Barner and Mike McNamara emphasized that company leaders need to understand local, national and global sensitivities in addition to workforce concerns in deciding when, where and how to speak out about social and political issues without endangering or challenging their operations, which is very difficult to balance. Panelist Paula Gold-Williams stated that it is important for CEOs to inform their boards of directors that the stakeholder landscape is much bigger today than a generation ago, and challenges to statements made publicly are to be expected.

Key open questions from the discussion include how company leaders can prospectively plan and immediately react to the inherent tensions in choosing to lend their voice to public debate.

To listen to the complete discussion, a recording of the webinar is available here: https://youtu.be/2PsogdvuZ-s

For additional guidance on navigating the ESG landscape, see *Avoiding Greenwashing Litigation: A guide to mitigating risks when marketing Environmental, Social and Governance (ESG) impacts* https://www.dentons.com/en/insights/guides-reports-and-whitepapers/2023/april/19/avoiding-greenwashing-litigation. Among other information, the document includes a helpful ESG statement checklist. Another piece covering the intersection of ESG and employment law is found at: https://www.dentons.com/en/insights/articles/2023/april/13/esg-an-employment-law-and-hr-perspective.

The Think Tank held a two-part discussion on "DEI, ESG, And Energy Justice As We Emerge From The COVID-19 Pandemic." For these roundtables, the Think Tank again partnered with the Keystone Policy Center, as well as with the Washington, DC Metropolitan Area Chapter of the American Association of Blacks in Energy. Panelists shared experiences regarding how the energy industry is responding to the push towards racial equality and social inclusion in light of large-scale transformational advancements in both the workplace and the community. Among other topics, the panel examined the impact of emergence from a post-pandemic world, sustainability mandates and the growing threat of a global economic recession on how business is conducted.

Panelist Paula Gold-Williams noted that despite challenges posed by COVID-19 and the threat of a global recession, energy companies recognize the long-term benefits of sustainable practices. Investing in renewable energy, energy efficiency, research and development, and community engagement with the African-American community not only promotes environmental sustainability but also fosters economic resilience and social well-being. Panelist Clarence Hawkes stated that building trust in communities of color requires a multifaceted approach from companies that takes into account representation and ideas both from within the companies themselves (including hiring practices for staff and leadership) and from the communities they serve and with whom they interact. Panelist Aaron Cope emphasized open and transparent communication with customers, including, for energy companies, providing clear and accessible information about energy rates, billing practices, and any changes or updates in energy services. Among other things, energy companies should engage with local communities to raise awareness about sustainability and energy conservation, such as organizing workshops, educational programs, and initiatives to promote energy-efficient practices, renewable energy adoption, and responsible energy consumption among all customer groups and to keep all customer communities informed.

These discussions are found at the following links:

Part one: https://www.youtube.com/watch?v=T7B-yR4Y7qc

Part two: https://www.youtube.com/watch?v=gHoL1lDJMqg&t=2s

Economic Consequences of Major Policy Shifts: Economic Implications for Smart Cities of the Dobbs Decision

In early November, the *Community Social Infrastructure, Economic Development and Health & Safety Pillars* joined forces with Society for Risk Analysis (SRA), SRA Economics and Benefits Analysis Specialty Group, SRA Risk, Policy & Law Specialty Group for an important conversation about some of the socioeconomic consequences, costs and implications for states and their Smart Cities and communities of the Supreme Court's decision last year to overturn Roe v. Wade.

The Supreme Court's 2022 decision overturning Roe v. Wade is equivalent to a major policy change in federal and state rules for households, business and the economy. In the aftermath of the Dobbs decision, significant changes to state laws governing reproductive rights are expected to have immediate impacts for more than 30 million people in the US and their families. Disproportionate health and economic consequences are anticipated for young, low income, minority women and the vulnerable communities they live in. In addition, the changes in state laws are expected to exacerbate maternal mortality and childhood poverty. Other potential socioeconomic costs include reductions in women's participation in the workforce, lower educational attainment by women and their family members, reduced diversity of the talent pool, and greater economic division between the states restricting reproductive options and those that expand them. Unless a major policy correction is delivered from the federal level, this disparity alters the economic landscape for development innovations such as Smart Cities, especially those located in the restrictive states.

Robin Cantor, Managing Director, Berkeley Research Group and former President, SRA set the context by reviewing the geography of Smart Cities located in states with and without recently expanded abortion restrictions after Dobbs and moderated the discussion. Panelists

addressing the consequences at various levels of economic activity included Susan Banks, Partner, Health Care Group, Dentons US LLP, Yana van der Meulen Rodgers, Professor in Department of Labor Studies and Employment Relations, Rutgers University, and Mayra Pineda-Torres, Assistant Professor in School of Economics, Georgia Institute of Technology.

Professor Pineda-Torres reviewed economic research that addresses the direct and indirect costs women face when looking for an abortion in the presence of abortion restrictions or bans. Based on studies of historical abortion restrictions such as parental involvement laws, mandatory waiting periods, and other limitations, restrictions on abortion access have economic consequences on marriage, educational attainment, labor force participation, financial stability, and additional adverse outcomes on the future generation. In addition, the research indicates significantly different impacts by demographic group with larger costs imposed on Black and Brown communities. She also noted that it is generally expected that women will face higher costs now that abortion bans have been implemented or enacted in nearly half of US states.

Ms. Banks addressed some of the more significant implications at the industry level for healthcare providers. Even for healthcare providers that do not themselves furnish abortion services, mission-driven organizations face difficult decisions regarding how to address care delivery in this new legal landscape including, for example, areas such as the provision of emergency contraception to victims of assault. Providers in restrictive states are struggling to define boundaries between legally permissible versus illegal emergency medical care and treatment for pregnant patients, having to navigate conflicts between state abortion prohibitions and the federal Emergency Medical Treatment & Labor Act (EMTALA). In addition, healthcare providers must balance data privacy considerations and access to "healthcare-adjacent" data regarding travel, lodging, and childcare arrangements for women needing to travel to other states for abortion services. Such data arguably is not subject to HIPAA protections and could be vulnerable to subpoena. In combination, these risks affect what data to collect and store, are significantly complicating the care landscape, and are driving resource allocations in the healthcare industry. Healthcare providers also are analyzing the expansion of potential criminal liability associated with reproductive healthcare, care for pregnant or potentially pregnant women generally, and addressing the inevitable tension these issues are placing on their medical staffs.

Professor van der Meulen Rodgers focused on the macro-economic implications of the abortion restrictions and planning in Smart Cities. Abortion restrictions have adverse effects on women's educational attainment and labor supply. When aggregated at the macro level, these effects will reduce the pool of available workers and their skill level, which ultimately dampens economic growth. Access to abortion services affects the human capital investment of the next generation. Children born after the

Supreme Court's 1973 Roe v. Wade ruling were more likely to graduate from college and less likely to be welfare recipients or single parents. Women who were able to delay childbirth until they had greater economic and emotional security were able to have closer relationships with their children and raise them in relatively better economic circumstances, with fewer indicators of delayed child development. Previous research also shows that without publicly funded family planning services, states would be spending more than US$1.2 billion annually in their Medicaid programs to cover the costs of unplanned births. The onus will be on Smart City governments in states with abortion bans to invest in affordable high-quality childcare, paid parental leave, paid sick leave, public education, and other parts of the care infrastructure that impact families and child well-being.

Panelists recognized that the abortion bans go beyond denying women the right to choose; rather, they reinforce reproductive injustice and deny people across genders their fundamental rights to control their sexuality, gender, work and reproduction. Smart City leaders and community members will be challenged to counter the economic consequences with policy, legal and political actions to mitigate the costs of the subsequent reproductive disparities.

The recording of the discussion can be found here: https://www.sra.org/webinar/the-economic-risk-of-overturning-roe/

***Readers interested in the continuing research and information on the impacts of restrictions on reproductive rights are referred to the following resources:*

US Department of Health and Human Services (HHS) Press Release, HHS Secretary Xavier Becerra Statement on EMTALA Enforcement (May 1, 2023), available at https://www.hhs.gov/about/news/2023/05/01/hhs-secretary-xavier-becerra-statement-on-emtala-enforcement.html; Administrative Complaint by National Women's Law Center (Nov. 8, 2022), available at https://nwlc.org/wp-content/uploads/2022/11/2022.11.08-Mylissa-Farmer-EMTALA-complaint.pdf.

HHS Office for Civil Rights (OCR), Proposed Rule, HIPAA Privacy Rule To Support Reproductive Health Care Privacy, 88 Fed. Reg. 23506 (April 17, 2023), available at https://www.govinfo.gov/content/pkg/FR-2023-04-17/pdf/2023-07517.pdf; HHS Fact Sheet available at https://www.hhs.gov/hipaa/for-professionals/regulatory-initiatives/hipaa-reproductive-health-fact-sheet/index.html.

Jones, K., & Pineda-Torres, M. (2021). TRAP'd Teens: Impacts of Abortion Provider Regulations on Fertility & Education. https://www.mayrapinedatorres.com/_files/ugd/e57ffb_1a3a64933e234b2ab1c78f6bd9756fbb.pdf

Lindo, J. M., & Pineda-Torres, M. (2021). New evidence on the effects of mandatory waiting periods for abortion. Journal of Health Economics, 80, 102533. https://www.sciencedirect.com/science/article/abs/pii/S0167629621001181

Lindo, J. M., Pineda-Torres, M., Pritchard, D., & Tajali, H. (2020, May). Legal access to reproductive control technology, women's education, and earnings approaching retirement. In AEA Papers and Proceedings (Vol. 110, pp. 231-235). 2014 Broadway, Suite 305, Nashville, TN 37203: American Economic Association. https://www.aeaweb.org/articles?id=10.1257/pandp.20201108

Rodgers, Yana, Ernestina Coast, Samantha R. Lattof, Cheri Poss, and Brittany Moore. The macroeconomics of abortion: A scoping review and analysis of the costs and outcomes. PloS one 16, no. 5 (2021): e0250692. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0250692

Wolfe, Taida, and Yana Rodgers. Abortion during the COVID-19 pandemic: racial disparities and barriers to care in the USA. Sexuality Research and Social Policy (2021): 1-8. https://link.springer.com/article/10.1007/s13178-021-00569-8

Grappling with the Global Trust Deficit

In September, the *Global Best Practices* and *Community Social Infrastructure Pillars* of the Think Tank invited Dr. Lawrence Jones of the Center for Sustainable Development in Africa and Edison Electric Institute's International Programs and Sandra Baer of Personal Cities to discuss their multi-year inquiry into rebuilding trust in a broken world. Much has been written about trust as the foundation for how we live and work together. As we move forward in an increasingly uncertain world, we are all more aware of a "trust deficit" or overarching lack of trust in leadership among people across societies and between nations. This phenomenon appears to have grown in recent years. Whether exacerbated and highlighted by the COVID-19 pandemic, or the result of a coincidental convergence of crises, political divisiveness, vexing income inequality, social and racial injustice, impacts of the climate crisis, misinformation and uncertainty, are contributing to increased levels of mistrust. Jones and Baer spent the better part of a year investigating this concept of the "trust deficit" through a process called "question-storming." The starting point is the notion that "To change the world, we must ask questions that disrupt the world." Different from brainstorming, a process with which most are familiar that seeks to find answers to pre-defined questions or challenges, question-storming steps back further to try to understand what questions we should be asking. Diverse groups of people are brought together and only allowed to ask questions, not propose answers. The process forces a deepened level of listening and release of deeply entrenched opinions and leads to discovery of new perspectives and complexities.

After 20 sessions with more than 200 people across 25 countries, they collected their findings, including a set of "catalytic questions," in a report that was launched during the Think Tank webinar: **"How to Rebuild Trust: Question Storming to Create a Platform for Thinking Differently and Taking New Actions."**

Among the key takeaways are:

1. Be aware of the "trust deficit" in leadership across societies in many countries. Left unaddressed, the current climate of distrust will erode global solidarity and diminish our chance to achieve a more collaborative, equitable world. Rebuilding trust will be key to all of us feeling safer and healthier as we create a more livable, sustainable future. As the foundation to reimagine our future, the "Question Storming" approach may help. By asking tough questions—the ones that expose our biases, our fears, the ones that bring our beliefs to the surface—only then will we hear and formulate the right questions that unlock solutions, never before discovered.
2. Examine the difficult question from a multitude of angles—to "see" it through the lens of others who bring different perspectives. Ultimately, by taking participants through a collective journey to probe deeply, Question Storming inspires everyone to think differently and to "let go" of their traditional or habitual approaches to problem solving. We encourage others to try this approach: ask a difficult question and be prepared to make sacrifices, to compromise and make a commitment toward understanding.
3. Take actions that build trust. Remember that trust cannot be built on promises alone. An authentic, verifiable pledge is always followed by action. Do not wait for "someone else" to take the lead; take charge and be responsible for the change you want to see.

The link to the webinar is found at: https://www.youtube.com/watch?v=vCtjgmdwKdU

The report is available at: https://tinyurl.com/ycxur2sf

This project evolved out of an earlier inquiry: Rethinking, Reimagining and Redesigning Global Urbanization: The Hard Questions for Urban Stakeholders, available at: https://acrobat.adobe.com/link/review?uri=urn%3Aaaid%3Ascds%3AUS%3A95e7e6ae-1737-4b37-9ead-e1281d2320f7#pageNum=1.

Heroes of the Storms: the Electrical System in the New Age of Resilience

In the latest book in his series celebrating the unsung heroes of the nation's electrical system, Steve Mitnick shares stories of the men and women who are dedicated to keeping the lights on. In the wake of destructive storms, these men and women gather from near and far, like an army of bucket trucks, to reassemble our critical power infrastructure so that we can plug back into our lives. Most of us take the dedication, courage and sheer persistence of these heroes for granted. *Heroes of the Storms* tells their tales of sacrifice and sheds light on the monumental unseen efforts not only to restore the power system but to keep these heroes safe, fed and rested during the few precious hours available to them from time to time during the process. It also discusses the planning and training they undertake to be ready when called into action. Storm restoration is not simply a matter of putting lines back on poles. It requires a delicate and intricate choreography that utility engineers work constantly to refine in order to reduce the number of days of outages. Mitnick also touches on utility efforts to harden their entire systems to mitigate the impact of disruptions, particularly interruptions by increasingly frequent and powerful weather events.

Joining Mitnick was his co-author and Senior Staff writer for Public Utilities Fortnightly Rachel Moore, and Keystone Policy Center Chair and long-time utility industry executive Paula Gold Williams.

The webinar can be found here: https://www.youtube.com/watch?v=8dZvNZiuRzA

The book is available for download at: https://www.fortnightly.com/heroes-storms or read it online at: https://edition.pagesuite-professional.co.uk/html5/reader/production/default.aspx?pubname=&pubid=7970641e-75b2-438d-8417-decc67f20381.

Energy Crisis into Energy Warfare

The global squeeze on energy supply has triggered crippling shortages and sent power and fuel prices soaring over the past year. This has increased the cost of powering industries across the globe and added to inflationary pressures. Among the key causes of the severe disruptions to energy globalization has been the war in Ukraine and post Covid-19 developments. Jagged geopolitics and energy warfare by Russia have created high energy prices as well as unprecedented risks of energy shortages. Layered on top of this is the need to decarbonize at a greatly accelerated pace.

The Think Tank and the Keystone Policy Center collaborated on a series of discussions which were part of the "Key Conversations" energy policy series. The discussion on Energy Security in the Face of Energy Warfare brought together Dr. Paul Sullivan, a Nonresident Senior Fellow with the Atlantic Council, a Nonresident Senior Research Associate at KFCRIS, and a Distinguished International Fellow at the NCUSAR; Melissa Mahle, former CIA Intelligence Officer; Michal Motylewski, Development Counsel of Dentons Europe Energy Practice in Warsaw; and Thomas Schubert of Dentons Venture Tech and German Energy practices. They discussed the ramifications for the global energy sector of the ongoing war in the Ukraine, including immediate concerns for Ukrainians and for neighboring European countries to implications for climate initiatives in the US in the near and long term. They also took on controversial issues such as approaches to energy shortages and alternative energy resources, the role for efficiency, the intersection of historical and future energy "security," water scarcity and mining, and perceptions on "clean" energy, "energy independence," and economic trade-offs.

An earlier discussion focused on the global squeeze on energy supply and the subsequent push to speed adoption of government policies that will aid in a faster transition to cleaner energy. Richard Newell, CEO of Resources for the Future; Phil Sharp, former Indiana member of the House of Representatives and Harvard professor; Paula Glover, President of the Alliance to Save Energy; and Rudy Garza, CEO of CPS Energy held a lively discussion of energy economics and market mechanisms related to carbon reduction targets, the impact on policy of unexpected global disruptions and the capability of nations to respond, the critical roles that resilience and efficiency play in meeting continued crises.

The Energy Security discussions can be found at:

https://www.youtube.com/watch?v=8_A3IQa-sY4

and:

https://www.youtube.com/watch?v=iMJZad8iZWw

New Developments in Decarbonization

Decarbonization is a goal shared by industry, policy makers and advocacy groups, but efforts to reduce carbon often fall short of stated objectives because of challenges posed by incomplete solutions and conflicting regulatory and policy regimes. Paula Glover, President, Alliance to Save Energy; Greg Kats, CEO, Smart Surfaces Coalition; Jon Sohn, Director of Government Relations (US), Capital Power; and Deepa Poduvol, Senior Vice President and Sustainability Leader, Black & Veatch shared insights on successful decarbonization strategies and how to better address challenges. Paula Glover described the Alliance's decarbonization strategy, the "Energy 2040" initiative, which focuses on demand as well as supply. Glover went on to say this strategy aims to correct the over-use of supply side solutions with the reduced demand through efficiency, an equally valuable tool to reduce carbon.

It is difficult to look at decarbonization without considering its human implications. Disadvantaged households are at greatest risk to the negative effects of too much carbon dioxide in the atmosphere, such as extreme weather and high energy bills. Greg Katz noted that in Baltimore, poorer areas are 14 degrees hotter in the summer than wealthier parts of the city. The Smart Surfaces Coalition has advanced construction technologies and related policy changes in Baltimore have empowered the city to reduce heat at 10 times the rate of global warming.

An additional takeaway from the discussion is that money alone is not the answer to decarbonization. Jon Sohn shared how Capital Power is drawing on a combination of carbon capture technologies, clear milestones and investment to reach its net zero carbon goals by 2045. Deepa Poduvol discussed Black & Veatch's emphasis of taking a life cycle perspective and investing in sustainable, effective and efficient practices, which has allowed it to innovate and scale up the more than 7,000 projects in which it is engaged globally.

The recording is available at this link: https://youtu.be/TW7lWgnN5p0

For information on investing in renewable energy in Europe, see https://www.dentons.com/en/insights/guides-reports-and-whitepapers/2023/march/14/investing-in-renewable-energy-projects-in-europe-2023.

For information on recent developments in compliance carbon credits in Canada, see https://www.dentons.com/en/insights/articles/2023/june/13/how-to-guide-to-registering-and-trading-compliance

Cruising Into The Future: A Look At The Current And Future State Of Autonomous Vehicles And Smart Communities

The image of self-driving vehicles, once a curiosity seen only in science fiction, is now a reality. Not only are autonomous vehicles (AVs) here, they are saving lives and enhancing communities. On March 14th, we heard from three panelists about the technology, infrastructure and policy landscape driving AVs: Jeff Bleich, Chief Legal Officer, Cruise; Jeff Denham, Senior Policy Director, Public Policy practice, Dentons US LLP and Gabriel René, Founder and CEO, Verses. Eric Tanenblatt, Global Chair of Public Policy and Regulation and US Public Policy practice leader and co-lead of the Autonomous Vehicles Sector for the US Region, Dentons, moderated the panel.

Jeff Bleich of Cruise identified the many tangible benefits AVs have for humans: increased public safety, more time, greater mobility for disabled and elderly passengers, and a cleaner environment. From a public safety perspective, 90-95 percent of car crashes are caused by human error. AVs eliminate human error and can reduce fatal accidents. For the disabled, particularly for passengers who are blind, AVs are a game changer. The National Federation for the Blind estimates that 70 percent of working-age adults in the blind community are not working full-time; AV technology could help change that. For the environment, most AVs are electric, which will help reduce greenhouse gases.

Moreover, AVs could take more cars off the road since passengers could access vehicles through a share service.

From a public policy perspective, recent legislation such as the Infrastructure Investment and Jobs Act (IIJA) will help incentivize AVs. While there are no specific bills directed to AVs that are likely to advance this in Congress, Jeff Denham remarked that there should be additional future incentives, and although there is some bipartisan support for incentivizing AVs, policy makers have to be sensitive to concerns raised by organized labor.

AVs are dependent on Artificial Intelligence (AI), and although AI operating systems are becoming more advanced in communicating with one another, our panelists acknowledged that there continue to be some risks. Gabriel René pointed out that there are natural tensions here worth highlighting. Many companies spend significant funds on research and development for autonomous transportation, and while R&D is important, actual standards and adaptive learning is what will ensure safety. Jeff Denham suggested that public-private partnerships could be helpful to address the liability issue.

The most important takeaway from the webinar was the continued human element of AVs. The more widespread development of AVs will significantly improve quality of life, particularly for the elderly and those with disabilities. The human impact continues to be important to ensure that the operating systems run smoothly.

The webinar is available here: https://www.youtube.com/watch?v=vItg_bUkzzU

Dentons' annual Global Guide to Autonomous Vehicles provides a detailed roadmap of the developing policy, regulatory and legal landscape for autonomous vehicles, as well as the specific driving forces and roadblocks across key areas that will define the global mobility revolution. The guide is available at this link: https://www.dentons.com/en/insights/guides-reports-and-whitepapers/2023/march/8/global-guide-to-autonomous-vehicles-2023

For a discussion about the relationship between urban density and the modernization of mobility infrastructure, tune in to: https://www.dentons.com/en/insights/newsletters/2023/may/9/smart-cities-chat-series/episode-22-why-every-smart-city-needs-smart-density

Hydrogen Now Has Traction

Bolstered by recent federal policy changes and industry investment, hydrogen has emerged as the wunderkind of the energy world. Despite all of the buzz, there remain unanswered questions about whether the scalable production of hydrogen is feasible. What exactly is "clean" hydrogen? Who are hydrogen's off takers? Will the extremely high costs of producing hydrogen go down over time? Robert Wilhite, Senior Vice President and Leader of Strategic Advisory, Black & Veatch; Alex Kizer, Executive Vice President of Research and Analysis, Energy Futures Initiative; Gabriele Haas, Partner at Dentons and Linda Willard, Counsel at Dentons, shared their thoughts on the latest developments in the larger role hydrogen is playing in the global energy mix as nations seek to lower emissions and diversify their energy portfolios.

Hydrogen has tremendous potential. As Rob Wilhite noted, it can be blended with natural gas to serve as a lower-carbon power source, it can be used as an alternative fuel for heavy vehicles, and it can be cleaned for industrial energy use. Recent federal legislation, the Inflation Reduction Act (IRA) and Infrastructure Investment and Jobs Act, provide unprecedented funding and tax incentives for clean hydrogen and hydrogen infrastructure. In the US, various regions of the country, including the Ohio River Valley and the Gulf Coast, are putting together hydrogen ecosystems, better known as hubs, through which they are seeking grants from the Department of Energy. These hubs will serve as regional testing grounds to better understand technology and deployment and evaluate whether demand can justify the cost. New tax credits from the IRA that increase as carbon intensity of hydrogen production decreases are reducing the risk of investment in this nascent technology by making it less costly.

Clean hydrogen is not the same as green hydrogen, which is hydrogen generated completely by renewable energy. As one audience member pointed out, there is no such thing as "clean" hydrogen, just "cleaner"

hydrogen. In Germany, the Hydrogen Acceleration Act revised the hydrogen strategy to expand the definition of clean hydrogen to be broader than green energy, but Gabriele Haas cautioned that this extension is rather limited. She also pointed out, in contrast to the US hydrogen derived from natural gas or other fossil fuels is not being discussed by policy makers in Europe. The IRA sets the bright-line standard a taxpayer must meet of no more than 4.0 kg of carbon dioxide per kg of hydrogen produced in order for the taxpayer to take advantage of a small (20 percent of US$0.60 kg) hydrogen tax credit.

Cost is also barrier to large-scale hydrogen production. As Alex Kizer pointed out, a single electrolyzer can cost upwards of US$16 billion. It's also unclear also whether existing natural gas infrastructure can be used to successfully transport hydrogen. The hubs will serve as a good testing ground for the infrastructure and potential off takers. Linda Willard pointed out that the hub application process has been quite positive, as it has been a catalyst for government, industry, universities and other stakeholders within regions all over the country to develop a plan for a hydrogen ecosystem.

The panelists expressed cautious optimism about hydrogen, as long as it's treated as a tool in a larger toolbox of strategies to help reach decarbonization. Diversity of technologies is an important aspect of envisioning where hydrogen will fit going forward. Seeing hydrogen as the only solution is short-sighted and unrealistic. With smart policy and regulatory choices, hydrogen can smooth the decarbonization transition, but it will have to coexist alongside more traditional baseload (nuclear and natural gas) as well as renewables like wind and solar. Hydrogen can provide new opportunities for new corporations to provide solutions for production and storage, particularly for developing countries in Africa.

The recording of the webinar is available here: https://www.youtube.com/watch?v=M94CthU57mw

For more information on regional developments in hydrogen, see:

Green Hydrogen in Chile

https://www.dentons.com/en/insights/articles/2022/april/12/green-hydrogen-in-oman-back-to-the-future

https://www.dentons.com/en/insights/articles/2021/january/26/making-early-hydrogen-projects-investable

https://www.dentons.com/en/insights/articles/2021/march/1/scaling-up-green-hydrogen-in-europe

Smart Technologies and Innovative Policies to Address Wastewater and Improve Drinking Water

Access to clean water and safe drinking water is essential but is often taken for granted. Aging water infrastructure systems are particularly vulnerable to extreme weather events such as severe droughts or 100-year floods.

Wayne Griffith, Executive Vice President, Chief Strategy Officer, DC Water; Ben Grumbles, Executive Director, Environmental Council of the States (ECOS); Christine Boyle, Vice President of Business Incubation at Xylem and Dave McGimpsey, Partner at Dentons shared their thoughts on how technology, innovation and human capital can work together to advance water treatment. A number of themes emerged from the discussion.

Healthy water depends on a healthy climate

Water supply and quality is inextricably tied to the larger issue of climate change. Ben Grumbles discussed the "beyond the pipe" approach to water infrastructure. Indeed, green infrastructure such as wetlands, upstream investment, terracing and stream banking, is as important as traditional grey infrastructure. Investments in storm incident response where data is used to control flows during storms can go a long way to helping mitigate some of the extreme weather brought about by climate change. Recent federal laws, including the IRA and the IIAJA, include funding and incentives for nature-based community solutions, such as green infrastructure.

Water utilities use a tremendous amount of energy in wastewater treatment. Many utilities have started to develop their own clean energy solutions. For example, DC Water's Blue Plains facility -- the most advanced wastewater treatment plant in the world -- is able to generate energy from the waste it treats.

Innovation is essential to ensuring a sustainable, reliable and equitable water supply

Water is a fundamental human right, which water pricing must take into account. How water is priced will continue to drive the water policy discussion, particularly with respect to equity. Price sends a signal about use, and it is important to note that the price, cost and value of water can vary. Technology can help in calibrating price and making prices better reflect value. Along those lines, nature-based sensors and similar technologies reduce the investment in traditionally costly grey infrastructure. With respect to sustainability, there is a lot of learn from European countries, which have moved ahead of the US in requiring gas and carbon mitigation at many of its wastewater treatment facilities.

Technology is useless without people

Technology and data are necessary tools for ensuring that water treatment and management is efficient going forward. Without human input to improve technology and interpret and respond to data, however, technology itself is useless. Humans also drive the policy which advances and regulates the technology.

In the area of water, community is critical. Water is becoming more localized, particularly in rural areas, where access to water from a large traditional utility is not feasible. We will start to see economies of scale that reflect these changes. Even larger traditional utilities are engaging with their customers more than ever before. DC Water, through its Clean Rivers program, for instance, is working closely with the community to reduce combined sewer overflows into the District's waterways. On a more macro level, regional coalitions such as the Great Lakes Regional Collaboration are driving water policy function on a human level, as do the local, state and federal policy makers and regulatory agencies charged with keeping the water clean.

The recording of the webinar is available at: https://www.youtube.com/watch?v=trlZq-yfZ3U

Cleantech Investment Outlook 2023

As we continue to consider and address solutions for realizing global environmental and emission goals, Cleantech is often discussed as a solution. While the deployment of clean technologies faces investment and logistical barriers, there is widespread optimism about the future of these technologies.

Sector leaders predict that the regulatory, economic and scientific push for clean technologies will see billions of dollars in global private investment in 2023. Additionally, government policies will have a direct and very strong impact on the cleantech market in 2023. The IRA, for example, included numerous technologies in the bill, which should lead to faster adoption of electric vehicles and greater deployments of carbon capture and hydrogen-related technologies.

This federal investment will generate growth in clean energy projects in the US and subsequently incentivize other nations to do the same. Federal programs such as the Department of Energy Loan Programs Office play a key role in supporting cutting-edge clean projects that will further drive investment in the cleantech market.

Jeff Weiss, Cofounder and Executive Chairman of Distributed Sun, LLC; Claudia Meer, Senior Strategic Advisor of DIF Energy Transition at DIF Capital Partners; Bob Powell, founder and CEO of Brightmark and Stephen Comello, Senior Vice President of the Energy Futures Initiative Foundation all shared their thoughts on the barriers faced by clean technologies and the strategies for moving forward and deploying clean technologies.

Among the challenges for rapid development and deployment of clean technologies is the tremendous scale of funding needed and the multifaceted integration of a wide variety of clean technologies required in order to meet energy and emissions goals. The panelists noted the shift in availability of government funding for clean technologies as well as the societal shift towards assigning a premium to clean technologies. Even with a wider availability of funding and societal acceptance, the panelists noted that deployment of clean technologies still faces practical regulatory barriers such as siting and permitting obstacles as well as the need for additional education and acceptance at the community level.

While the experts all acknowledged the barriers facing deployment of clean technologies, all voiced optimism for the future. The panelists agreed that Artificial Intelligence (AI) will drive the future of cleantech development globally. Indeed, the precision and speed of AI in integrating and managing the complex energy system is critical for clean technology investment to reach the scale necessary to meet global energy demands. There also was agreement among the panelists that cleantech will advance fastest if it is allowed to do so against the backdrop of "all of the above" energy policies that allows for nuclear, hydrogen, geothermal, hydropower and natural gas, in addition to wind and solar.

Climate, energy security and social progress need to be part of the conversation. And the advancement of clean technology should be expeditious and efficient. As one of the panelists noted, "Pragmatism at speed is better than perfection that comes too late."

https://www.youtube.com/watch?v=MW6rozPoYmY

Upcoming Topics for Discussion

Over the next several months, the Think Tank will take up topics including:

- The impacts that AI will have on the future of our cities and communities
- Guardians of the Grid: a brave new world of sustainable and secure energy infrastructure
- Smart agriculture
- Urban wellness and the built environment
- Climate mitigation – what will it take?
- Empowering communities of color through smart and inclusive innovation

Think Tank members are invited to propose topics for discussion and to submit short articles and thought pieces on any topic related to infrastructure modernization and smart and connected cities and communities for inclusion in Think Tank reports. Please reach out to the Editorial Board to share your topic ideas.

Thought Leadership From Think Tank Members

Arkansas and Oklahoma: A Creative Strategy for the Autonomous Age

By: Eric Tanenblatt and Chan Creswell

The speed of technological advancement can leave little time for policymakers and stakeholders to recalibrate and prepare for a new normal. In a paradigm consisting of accelerating change, acute local priorities, and limited resources, specific communities might find themselves left behind in the tech industry's race to push the boundaries of what is possible.

For some communities, a creative approach is needed to ensure that they, too, reap the benefits of technological advances that will help resolve some of the root challenges to economic and social prosperity. The widespread deployment and development of autonomous vehicles (AVs) are no different. All stakeholders in the AV space must work to ensure that the promise of a bright future does not exclude certain towns, cities, and states.

The Need for Intentional Development

Whether due to geography, economics, politics, or other reasons, often the communities that would most benefit from the introduction of new technologies do not have access to these opportunities. Often these are errors of omission rather than intention. Regardless, these errors exacerbate inequities and create new problems for millions.

Consider the effects of delayed internet and broadband access here in the United States. When the COVID-19 Pandemic forced us all to quarantine in our homes, millions of Americans without adequate broadband access were left to engage with the world with spotty and unreliable internet, or with no internet at all. Stories emerged of students forced to go to great, and sometimes hazardous, lengths to complete their school work. People in need of healthcare, even if they could access telemedicine capabilities, might not have been able to send and receive sufficient information with their provider due to lagging upload and download speeds. Businesspeople struggled to work from home and families grappled with trying to connect to carry on normal daily activities.

According to the FCC's 2021 Broadband Report, 14.5 million Americans lived in areas without access to high-speed internet in 2019. Some studies say these numbers are a significant undercount.[1] BroadbandNow estimates that at least 42 million Americans still do not have broadband access.[2] This disparity often breaks down along socioeconomic lines. Studies have found that just under half of the country's rural and tribal lands do not have access to the internet speeds that the vast majority of urban areas possess, while many lower-income individuals struggle to afford high-speed internet even if the infrastructure exists.[3] [4]

Connectivity issues are not limited to the United States. Outside of the world's wealthiest countries, the problems intensify. Only about half of households across the globe have an internet connection, leaving some 3.7 billion people disconnected from one of global society's principal tools.[5]

No one planned this lack of accessibility. Development tends to follow financial reward, which, even if unintentional, can leave more vulnerable communities behind. While these inequalities are not the fault of any one individual or organization, the responsibility to address these issues lies with every stakeholder.

Arkansas and Oklahoma: A Creative Strategy for Inclusion

As autonomous vehicles continue to mature, policymakers, thought leaders, and industry players must employ strategies that lead to inclusion and involvement that uplifts and benefits all communities regardless of their geographic location or economic background. Already, Arkansas and Oklahoma have established a unique working relationship that provides a concrete path for states to become new early adopters and ensure their communities experience the benefit of new investment from the autonomous vehicle industry.[6]

For years now, certain states have seen significant new investments from the AV industry. In California, the state's economic background, climate, research institutions, and history of early adoption attracted plenty of AV companies looking to develop and deploy throughout the state. Early on, states like Arizona and Nevada created frameworks that put them on the map for AV developers. Texas, Pennsylvania, Florida, Georgia, and others have seen researchers and developers bring new opportunities to their states. Other states, however, have faced greater challenges breaking into the AV sector. For a myriad of reasons, their communities have yet to benefit from the investment and new jobs brought by the AV industry. Furthermore, unlike their contemporaries, these states are not well positioned for widespread deployment of autonomous technology.

Arkansas Governor Asa Hutchinson and Oklahoma Governor Kevin Stitt refuse to let their states be left behind in the race toward widespread autonomous vehicle deployment. In August, the two states announced an agreement to partner on transforming their region into a hub for advanced mobility. Through this partnership, Arkansas and Oklahoma hope to enhance their capabilities and reinforce economic developments.[7]

Separately, both states are endeavoring to form a welcoming environment for AVs. Among other proposals, partnerships with established community institutions in academia and industry are helping to drive the effort forward. Oklahoma State University created the Helmerich Research Center (HRC) on its Tulsa campus. At the HRC, the OSU College of Engineering, Architecture, and Technology focuses its research on materials essential to advanced mobility technologies and vital to the country's security and supply chains. In Arkansas, Walmart launched an AV pilot program for last-mile delivery. Additionally,

1 Fourteenth Broadband Deployment Report | Federal Communications Commission (fcc.gov)
2 BroadbandNow Estimates Availability for all 50 States; Confirms that More than 42 Million Americans Do Not Have Access to Broadband - BroadbandNow
3 Issue Brief | Closing the Digital Divide | White Papers | EESI
4 The Internet and the Pandemic | Pew Research Center
5 Billions of people lack internet access during the coronavirus crisis | World Economic Forum (weforum.org)
6 Arkansas to collab with Oklahoma on transportation - Axios NW Arkansas
7 Arkansas and Oklahoma Partner on Advancing Mobility Tech - Northwest Arkansas Council (nwacouncil.org)

the Walton Family Charitable Support Foundation issued a planning grant to the University of Arkansas to support research into smart mobility innovations, including autonomous vehicles, connected vehicles, unmanned aerial mobility, and artificial intelligence in mobility and logistics.

Taking the effort a step further, instead of competing for potential development, Arkansas and Oklahoma will be working in collaboration. Tulsa Innovation Labs, a group of public and private partners dedicated to positioning Tulsa as a tech hub, will host a "launch pad" at the HRC to complement the University of Arkansas's research. Together, they will "fuel research and commercialization to drive innovation to market and establish home-grown advanced mobility technologies." Tulsa Community College, NWA Community College, and Holberton School Tulsa will partner to develop the area's advanced mobility workforce.[8] [9]

Both states are committed to coordinating economic development efforts through the Arkansas Council on Future Mobility and the Oklahoma Aerospace, Autonomous Systems and Defense Council. Already, Tulsa Innovation Labs, Northwest Arkansas Council, and Runway Group, with support from the George Kaiser Family Foundation and the Walton Family Foundation, are working to make the U.S. 412 Corridor between Springdale and Tulsa a hub for advanced mobility work.

Altogether, these two states project that these efforts will support the creation of up to "55,000 new jobs in careers such as software engineering, cybersecurity analytics, drone piloting, vehicle maintenance, and mechanical and industrial engineers."[10]

Collaborative approaches, such as these, illustrate how infrastructure modernization can and should be undertaken to ensure that the communities everywhere can take advantage of key developments and are not left out simply because they are not in large urban centers or regions that might be perceived by entrepreneurs as more obviously financially rewarding. A painful lesson learned during the COVID-19 pandemic was

8 Governors Stitt, Hutchinson Partner to Create Super Region for Advanced Mobility in the Heartland (oklahoma.gov)
9 New Early Adopters Look to Take Action in the US Autonomous Vehicle Industry - Driverless Commute (thedriverlesscommute.com)
10 Governors Stitt, Hutchinson Partner to Create Super Region for Advanced Mobility in the Heartland (oklahoma.gov)

how essential it is that all communities are able to access technological advances if we are to enjoy the benefits of modernization. The AV industry is headed in the right direction and will serve as a model for other sectors in the future.

Development and inclusion are not locked in a dichotomy. While technological advancement can leave certain communities behind, the autonomous vehicle industry can create a new path forward in every town and city across the country. To do so, stakeholders must continue to develop creative strategies, like the Arkansas-Oklahoma partnership. If stakeholders keep inclusive development at the forefront of their mission, they can ensure that the coming autonomous vehicle revolution is both successful and equitable.

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Blue Carbon and Urban Resilience

By Andrew Snowhite

**This article was originally published by NewCities at https://newcities.org/blue-carbon-and-urban-resilience/. Additional information on the topic of Blue Carbon is available at this link.*

As coastal cities around the world determine their climate mitigation and adaptation plans, an important nature-based solution must be considered: Blue Carbon. Much has been written about this topic in the academic and NGO spheres; however, its recent introduction into the mainstream conversation reflects its growing importance in city planning, financing, and operations. This is due to blue carbon's environmental, economic, and social benefits, and the associated risks if ignored.

Blue Carbon and Why it Matters

Blue carbon is carbon that is captured and stored in ocean and coastal systems, specifically in mangrove forests, sea grasses, and tidal marshes. Over 80 percent of global carbon is cycled through the ocean, which makes it critically important to climate change.[1] Blue carbon accounts for over 50 percent of carbon stored in ocean sediments and could absorb up to 1.4B tons of emissions annually by 2050.[2] Mangroves and salt marshes remove atmospheric carbon at a rate 10 times greater than tropical forests. While seagrasses sequester carbon 35 times faster than rainforests, storing it for millennia versus decades.[1,2]

Blue carbon ecosystems are widespread, covering almost 50 million hectares on every continent except Antarctica.[3] This includes tropical coastlines around the world, as well as temperate and subpolar areas such as Port Phillip Bay in Melbourne Australia, the Bay of Fundy in Canada, and Scotland where blue carbon sequesters about three times as much carbon a year than all of its forests combined.

Aside from their key role in the global carbon cycle, blue carbon ecosystems also provide local communities with a variety of economic and cultural benefits. I would be remiss if I didn't mention the stunning beauty of these ecosystems as well. When I think of marshes, my mind wanders to the densely vegetated Chesapeake Bay coastline of my home state of

Virginia, which is teeming with life. Mangroves and seagrass remind me of my favorite scuba diving site, a place in the Milne Bay area of Papua New Guinea called "Observation Point." It was named by my mentor Dr. Eugenie Clark ("The Shark Lady") as its sandy outshoot was the perfect place to study the sand diver fish Trichonotus. Aside from a fringing coral reef, the area also included seagrass meadows with dancing shrimpfish and a vibrant mangrove forest inhabited by enormous bright orange seahorses. I encourage everyone to visit blue carbon systems if they have the opportunity, and to view their majesty above and below the water.

Unfortunately, places like Observation Point are becoming increasingly rare since blue carbon systems are disappearing at an alarming rate, especially in urbanizing areas. Already the world has lost 30 percent of its seagrasses and 50 percent of its mangroves and tidal marshes.[1,3] Each year humanity's destruction of coastal wetlands releases 450 million metric tons of CO2, the equivalent of 97 million cars.[3]

Blue Carbon and Cities

Currently, 2.4 billion people, about 40 percent of the world's population, live within 100km of the coast.[5] About a billion of these people are within 100km of a seagrass meadow and are 100 million within 10km of significant mangrove systems.[6] These numbers will increase significantly in the coming decades as billions of additional urbanites join the planet, primarily in tropical and subtropical areas. The timing could not be worse, as climate-related risks will continue to increase dramatically. As more and more coastal cities develop and implement resiliency plans, and practitioners and policymakers start planning for a changing planet, the following blue carbon factors should be considered:

Environmental

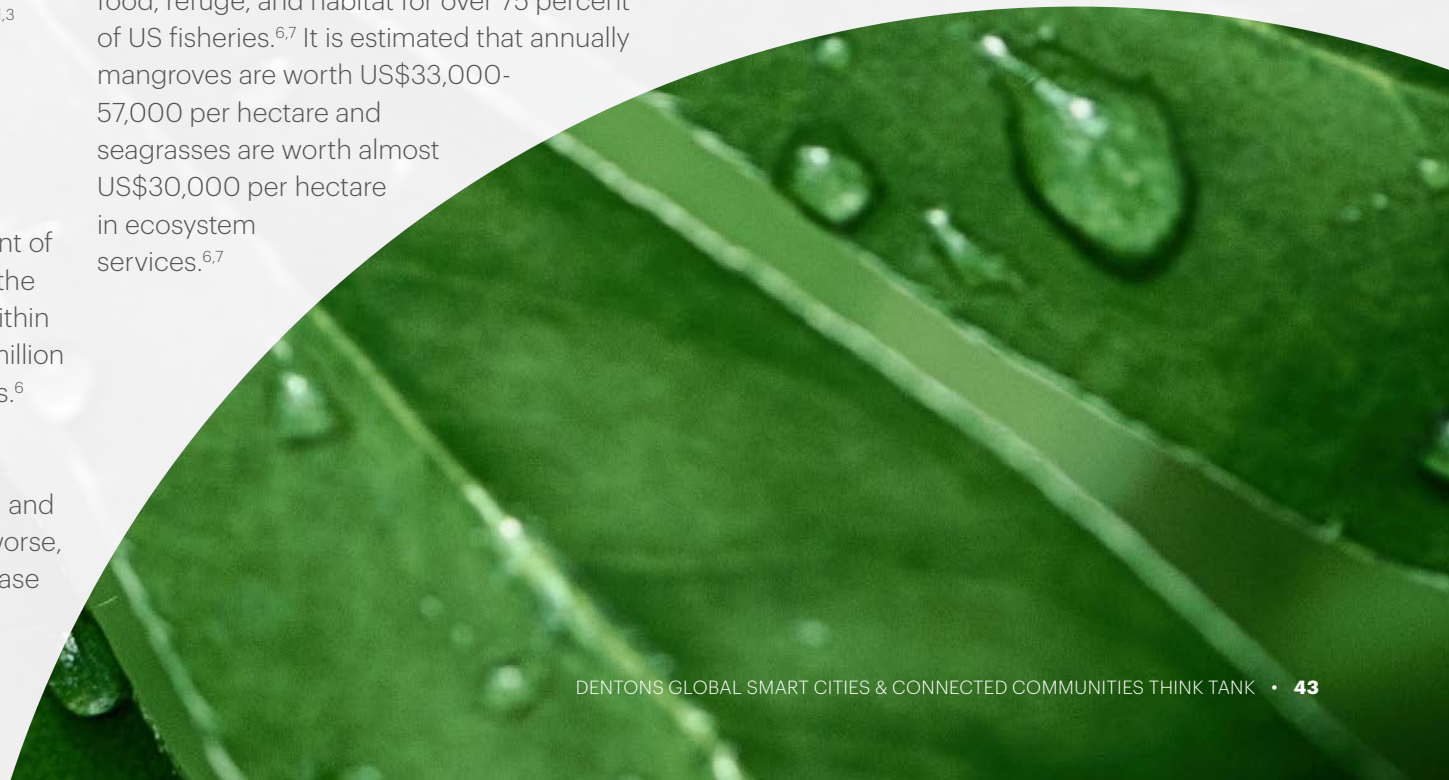
Along with climate benefits, blue carbon systems have numerous other natural benefits: increasing coastal resilience to storms by absorbing storm surges, controlling erosion, reducing the release of pollutants into coastal waterways, and providing critical habitats.[7]

Economic

Blue carbon systems serve as the backbone of many industries. Seagrasses alone create a nursery habitat for almost one-fifth of the world's largest fisheries, and salt marshes provide food, refuge, and habitat for over 75 percent of US fisheries.[6,7] It is estimated that annually mangroves are worth US$33,000-57,000 per hectare and seagrasses are worth almost US$30,000 per hectare in ecosystem services.[6,7]

These systems not only protect fish and other animals but people and property as well. Specific to urban areas, mangroves protect 15 million people a year from flooding and reduce property damage by more than US$65 billion.[8] The first 100 meters of mangroves are able to lower wave heights by as much as 66 percent, an important incentive for cities to maintain or restore these systems.[9] Financial institutions like AXA XL are now looking at opportunities to insure mangroves to build resiliency, similar to novel programs to insure coral reefs.[9]

Healthy blue carbon systems save cities money. In the Galveston Bay of Texas, salt marshes reduce the demand for municipal wastewater treatment by mitigating the release of pollutants into coastal waterways, saving an estimated US$124 million.[7] The Economist notes that building a sea



wall
costs about
US$20 million, but restoring mangroves to protect the same area costs only about US$23,000 in the Caribbean and US$45,000 in Florida.[10] On a global scale, the Global Commission on Adaptation estimates that protecting and restoring mangroves globally would cost less than US$100 billion but would create US$1 trillion in net benefits by 2030.[11]

Tourism jobs and businesses also are supported by blue carbon systems. In Singapore, visitors kayak through the mangrove forests of Pulau Ubin, and in Abu Dhabi walk the trails of the Mangrove Park on Jubail Island. A recent study identified 3945 mangroves "attractions" in 93 countries and territories.[12] Historically, hotels removed seagrasses believing they were unsightly, but research shows this causes higher turbidity and loss of biomass.[13] A great example of a hotel embracing sea grasses to enhance the tourism experience is the Six Senses Laamu in the Maldives. Not only are they conserving their own sea grasses, but they helped develop a National Seagrass Monitoring Protocol and persuaded 37 other resorts to protect their seagrasses.[14]

Society

Blue carbon systems have a variety of positive impacts on people and communities too. This includes core needs like income, food security, and access to clean water, as well as culture and recreation. Also, there are issues related to equity, property rights, and maintaining traditional practices.

Academia is starting to synthesize the importance of blue carbon and communities, particularly for low and middle-income countries. Blue carbon projects are showing positive results in supporting community development projects like the Vanga Blue Forest in Kenya, where restoring and protecting almost 500 hectares of mangroves created social and economic benefits for the local community.[17] A project to protect coastal areas in Indonesia that stopped 13 million metric tons of blue carbon from being released into the atmosphere amounted to US$540 million in social welfare benefits.[18]

A recent article in the journal Ambio details how blue carbon frameworks for just and sustainable community engagement are emerging. This includes The Commonwealth Blue Charter and the Blue Carbon Code of Conduct, which acknowledge the importance of community rights and participation, as well as a "unity of purpose amongst the Blue Carbon community in learning from mistakes made in terrestrial ecosystems."[17] And a 2021 Frontiers in Climate article created a framework for operationalizing climate-just ocean commitments.

In places like New York City where funding is more abundant and blue carbon ecosystems have been degraded over centuries, developers are seeing the value in blue carbon restoration as part of their projects. The River Ring apartment high-rises in Brooklyn are being designed to include tidal pools and salt marshes while across the city the Rockaways, Arverne East will include a 35-acre restored beachfront and nature preserve on a site that used to be an abandoned parking lot.[20] It's a win-win for all involved: residents gain health benefits from access to outdoor spaces and developers see the value of their projects increase up to 20 percent while more easily earning community support and access zoning incentives.20. Bonnie Campbell from Two Trees, the developer of River Ring, told The New York Times: "One thing we heard over and over when we did stakeholder outreach with neighbors was the value in getting back to nature, feeling like you're somewhere other than New York City, and feeling like you're connected to the water."

Blue Carbon Markets

In recent years the concept of blue carbon markets has gained steam worldwide. The Economist describes these as ecosystem restoration projects that generate 'credits' based on tonnes of carbon captured and stored. Those credits are then sold to buyers looking to

offset their own carbon emissions.[15] The market is still in its infancy, with demand outstripping supply. Their added appeal is due to improving adaptation and resilience, positive social impacts in vulnerable communities, and the potential to measure their impact.[15] This is being reflected in real-world case studies, such as the Mikoko Pamoja project in Kenya and Vida Manglar in Colombia. The Bahamas has identified US$300 million worth of assets that could be offered on the voluntary carbon market. Not only does this incentivize conservation, but also it could offset future costs: almost half of the country's existing US$10 billion debt is connected to past damage from hurricanes and climate change.[16]

Similar to other offsets, blue carbon projects are contingent on the quality of the credits offered, how they are managed long-term and community engagement. Perhaps the biggest challenge ahead is supply, as my friend and colleague Dr. Carlos Duarte told the Economist, "Financial resources for blue-carbon resources are growing rapidly, yet we don't see a supply of projects that matches these funds."[10]

One solution is determining how to market blue carbon, which is the topic of a new paper co-authored by Dr. Duarte and a team of transdisciplinary experts titled Operationalizing Marketable Blue Carbon. Blue carbon markets and nature-based climate solutions were recently outlined by McKinsey & Company too in their report Blue Carbon: The potential of coastal and oceanic climate action.

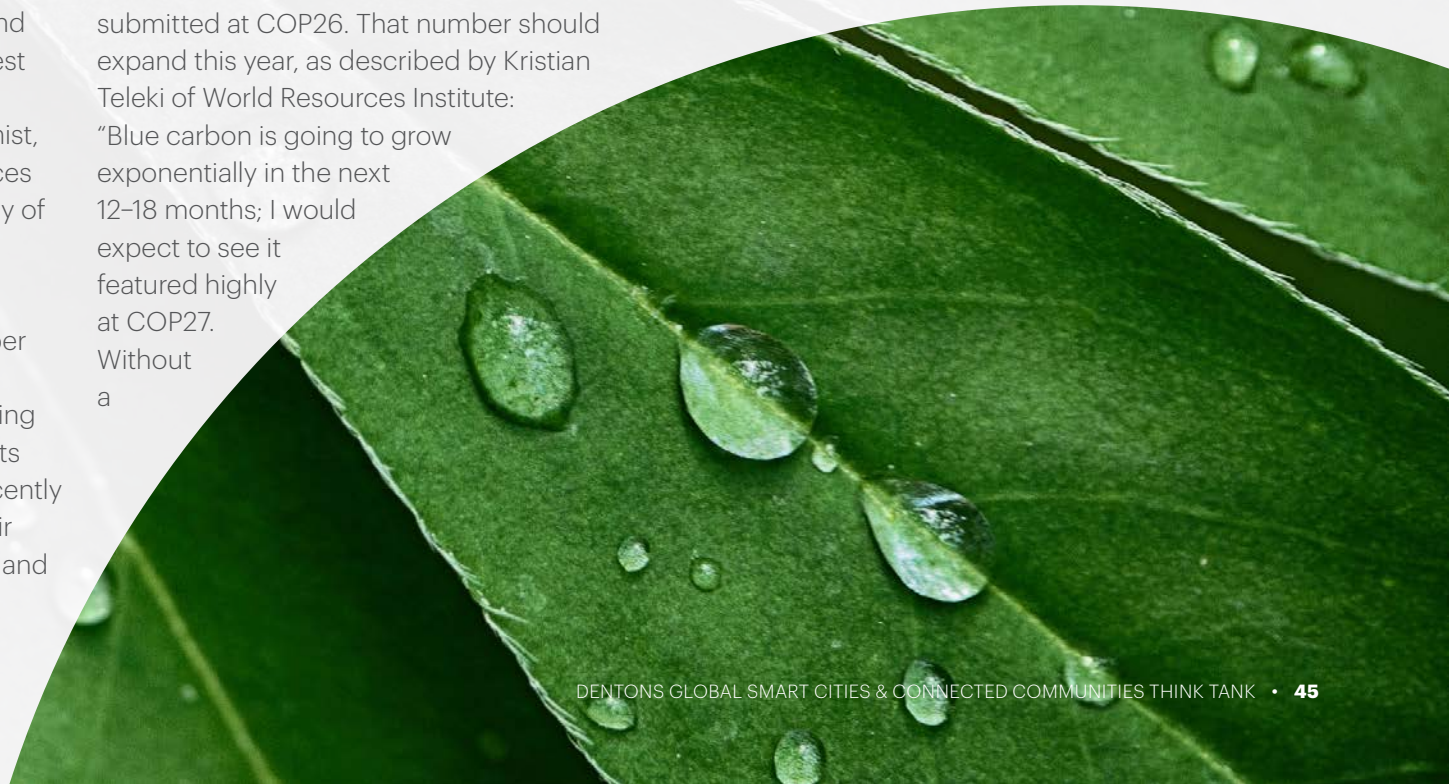
A Resilient Blue Future

Clearly, conserving and restoring blue carbon systems provides a variety of benefits to coastal cities, increasing environmental, social, economic, and built space resiliency. Inland cities should also consider their downstream impacts on these valuable and precious ecosystems.

I am hopeful that we will see city planners and managers increasingly embrace blue carbon strategies, like the Port of San Diego which is studying eelgrass' ability to sequester carbon, or the blue carbon credit initiatives underway in Fukuoka and Yokohama, Japan.

A number of countries are starting to embrace blue carbon as well, with 43 of 113 including it in their greenhouse gas inventories ("NDCs") submitted at COP26. That number should expand this year, as described by Kristian Teleki of World Resources Institute: "Blue carbon is going to grow exponentially in the next 12–18 months; I would expect to see it featured highly at COP27. Without a doubt, people are waking up to the huge opportunity that the ocean presents to solve climate change, food security, and poverty."[15]

Our urban future depends on healthy and thriving blue carbon ecosystems. We have the tools and knowledge to protect and restore these amazing ecosystems. Now is the time for cities and communities to integrate blue carbon into their resilience plans.



Sources

1. The Blue Carbon Initiative. (n.d.). https://www.thebluecarboninitiative.org
2. McVeigh, Karen. (2021). Blue carbon: the hidden CO2 sink that pioneers say could save the planet. The Guardian. https://www.theguardian.com/environment/2021/nov/04/can-blue-carbon-make-offsetting-work-these-pioneers-think-so
3. Broom, Douglas. (2021). These blue carbon ecosystems could slow climate change. World Economic Forum. https://www.weforum.org/agenda/2021/11/blue-carbon-cut-emissions-by-fifth/
4. McVeigh, Karen. (2021). The problem with blue carbon: can seagrass be replanted...by hand? The Guardian. https://www.theguardian.com/environment/2021/nov/05/seagrass-meadows-could-turn-tide-of-climate-crisis-aoe
5. The Ocean Conference. (2017). Factsheet: People and Oceans. United Nations. https://www.un.org/sustainabledevelopment/wp-content/uploads/2017/05/Ocean-fact-sheet-package.pdf
6. UNEP. (n.d). Why protecting & restoring blue carbon ecosystems matters. https://www.unep.org/explore-topics/oceans-seas/what-we-do/protecting-restoring-blue-carbon-ecosystems/why-protecting
7. PEW. (2021). Coastal 'Blue Carbon': An Important Tool for Combating Climate Change. https://www.pewtrusts.org/en/research-and-analysis/issue-briefs/2021/09/coastal-blue-carbon-an-important-tool-for-combating-climate-change
8. Sustainable Tourism International. (n.d.). What is Blue Carbon and Why Does it Matter? https://sustainabletravel.org/what-is-blue-carbon/
9. Cunliffe, C. (2020). Mangrove insurance-opportunities to build resilience in the Caribbean. AXA XL. https://axaxl.com/fast-fast-forward/articles/lets-talk-protecting-and-restoring-mangroves
10. World Ocean Initiative. (2021). How to scale up blue-carbon projects. The Economist. https://ocean.economist.com/blue-finance/articles/how-to-scale-up-blue-carbon-projects
11. Billecocq and Vegh. (2021). The business case for investing in resilient coastal ecosystems. UNFCCC. https://climatechampions.unfccc.int/the-business-case-for-investing-in-resilient-coastal-ecosystems/
12. Spalding and Parrett. (2019). Global patterns in mangrove recreation and tourism. Marine Policy. DOI: 10.1016/j.marpol.2019.103540
13. Daby, D. (2003). Effects of seagrass bed removal for tourism purposes in a Mauritian bay. Environmental Pollution. Volume 125, Issue 3. https://doi.org/10.1016/S0269-7491(03)00125-8
14. Maldives Underwater Initiative by Six Senses Laamu. (n.d.). https://www.maldivesunderwaterinitiative.com/seagrass-conservation
15. World Ocean Initiative. (2022). Are blue carbon markets becoming mainstream? The Economist. https://ocean.economist.com/blue-finance/articles/are-blue-carbon-markets-becoming-mainstream
16. Wyss, J. (2022). The Bahamas Plans to Sell 'Blue' Carbon Credits in 2022, PM says. Bloomberg. https://axaxl.com/fast-fast-forward/articles/lets-talk-protecting-and-restoring-mangroves
17. Dencer-Brown et al. (2022). Integrating blue: How do we make nationally determined contributions work for both blue carbon and local coastal communities? Ambio. DOI: 10.1007/s13280-022-01723-1.
18. Hilmi et al. (2021). The Role of Blue Carbon in Climate Change Mitigation and Carbon Stock Conservation. Frontiers in Climate. https://www.frontiersin.org/articles/10.3389/fclim.2021.710546/full
19. Reiter et al. (2021). A Framework for Operationalizing Climate-Just Ocean Commitments Under the Paris Agreement. Frontiers in Climate. https://www.frontiersin.org/articles/10.3389/fclim.2021.724065/full
20. Sisson, P. (2022). The Next Level in Sustainability: Nature Restoration. The New York Times. https://www.nytimes.com/2022/03/15/business/developers-nature-restoration.html?searchResultPosition=1

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Why Canada has the Potential to Become an EV Battery Supply Chain Powerhouse

By Ali Amadee and Anoosh Loertscher

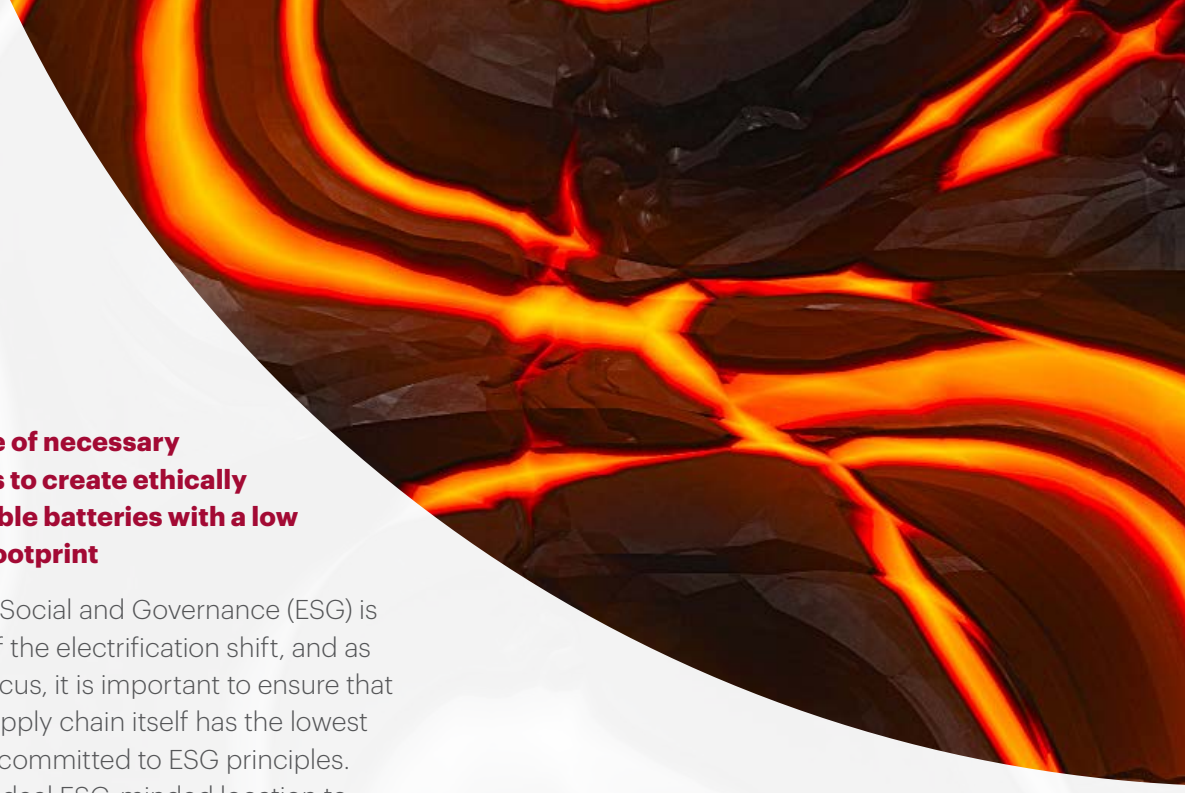
The electrification of transport is gaining momentum around the world and countries are setting ambitious goals towards fully transitioning to zero-emission vehicles in the coming decades. Batteries constitute a key component of electric vehicles (EVs) and the reinforcement of the global battery supply chain will be necessary on the path to successful electrification. The supply of batteries presents major challenges. These challenges include technological issues, production cost concerns, as well as complex supply chain and industrialization considerations (particularly those related to critical minerals, chemical products and the materials necessary to produce batteries). Currently, the battery supply chain is focused mainly in Asia. Western governments, guided by various strategic and geopolitical motivations, are intervening heavily to support the development of their local battery supply chains and to help strengthen their related private sector.

In this ongoing race amongst nations to develop local battery capabilities, Canada is emerging as an international leader in the EV battery ecosystem and is ideally positioned to play a leading future role in all segments of the supply chain. The country's position as an emerging battery supply chain leader is being recognized worldwide; the BloombergNEF annual global lithium-ion battery supply chain ranking placed Canada as the second-best battery supply chain in the world in 2022, behind China and ahead of the United States.

The opportunity appears to be ripe for Canada to position itself as an international hub for the EV battery industry. While we are mindful that such aspirations present important challenges, here are a few key reasons why we believe Canada has the potential to be amongst the EV battery supply chain leaders of the future.

1. Abundance of critical minerals and a solid mining sector

Canada has all the critical minerals required to manufacture EV batteries, as per the currently common battery chemistries: graphite, nickel, aluminum, copper, lithium, cobalt, manganese, molybdenum and rare earth elements. In addition, Canada has a proven track record as a major mining powerhouse, which can be a key differentiator in helping boost the growth of its local battery sector.



2. A strong manufacturing base to support the development of a local battery industry

Canada offers manufacturing expertise, comparatively lower costs to similar nations and strong R&D capabilities, that situate it as a global leader in the field of manufacturing. Canadian expertise is coupled with efficiency: Canadian manufacturing costs are the lowest in the G7. Canada's strength as an industrial power has already allowed it to attract significant interest and investments in the manufacturing of key chemical components for batteries, such as battery cathode and anode active materials. Important announcements have been made recently in this space: the recent investments by BASF and Ultium–a joint venture between General Motors and Korea's POSCO Chemical–in Bécancour, Québec, and the CA$1.5 billion investment by Umicore in a cathode active material facility in Kingston, Ontario, are evidence of Canada's attractive position as an industrial leader and an integral part of the North American EV battery supply chain. In addition, several local players of the battery ecosystem across Canada, such as Nano One, Nouveau Monde Graphite, Li-Cycle and Lithion, to name a few, continue to expand their operations and will play a key role in the development of the industry.

3. Presence of necessary elements to create ethically responsible batteries with a low carbon footprint

Environment, Social and Governance (ESG) is at the heart of the electrification shift, and as part of that focus, it is important to ensure that the battery supply chain itself has the lowest footprint and committed to ESG principles. Canada is an ideal ESG-minded location to develop EV batteries. Canada's natural resources development and manufacturing projects are subject to a high-standard of environmental and social responsibility protection measures and oversight when compared to many other nations. Low-cost clean energy, such as hydro-power, is abundant in Canada and is ideal to power energy-heavy battery supply chain production facilities. In fact, Canada has one of the largest hydroelectric developments in the world. As the world's third largest producer of hydroelectricity, Canada provides the EV battery supply chain with an abundance of renewable and affordable electricity, allowing industrial clients to benefit from some of the lowest North American utility costs. Moreover, the proximity to raw materials and other elements of the battery supply chain, including the availability of low carbon aluminum, would allow for the creation of a tightly knit local North American EV and battery ecosystem. The potential of an integrated and efficient Canadian EV battery industry will limit the necessary transportation within the EV supply chain, thus drastically reducing the industry's carbon footprint.

4. A historically strong vehicle manufacturing industry committed to electrification

Thanks to the existing and easily transferable Canadian automobile manufacturing ecosystem, the world's largest automakers have already committed to source Canadian batteries and Canadian-built EVs. A robust network of original equipment manufacturers, including Ford, GM and Stellantis, have committed billions to manufacturing EVs in Canada. Volkswagen AG and its battery company, PowerCo SE, recently selected St. Thomas, Ontario to establish Volkswagen's first overseas gigafactory for cell manufacturing. Canada is also already home to a network of zero-emission bus producers, including New Flyer, NovaBus (Volvo), Lion Electric Company, GreenPower Motor Company and Vicinity Motor Corp. (Grande West), who are all currently manufacturing in Canada.

Canada further offers a renowned network of over 700 auto parts suppliers, many of which, including Linamar and Magna International, already supply parts for hybrid and electric battery vehicles. The strong Canadian aerospace industry as well as recreational vehicle manufacturers (such as BRP and Taiga Motors) are also active players in facilitating the transition towards electrification. In addition to the great market opportunities in the neighboring United States, all of these Canada-based stakeholders could constitute ideal potential customers and partners for any cell or battery manufacturer willing to establish its presence in Canada.

5. Strategic positioning

Canada is at the crossroads of the critical North American, Canadian-European and Asia-Pacific free trade and supply chain zones. Benefiting from robust rail and marine transportation systems, as well as a series of accessible ports linking the Atlantic ocean to the Great Lakes, East and Midwest regions of the USA, Canada is uniquely positioned to serve as the epicentre of the global EV battery ecosystem. The corridor between the Saguenay region in Québec and Windsor in Ontario, is establishing itself as the heart of the Canadian EV battery supply chain. Comprised of major metropolitan areas, including Greater Montréal, the Greater Toronto Area and the National Capital Region, as well as key industrial regions, including Saguenay, Trois-Rivières, Bécancour, Kingston, Oshawa and Windsor, elements of all segments of the EV battery supply chain are serviced in this corridor that was already home to one of the world's largest automotive industries.

6. Human resources and R&D capabilities

Canada offers a qualified and multilingual workforce that is born from its renowned network of universities and research institutes. It also remains a popular immigration destination for a qualified work force, which will be an essential part of the industrialization process required for a vibrant battery manufacturing ecosystem. University innovation centers that have been at the forefront of many industries, including the technology hub at Waterloo University, as well as the research and innovation institutes at the University of Toronto, McGill University, Concordia University and Université de Québec à Trois-Rivières, to name a few, will be playing a key role in the study of electrification and energy storage. Research costs in Canada are generally the lowest in North America, and government support for R&D is also very generous. Innovation will be a key driver for the battery industry, as various companies, start-ups, and well-established ones alike, are working to unlock technologies that can manufacture better performing batteries for the most affordable price, with a view to solving the battery cost efficiency challenge. The Canadian R&D base can play a major role in helping to advance this cause. A culture of innovation is well-rooted in Canada and has helped shape internationally-renown innovation and industrial hubs in various sectors throughout the country. The same level of success can certainly be envisioned for the young and emerging Canadian battery ecosystem.

7. Governmental and popular support for the development of the battery supply chain

In the past three years, the federal and provincial governments (especially Québec and Ontario) as well as municipalities and regional authorities have actively supported the development of a local battery supply chain. This support has included active diplomatic efforts at the highest levels to attract foreign direct investment, promoting strategic international alliances in the sector with allied nations and significant funding commitments to projects of various

sizes in the battery supply chain. Moreover, ambitious regulatory schemes to enforce a transition to zero-emission vehicles by federal and provincial authorities are motivating the industry to move even faster. It would be fair to say that, overall, these efforts have played a key role in helping to boost the emergence of the battery and EV supply chain in Canada. Moreover, the development of a local battery cluster has generally received a positive reaction from the industrial and investment communities as well as the general population. The growth of the battery cluster is viewed as a driver for the creation of high-quality employment, development of a local green innovation-driven economy and the return of manufacturing jobs to communities in need of developing their local economy. Social buy-in as well as federal and provincial government support, all of which are key to the development of major industrial projects, certainly seem to be present.

Conclusion

Recent developments indicate that Canada is seizing the opportunity to realize its potential as a battery supply chain leader. Canadian Industry Minister, Francois-Philippe Champagne, recently categorized Canada, and those investing in the country, as entering a "generational opportunity." Indeed, the development of the Canadian EV ecosystem truly is a generational opportunity to contribute to the emergence of a global EV and battery powerhouse. However, it would be naïve to assume that the establishment of a still nascent battery industrial base, with all of the challenges that exist for the industry, will be a simple or rapid process. Canada has the required assets, as well as government and community support, to realize its full potential. However, the path towards developing local cell and component manufacturing capacity, which is still in its infancy, requires hard work, commitment, continued support by all the players involved and, of course, major investments.

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This article is an abridged version of a longer article which can be found at: https://www.dentons.com/en/insights/articles/2023/january/20/ai-in-2023-key-trends-and-developments#:~:text=There%20is%20an%20increasing%20trend,certain%20uses%20of%20the%20technology

Eight AI Trends to Watch

By Simon Elliott, James Fox, Kuan Hon and Risha Vithiani

Artificial intelligence (AI) is a technology that continues as a central focus for governments and businesses as a key enabler for digital transformation and innovation-driven growth. The use cases continue to expand and the value proposition is brought to life more and more every day.

Over the last 10 years, AI has become part of so many aspects of our society and an important part of the formation of our future. AI models are offering cybersecurity, autonomous systems, robotic process automation and many other benefits to multiple industries across the world. Below is a summary of key AI-related trends and issues which are likely to be at the center of the continuing evolution of AI as a central innovation and growth tool.

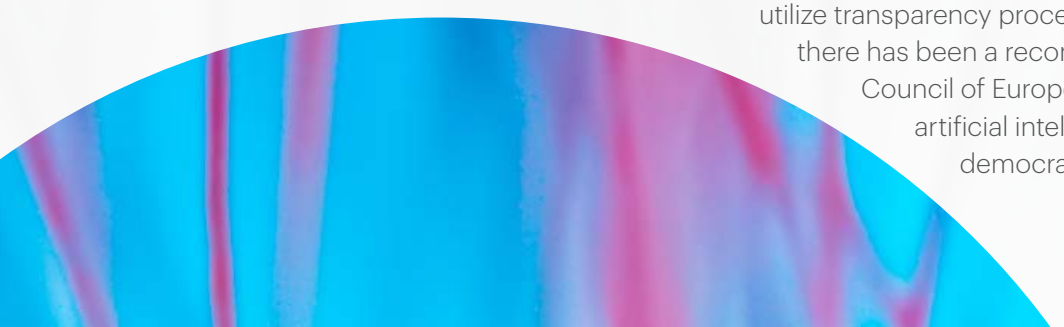
1. Transparent AI

Transparent AI is one of the most discussed areas in AI and involves a wide range of issues, including the process of allowing individuals to see whether AI models have been thoroughly tested and to demonstrate why AI has made decisions. These and other functions are seen as crucial due to the complexity of AI, including addressing issues of accountability and liability should harms occur.

Data can be unbalanced. This means it may produce discriminatory outputs based on, for example, gender, race, religion, age, disability and/or health. There are several well-known examples of this, including AI used in recruiting which depicted CEOs as being male and white. Bias implicit in AI is gaining increased attention.

Over the coming year, expect to see additional pressure on companies and developers to utilize transparency processes. In Europe, there has been a recommendation for a Council of Europe convention on artificial intelligence, human rights, democracy and the rule of law. The proposed convention reiterates the importance of transparency and highlights the need for procedural safeguards to ensure the use of transparent AI systems that explain the reasoning that the AI followed before arriving at a decision, both to benefit individuals and oversight authorities.

Globally, there are various efforts to improve transparency. One example is in Singapore, where organizations from the Eu, UK and US are collaborating on the Veritas Initiativem which seeks to enable financial institutions to evaluate their AI-driven solutions against the principles of “fairness, ethics, accountability and transparency”.



2. AI assurance

The concept of AI assurance covers a range of activities that aim to investigate, and then communicate, whether AI systems are trustworthy in order to increase confidence both by those considering deployment of AI and those who may be impacted by it. The more widely adopted AI becomes, the greater the need for certainty regarding the standards to which the AI has been developed. Regulators' and governments' aim will be to ensure not only that AI is functioning as intended, but also to demonstrate this to the market and to society in general.

Assurance activities can include, for example, testing bias in data and testing the behavior of algorithms.

Assurance also comes from harmony of standards and emphasis on the role that standards can play as governance tools and innovation mechanisms.

3. Metaverse

The metaverse represents the convergence between the real world and the virtual world. It relies heavily on AI. It is difficult to define the metaverse with any great precision. The metaverse remains largely a hypothetical but rapidly evolving idea with multiple meanings. Some suggest that the metaverse is to the world now, what the internet was to computer scientists during the 1960s. It is mostly a user experience generated by devices and tools.

One of the key building blocks of the metaverse is AI technology. As part of this, AI will be involved in a significant amount of content and experience creation. This includes not just images, music and videos but also synthetic media, in the form of digital experiences and objects created by AI. The metaverse could be the key that unlocks a new world of transacting; providing and consuming goods and services; interacting (socially and professionally); researching; and much more. Regulatory development is vital to answer questions such as "what liability do metaverse users have to each other?" and "what liabilities do providers of metaverse-related technology have to users?" It also raises possible issues from an intellectual property perspective.

4. AI in recruitment and the Equality Act

AI is being used to filter applicants in the recruitment of employees, which creates new discrimination and bias risks for employers who use AI as part of their recruitment processes. Although the risks are not unique to employment (and also apply to credit assessment, for example), there are significant and personal implications that may also overlap with privacy regulations and protections.

If an AI system were trained using completely objective and impartial data, discrimination would unlikely be an issue. However, given that AI systems are initially developed and trained by humans, even with relatively unbiased training data, there is always going to be a human element and therefore a risk of historic bias influencing the data set. In addition, many AI systems constantly learn and their algorithms evolve depending on how the system is used meaning that, even if not biased to begin with, an AI can develop biased tendencies over time.

5. AI face recognition

The process of digital face recognition uses AI to scan a face and match it to unique identifiers against a database of images. Face capture transforms analogue information (i.e. the scan of the face) into a set of digital data and vectors based on the person's facial features. There is an increasing trend to use AI face recognition technologies, for example, to prove a person's identity as part of accessing their banking app, or for age verification. This trend is likely to continue in 2023 despite significant regulatory discomfort with certain uses of the technology. It has been one of the most heavily utilized forms of AI applied to policing and in public surveillance by enforcement authorities more generally in recent years.

There is particular controversy about "live facial recognition" (LFR). In Europe, the European Data Protection Supervisor has gone as far as to say that the automated recognition of human features in public spaces, such as faces, contravenes fundamental rights to privacy and freedom, and should be prohibited. Expect to see a forthcoming EU regulation, the AI Act (expected to become law in the not-too-distant future), seek to regulate its use.

See also Every Face You Scan: Regulating Facial Recognition Technology in New Zealand in this Report.

6. AI for healthcare

The potential use of AI in the healthcare industry is far reaching. It ranges from making it easier to acquire real-time data from patient health records, to the use of thermal cameras, medical robots and drug discovery. Similar to issues with facial recognition technology, the use of AI to analyze patient records, which is personal, sensitive, "special category" data under data protection/privacy laws, means there will need to be greater emphasis on ensuring that sufficient safeguards are in place, for example, by use of de-identification, enhanced compliance monitoring and access controls, and increased training and thorough equality impact assessments.

7. AI and intellectual property rights

Training AI using personal data or protected IP is providing a challenge to legislators worldwide. Over the coming years, organizations that create or use AI technologies which have been trained using (i) personal data and/or (ii) information/data protected by IP rights are likely to face increased regulatory scrutiny. Generative AI -- AI that generates text, images, speech, video and even technical inventions based on user-inputted instructions -- raises issues for current IP regulatory regimes to developers and users, in part because training generative AI involves using large bodies of IP-protected works in ways that may infringe under current legislation. Governments seeking to "unlock" the potential of generative AI may legislate to permit text and data mining of IP-protected data in order to train AI. Alternatively, jurisdictions may opt to clamp down on AI training without sufficient permission or attribution of IP-protected data used in AI training.

If AI is responsible for content creation autonomously without any human input, then questions arise about who owns the copyright protecting such content. Traditionally, this is the person or organization that creates the works. In some countries, such as the UK, this may be answered by the fact that computer-generated works will be owned by the person who made the necessary arrangements for the creation of the work. However, the questions remain: who is this person? Is it the person who created the software; or the person(s) who taught the software, or both? An Australian court ruled in 2021 in favor of AI inventorship (i.e. the AI system could be named as the inventor on a patent application). However, this has been overturned by the Australian Federal Court, so the matter is still uncertain. Expect to see lots of developments globally on this issue.

For an interesting discussion of AI generated images and the rights of human artists, see https://www.dentons.com/en/insights/articles/2023/january/27/ai-generated-images-and-copyright

8. AI regulation

The above trends illustrate that there is growing momentum to ramp up the regulation of the use of AI across various industries and jurisdictions. The UK government has announced its intention to provide an overarching framework with general guidance. It is keen to work with individual regulators from a wide range of industries to examine and monitor the use of AI within these different industries. The UK government has acknowledged that, although the use of AI will vary in each industry, the lack of clarity on how to regulate AI use is an issue. The inconsistency and overlap between different laws/regulators need to be addressed. Overall, the framework is expected to be soft-touch and on a non-statutory basis, helping it remain adaptable.

Conversely, a more rigid approach to AI regulation is being adopted by the EU. A framework will categorize AI in terms of risk: as unacceptable, high or low/minimal risk. Unacceptable-risk AI systems include, for example (i) subliminal, manipulative or exploitative systems that cause harm and (ii) all forms of social scoring (for example, AI that assesses an individual's trustworthiness based on social behaviors). Europe is also developing a regime to allocate liability.

In the US, a blueprint for an AI Bill of Rights has been introduced, and measures to propose national standards regarding personal data collected by companies and AI decision-making are being considered in Congress.

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Critical Mineral Supply Chain Challenges Facing the Smart Infrastructure Industry

By Nick Ettinger

"Critical minerals" are so named because they are critical inputs to one or more components of the modern economy with implications for national or economic security. Smart cities and communities and the modernized infrastructure that define them are particularly reliant on critical minerals: cobalt, lithium, and nickel for lithium-ion batteries in energy storage systems, portable electronics, and electric vehicles; copper and aluminum for solar panels and electricity networks; and even helium for the manufacture of fiber optics and semiconducting microchips essential to advanced telecommunications and all manner of electronics used in computers, adaptive traffic control systems, lighting, heating, and the like.[1] In order for our cities and communities to continue to accelerate along the path to modernization, a steady and secure supply of these inputs is essential.

The challenge here is the second characteristic that defines a critical mineral–a unique vulnerability to supply-chain disruption arising from factors like geologic scarcity, geopolitical issues, abrupt demand growth, and anti-competitive or protectionist trade behaviors. All these factors have converged in the wake of Russia's invasion of Ukraine. Aside from the prospective mineral resources of Eastern Ukraine potentially stranded by the conflict, the economic ramifications of Putin's aggression for countries highly dependent on Russian energy have awakened the West to the risks of overreliance on adversarial or geopolitically unstable regimes for critical minerals. Tensions with Russia and China are now threatening critical mineral supply chains already strained by the economic recovery from the pandemic.

For example, while the current upstream supply of lithium mostly comes from Australia, Chile, and Argentina, China processes and refines approximately 60 percent of the world's battery-grade lithium carbonate and lithium hydroxide.[2] China also dominates lithium-ion battery

1 Helium's "critical mineral" designation was removed by the US Geological Survey in 2022 despite protests from US Senators; see "Energy Committee Leaders to Secretary Haaland: Helium & Uranium are Critical Minerals", (2022), online: *US Senate Committee on Energy and Natural Resources* <https://www.energy.senate.gov/2022/2/energy-committee-leaders-to-secretary-haaland-helium-uranium-are-critical-minerals>

2 Chile and Argentina account for the rest of battery-grade lithium production; *The Role of Critical Minerals in Clean Energy Transitions*, World Energy Outlook Special Report, World Energy Outlook Special Report (International Energy Agency, 2022) at 13, 138.

manufacturing, accounting for approximately 80 percent of the world's capacity in 2021; the US was next closest with just 6 percent of manufacturing capacity.[3] To maintain its dominance of lithium-ion battery supply chains as demand growth accelerates, China has been stimulating domestic upstream production of lithium and Chinese companies have been buying hardrock mining and solar evaporative-brine projects around the world for the past several years.[4] Approximately 90 percent of unrefined Australian lithium, for example, currently goes to China.[5] As a result of the abrupt demand growth for electric vehicles, unrefined lithium-bearing ore prices increased by over 500 percent from 2020-2021, while spot and fixed-contract prices for refined lithium carbonate from China increased by 375 percent and over 200 percent, respectively.[6]

Vulnerability to critical mineral supply chain disruptions is not a new phenomenon

Years prior to the current crisis, the US acknowledged its vulnerability to critical mineral supply chain disruptions through the Trump Administration's "Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals"[7] and the resultant establishment of a critical minerals list in 2018.[8] That policy also led to the establishment of the Canada-US Joint Action Plan on Critical Minerals in 2020,[9] the aim of which is to develop a circular North American critical mineral supply chain.[10] Within weeks of taking office in 2021, President Biden ordered his administration to further develop strategies to address vulnerabilities in critical mineral supply chains.[11]

Recent North American initiatives to enhance the security of the supply of critical minerals

In 2022, Congress passed a series of new laws aimed at shoring-up North American manufacturing sectors of critical importance to US economic security. The CHIPS and Science Act of 2022 (PL 117-167), for example, earmarks US$280B for US semiconductor chip manufacturing and research. However, the Act doesn't address the supply of critical minerals necessary for such a dramatic increase in manufacturing. Of the 35 critical minerals on the inaugural 2018 list, approximately 30 are relevant to semiconductor manufacturing, and the US import reliance for 23 of those is greater than 75 percent.[12]

The Inflation Reduction Act also has the potential to dramatically increase the US demand for critical minerals. The Act introduces two new tax credits for electric vehicles designed to increase US battery manufacturing while decreasing the reliance on China for critical minerals. The first

3 "Mapped: EV Battery Manufacturing Capacity, by Region", (28 February 2022), online: *Visual Capitalist* <https://www.visualcapitalist.com/mapped-ev-battery-manufacturing-capacity-by-region/>.
4 Kip Keen & Camille Erickson, "China mining, battery companies sweep up lithium supplies in acquisition blitz", *S&P Global* (2021), online: <https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/china-mining-battery-companies-sweep-up-lithium-supplies-in-acquisition-blitz-67205411>.
5 *Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth*, 100-Day Reviews under Executive Order 14017 (The White House, 2021) at 101.
6 *Mineral Commodity Summaries: 2022*, by US Geological Survey at 100.
7 "A Federal Strategy To Ensure Secure and Reliable Supplies of Critical Minerals", (2017), online: *Federal Register* <https://www.federalregister.gov/documents/2017/12/26/2017-27899/a-federal-strategy-to-ensure-secure-and-reliable-supplies-of-critical-minerals>.
8 US Geological Survey, "Interior Releases 2018's Final List of 35 Minerals Deemed Critical to U.S. National Security and the Economy", (2018), online: USGS https://www.usgs.gov/news/national-news-release/interior-releases-2018s-final-list-35-minerals-deemed-critical-us.
9 Natural Resources Canada, "Canada and U.S. Finalize Joint Action Plan on Critical Minerals Collaboration", (9 January 2020), online: https://www.canada.ca/en/natural-resources-canada/news/2020/01/canada-and-us-finalize-joint-action-plan-on-critical-minerals-collaboration.html.
10 *National Blueprint for Lithium Batteries*, by Jennifer Granholm (Federal Consortium for Advanced Batteries, 2021).
11 *Building Resilient Supply Chains, Revitalizing American Manufacturing, and Fostering Broad-Based Growth*, 100-Day Reviews under Executive Order 14017 (The White House, 2021) at 6.
12 https://www.regulations.gov/comment/BIS-2021-0011-0032

credit is obtainable so long as 40 percent of the dollar value of the critical minerals contained in the vehicle's battery were extracted or processed in the US or a country with which the US has a free trade agreement, or if they were recycled in North America. That percentage increases to 50 percent in 2024, 60 percent in 2025, 70 percent in 2026, and 80 percent in 2027. The second credit is obtainable so long as 50 percent of the dollar value of the components contained in an electric vehicle battery were manufactured or assembled in North America. That percentage increases to 60 percent in 2025, 70 percent in 2026, 80 percent in 2027, 90 percent in 2028, and 100 percent in 2029. Further, the existing tax credit will no longer be available as of 2025 for new electric vehicles in which the batteries contain any critical minerals that "were extracted, processed, or recycled by a foreign entity of concern," or components that were "manufactured or assembled by a foreign entity of concern," which most notably includes China.

To address the acute overreliance on adversarial regimes for critical minerals amidst growing US demand, at the end of March 2022, President Biden formally invoked the Defense Production Act of 1950 – a Cold War-era statute that enables enhanced presidential powers and access to funding to shore up domestic critical mineral supply chains in the name of national security. The authorization paves the way for the administration to "create, maintain, protect, expand or restore sustainable and responsible domestic production capabilities" of critical minerals to prevent a shortfall that could "impair the national defense capability."[13] Canada is likewise increasing its financial support for domestic critical mineral production. The federal budget tabled in early April 2022 proposes CAD$3.8B in funding over the next eight years for upstream critical minerals projects.[14]

Production challenges exacerbate supply gaps

While incentives for North American critical mineral production are there, lead times for new upstream mining projects and processing facilities will likely significantly lag demand growth. For example, an optimistic lead time for the construction of critical mineral processing plants is 3-4 years, and the average time from discovery to first production for new mining projects is 16.5 years.[15] In North America, long lead times are reflective of rigorous regulatory regimes that include obstacles to permitting for environmental and other reasons. For example, a highly anticipated proposed lithium mine in Nevada with the potential for one of the largest production capacities in the US may face additional hurdles resulting from the designation of critical habitat for a rare endangered species of flower that overlaps with the prospective area.[16] In Arizona, a proponent has been working toward permitting approval for an in situ copper leach mine for the past 8 years, but the project is at least several years out from first production.[17] In Canada, the vast critical mineral-rich deposits of the Ring of Fire–first discovered in northern Ontario in 2007–are at least several years away from being developed. The roads necessary to access the remote region will cost billions, the impact on the surrounding peatland is highly controversial, and the cumulative adverse effects of development on the inherent and constitutionally protected rights of the region's Indigenous peoples need to be assessed and mitigated.

These realities reflect the fact there are few low-hanging fruits as far as high-quality deposits of critical minerals go in North America. The next frontier is the abyssal plains of the deep oceans, rich in polymetallic nodules and mineral crusts with high concentrations of critical minerals like cobalt, nickel, manganese, tellurium, and vanadium. As tantalizing as these deposits are, their future development is shrouded in considerable uncertainty given the possible impacts of their harvesting on the poorly documented, yet diverse

13 Joseph Biden, "Memorandum on Presidential Determination Pursuant to Section 303 of the Defense Production Act of 1950, as amended", (2022), online: *The White House* <https://www.whitehouse.gov/briefing-room/presidential-actions/2022/03/31/memorandum-on-presidential-determination-pursuant-to-section-303-of-the-defense-production-act-of-1950-as-amended/>.

14 *Budget 2022: Chapter 2: A Strong, Growing, and Resilient Economy*, by Department of Finance (Government of Canada, 2022)

15 https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions/executive-summary

16 https://www.reuters.com/business/environment/us-regulators-preserve-acreage-near-ioneers-lithium-mine-site-2022-02-02/

17 https://www.canadianminingjournal.com/news/taseko-granted-draft-permit-for-florence-copper-project-in-arizona/

ecosystems at those depths, and the incomplete regulatory regime currently administered by the International Seabed Authority.[18]

The impact of political and production challenges on infrastructure modernization

The upstream supply and processing of critical minerals pose a significant threat to the infrastructure and automotive needs of smart cities and communities. The current supply chain crisis will be exacerbated as demand continues to outpace supply and could become critical if further conflict erupts between importers and exporters.

In this time of great technological change and energy transition, significant work remains to ensure that supply chains reorganize to mitigate overreliance on adversarial regimes for critical minerals. Exploration and development must yield inventories of critical minerals that can pace demand growth. And regulatory schemes need to be optimized to accommodate the expedited development of mineral projects while ensuring the protection of the environment and other stakeholders. The alternative is the development of new technologies that are not reliant on critical minerals, but that also involves significant time and uncertainty, luxuries that our cities and communities presently cannot afford.

18 https://www.isa.org.jm/mining-code

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Nick Ettinger was a member of the 2022 class of the Dentons-University of Calgary International Energy Law travel course. Nick is a lawyer and an exploration geologist, with degrees in Geological Sciences from Queen's University and the University of Texas at Austin and a law degree from the University of Calgary.

Energy Warfare, Energy Security and a Shifting Global Energy Landscape

By Clint Vince

Putin's brutal invasion of Ukraine and his extreme "energy warfare" have seriously disrupted energy globalism and energy security. Prior to the invasion, pricing in the energy markets was stable and supply was available. Now, we find that we have been catapulted into a new era of jagged geopolitics: trade relationships, even long-standing ones, are shifting, and we are witnessing intensified regionalism. China, Iran, and sometimes Saudi Arabia are engaging in new competitive trade relationships. These combined dynamics have led to volatile oil and gas supply and pricing around the world.

Of particular concern is the new paradigm of geopolitics has caused significant supply chain issues regarding the availability of lithium, cobalt, copper, nickel, manganese, and other critical minerals and earth elements that are essential to our energy future. There even is concern now about the availability of enriched uranium for nuclear projects.

In the US, these problems are combined with serious unresolved siting, permitting, and mining reform issues and inadequate infrastructure. We face insufficient and antiquated transmission infrastructure and continuing severe interconnection problems, both of which impact the deployment of traditional resources as well as renewables needed to support increased demand and address climate concerns.

On the positive side, we have three hugely important recent pieces of legislation–the Bipartisan Infrastructure Law, the Inflation Reduction Act, and the Chips and Science Act–which are designed to jumpstart much needed infrastructure and innovation. We are still in the early days of seeing the effects of such legislation, but these measures seem to be spurring tremendous innovation in areas like hydrogen (where we lag far behind Europe but now are catching up). A lot of dollars are expected to flood in, but DOE is still working on the implementation phase.

All of this is playing out against a backdrop of megatrends that are rapidly transforming the energy sector along with other critical infrastructure sectors and causing us to redefine what we mean when we speak of "security". Disruptions caused by changing climate and cyber intrusion continue to be of the highest concern. Water scarcity will have far-reaching impacts on the energy industry and beyond. Population explosion and related urban migration are putting unprecedented stress on physical and social infrastructure. The global economy is becoming increasingly fragile, and the dominance of the US dollar is weakening. Dramatic advances in technology are accelerating changes across sectors at a pace never before experienced, with implications, positive and negative, that we cannot yet imagine.

What is needed in keeping up with these dramatic developments is much greater improvement in domestic policy and the removal of current layered regulatory impediments and uncoordinated bureaucracy. We also need drastically improved diplomacy. The well-being of the planet is at stake.

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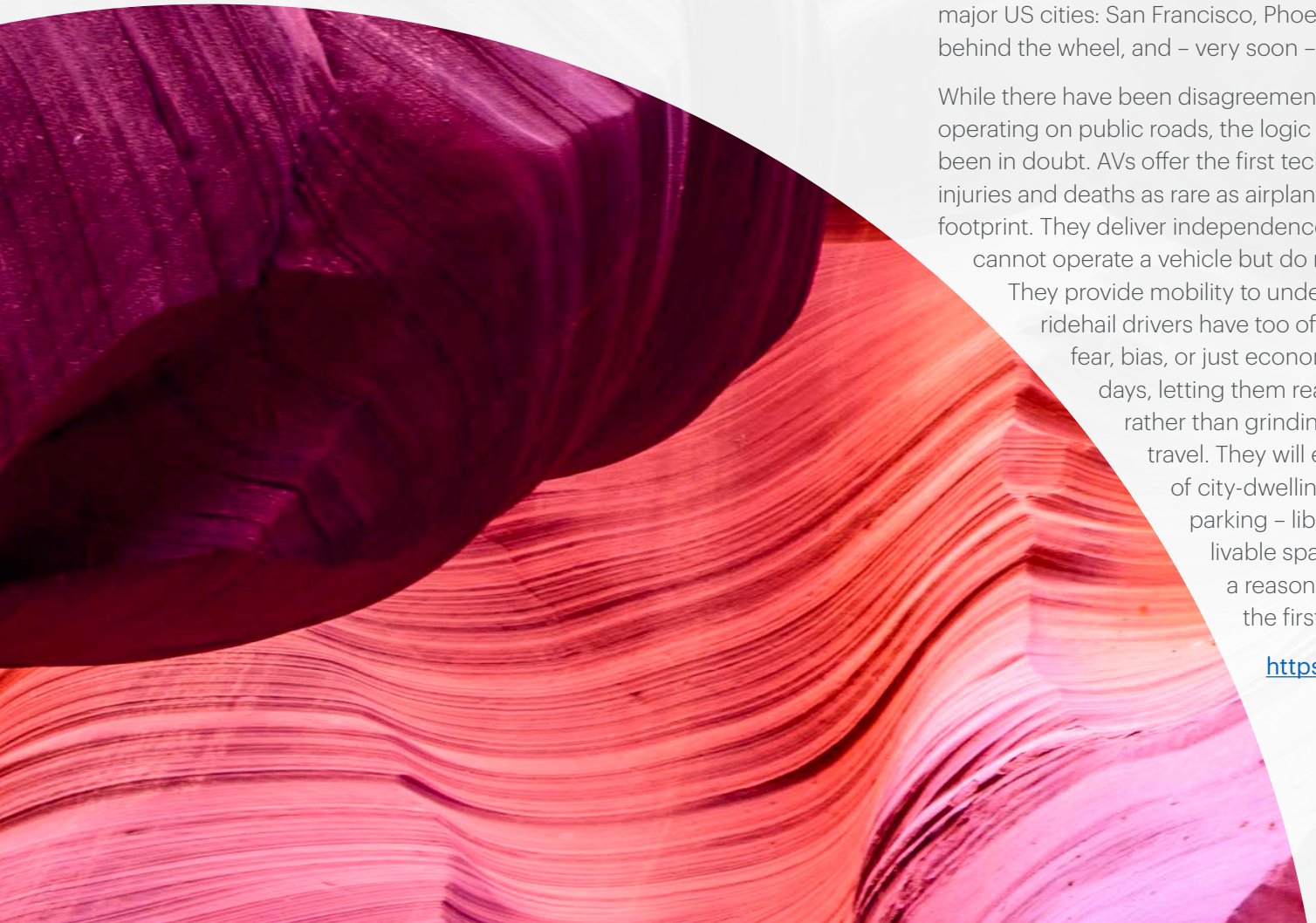
Autonomous Vehicles Aren't Coming, They Are Here: And That's a Good Thing

By Jeff Bleich



The science fiction writer, William Gibson, observed: "The future is already here – it's just not evenly distributed." If you are wondering when autonomous vehicles ("AVs") will finally arrive; they already have. While you read this, robotaxis are providing fared ridehail services on public streets in major US cities: San Francisco, Phoenix, Austin and others. There is no one behind the wheel, and – very soon – there will not even be a wheel at all.

While there have been disagreements about when AVs would begin operating on public roads, the logic of *why* AVs will be adopted has never been in doubt. AVs offer the first technology capable of making road injuries and deaths as rare as airplane crashes, while reducing our carbon footprint. They deliver independence to older and disabled people who cannot operate a vehicle but do not want to always depend on others. They provide mobility to underserved communities that traditional ridehail drivers have too often neglected – whether based on fear, bias, or just economics. They return time back to people's days, letting them read, eat, sleep, text, or just goof off rather than grinding through traffic when they need to travel. They will eliminate some of the worst aspects of city-dwelling – gridlock and wasted space for parking – liberating city planners to design truly livable spaces with easy transit. In short, there is a reason why passengers experiencing AVs for the first time are euphoric.

https://youtu.be/Pa6uCew5TWs

Transforming Road Safety

For over 100 years, the public has accepted a terrible human toll in exchange for the convenience of automobiles; namely, in order for all of us to simply get from place to place – work, school, jobs, homes – some vast number of us will need to die or suffer serious and lifelong injuries. In 2021 and again in 2022, America lost more than 42,000 lives to vehicle crashes.[1] Road collisions are the leading cause of death for American teenagers.[2] Despite improved braking systems, seatbelts, airbags, warning systems, crumple zones, etc., the death count is now higher than ever. In virtually all cases the collision's cause was the same – human error. In 2016, the US Department of Transportation reported that 94 percent of crashes involved human error.[3] Transportation Secretary Pete Buttigieg has assessed the situation well: "We live in an era when it is safer to fly in an airplane 30,000 feet above the ground than it is to walk down the street." This is true of transportation everywhere in the world. Last year, around the world, 1.3 million people perished in traffic accidents, with nearly 3,700 lives lost per day.

For the first time, we no longer have to accept this fate. AV technology offers humanity the chance to remove the one part of the vehicle operating system responsible for most of these needless injuries and death: the human driver.

This is not to denigrate humans or our skills. Humans are amazing. It took thousands of the world's greatest engineers decades and billions of dollars simply to train a machine to do what virtually all human beings can do at age 16. But once that milestone was achieved, the capacity of machines to improve over human driving has accelerated and is now overwhelming.

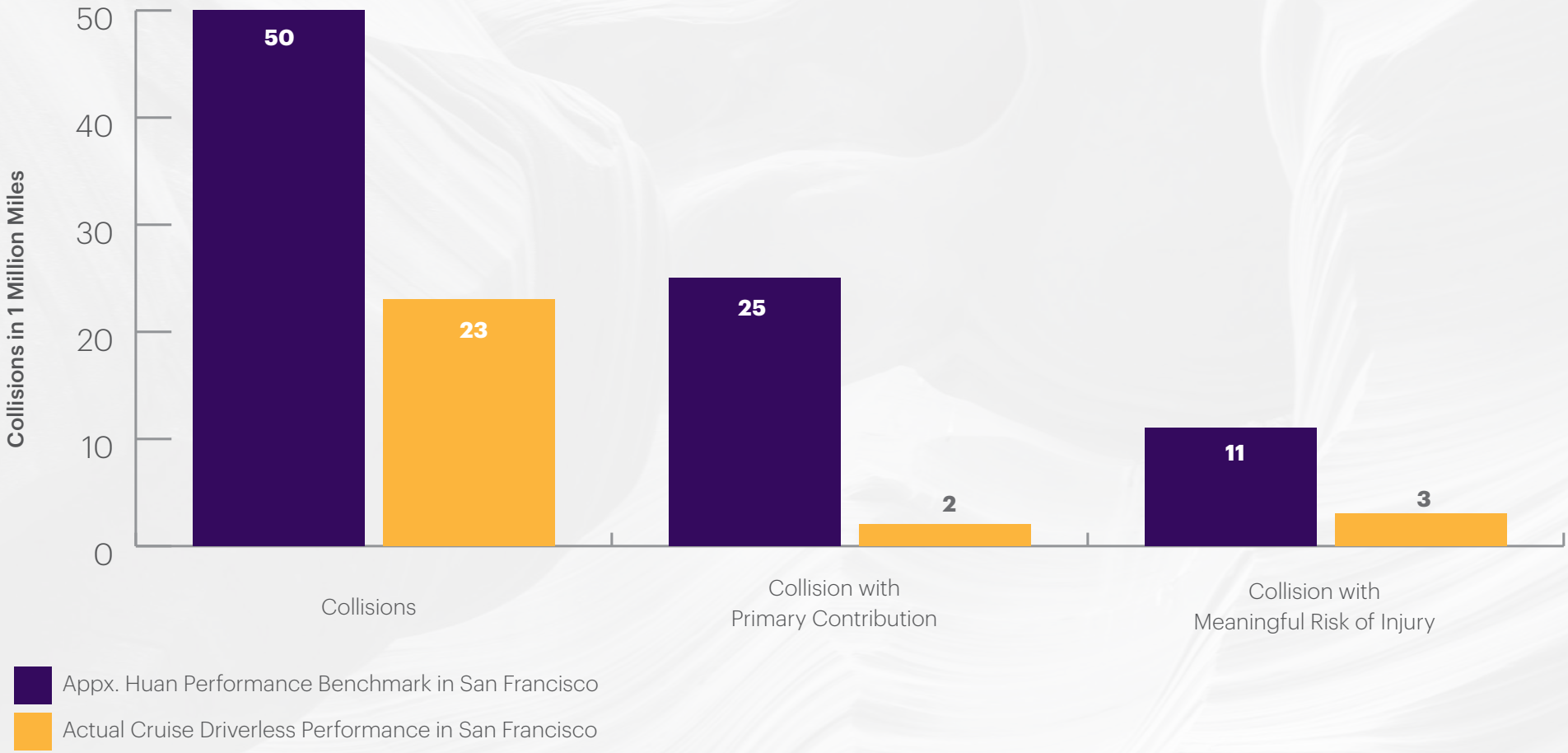
Unlike human drivers, AVs do not get drunk, distracted, distressed, drowsy, or have their skills degrade with age and time. On the contrary, they only get better and better. From here on, AVs have built-in advantages that make it impossible for human drivers to catch up. Human brains have a lot of things going on and rely almost exclusively on just two eyes and ears to process the road that only part of our brain is paying attention to. By contrast, the AV "brain" has only one function and dozens of sensors that dramatically expand detection of the surrounding environment through LiDAR, radar, camera, microphones, inertial measurement units (IMUs), and tactile sensors. Today, the AV can already "see" farther, clearer, wider, and better in challenging conditions (e.g., darkness, bad weather, etc.), and is more sensitive to sound or light. This will only improve with time.

In addition, because ridehail AVs operate as a fleet, the improvements immediately multiply. Once one vehicle's skill improves, every other vehicle in that fleet improves along with it; whereas no matter how good Lewis Hamilton or Max Verstappen gets, it doesn't help me drive one bit better. And fleets aren't burdened by free will. AVs don't operate when, where, or how they shouldn't. Human drivers may pick up fares in weather where they can't see well, or pull a double-shift even though their reflexes are slow and their eyelids are heavy, or they may drive too fast to get a good tip or to complete more fares. AVs are designed to be law-abiding and to drive safely and responsibly; they are programmed to stay within their operating design domain (or "ODD"), such as avoiding dangerous inclement weather, suspending ridehail activity when a part needs repair, and complying with speed limits.

We have been able to measure the results, and they confirm this safety advantage. As part of our testing and safety procedures, we developed with major national research universities a database of all collisions by ridehail drivers in San Francisco – one of the most difficult driving environments in the US. The study, conducted over multiple years, produced a reliable benchmark against which to measure AV performance. Once Cruise's AVs completed their millionth driverless mile, we reviewed their performance compared to that human benchmark driving. We found that our AVs avoided crashes and mitigated the severity of collisions better than humans. In fact, our AVs

1 https://www.nhtsa.gov/press-releases/traffic-crash-death-estimates-2022
2 https://www.nhtsa.gov/teen-driving/parents-talk-your-teen-driver-about-safe-driving#:~:text=In%202020%2C%20748%20teen%20drivers,major%20dangers%20affecting%20teen%20drivers.
3 https://www.nhtsa.gov/press-releases/usdot-releases-2016-fatal-traffic-crash-data

Human Drivers vs. Cruise AVs



were involved in 53 percent fewer collisions, caused 92 percent fewer collisions as the primary contributor, and had 73 percent fewer collisions with meaningful risk of injury. While there is room for improvement, in total we were involved in 36 collisions during this first million miles of driverless driving — the vast majority were minor, with 94 percent caused by the behavior of the other party.

Even the best technology will not be able to eliminate all collisions on roadways – AVs can't control the behavior of other road users or change the laws of physics, and they are not infallible either. But they can make these events much more rare. Research from the RAND corporation projected that deploying AVs that are only 10 percent safer than the average human driver could prevent 600,000 deaths in the United States over 35 years.[4] And that is just at 10 percent better than human drivers. Cruise's first million miles of driverless data suggests that – over the next 35 years – AVs will far exceed the RAND corporation's projection.[5] Done right, roadway deaths will become as rare as airplane fatalities.

Reducing Our Carbon Footprint

Another health benefit of AVs is that they are rapidly becoming all-electric and will reduce both carbon emissions and particulates as a result. Large AV fleets have the capacity to rapidly reduce excess carbon levels in our atmosphere. Personal vehicles with internal combustion engines have been one of the world's leading contributors to air pollution, climate change, and health problems such as respiratory illness, pulmonary disease, and childhood asthma, particularly to those who live close to major roadways.[6]

While Cruise is currently the only AV operator with a fully electric fleet, other AV companies have been following our lead or have announced plans to incorporate more electric vehicles. In comparison, 94 percent of human-piloted ridehail services are powered by fossil fuels in the US and Canada. Over the last 12 months, Cruise's fully electric AV fleet has already spared the planet more than 3,400 metric tons of tailpipe carbon emissions.

And, for those who are skeptics about whether electric vehicles ("EVs") actually reduce reliance on fossil fuels, the energy used to charge our EV fleet is offset through renewable energy credits purchased directly from farms in California's Central Valley, which we call our "Farm to Fleet" program. In 2022, Cruise used 3.1 gigawatt hours of renewable solar power for its operations and it avoided 785.6 metric tons of upstream carbon emissions through Farm to Fleet.

Operating as fleets, AV/EVs also reduce needless "deadhead" miles and other sources of wasted energy demand. Because AVs are systematically deployed rather than "trolling" for fares, they can rest between fares. Because they stay within posted speed limits, they use fuel at a lower rate. And by communicating with one another to avoid congestion, they will reduce overall travel times.

Delivering Independence and Access to Disabled and Elderly Communities

People with disabilities that prevent them from driving – visual impairments, lost or impaired limbs, or other conditions – are denied something that most abled people take for granted: independence. To get from place to place they have to rely on another person to drive them and often to assist them getting into or out of a vehicle. Their options are often few and unpleasant. In fact many of the 61 million people in the US with disabilities do not have any reliable – let alone enjoyable – access to transportation. This means people who often need it the most do not have a reliable way to get to healthcare appointments. It also places them at a disadvantage because of the challenges they face doing basic things required to gain or hold employment – interviewing, commuting, attending meetings, and engaging in community events.[7]

4 https://www.rand.org/pubs/research_reports/RR2150.html
5 https://getcruise.com/news/blog/2023/cruises-safety-record-over-one-million-driverless-miles/
6 https://www.transportation.gov/mission/health/cleaner-air
7 Centers for Disease Control and Prevention. "Disability Impacts All of Us". October 28, 2022, https://www.cdc.gov/ncbddd/disabilityandhealth/infographic-disability-impacts-all.html. 1 in 3 adults with disabilities have an unmet healthcare need due to transportation costs in the past year; 1 in 4 adults with disabilities did not have a routine check-up in the past year due to transportation barriers.

Similar challenges plague seniors. Anyone with aging parents is also familiar with the frustration and danger older adults face as their driving skills decline. Those who don't surrender their licenses place themselves and other road-users at risk. But giving up one's license can be isolating and demoralizing. Transportation barriers intensify these feelings and health effects as they find it more difficult to socialize, attend doctor's or other healthcare appointments, or act with the independence they've relied upon for years. Seniors are more likely to face "negative health outcomes, including social isolation, depression, and early entry into a long-term care facility" without reliable access to transportation.[8] Many seniors rely on public transit, but those who are wheelchair dependent are 65 percent less likely to use public transit, leaving them without reliable transportation options.[9] One survey reported that 25 percent of adults aged 65 and up and 33 percent of those aged 75 and up did not have access to transportation because of a disability or were homebound.[10]

AVs as a platform have the potential to give more members of the senior and disabled communities greater independence through the freedom of mobility. To help design our AVs to be more accessible, equitable, and affordable for these communities, Cruise engaged leaders in the disability community to participate in an Accessibility Council. Their input has helped us develop an accessible mobile app and in-vehicle experience that are customer-friendly to those with visual or hearing impairments. Perhaps the most revolutionary use case, though, is a purpose-built AV that affords motorized wheelchair users their first fully independent way of traveling – one that requires neither a driver nor another human to help these wheelchair users secure or stow their chair.

Finally, unlike human drivers who may size up a potential fare and avoid those that might take additional time to board and unboard their vehicles, AVs do not operate that way. They are designed to serve all passengers and do not become impatient or trade-off between faster- and slower-boarding passengers.

In short, while AVs will vastly improve the safety and quality of road travel for all passengers, for seniors and people with disabilities, these vehicles will literally be life changing. They will be accompanied by an accessible mobile app and in-vehicle experience. And something to consider: all of us, whether long term in old age or temporarily due to injury, will be members of the disability community. Cruise is not just for seniors and people with disabilities today; we are investing in transportation that will likely help many of us get around in the future.

Providing a More Equitable Form of Transportation

One fear people have expressed about AVs is that they will operate with biases that are either introduced by human programmers, or that they develop machine-learned biases by accurately modeling actual human behavior. But in reality, those are human-created, AVs present just the opposite situation; they offer a rare opportunity to eliminate these human-generated biases.

Sadly, we know that transportation is inequitably distributed today. Some taxi or ridehail drivers who may avoid certain parts of a city either because they expect to receive lower tips, or because they are concerned about its crime rate, or because they harbor prejudices towards different groups. But AVs do not receive tips, they cannot be mugged, and AVs have the tools to detect/remove any unintended biases. AVs view the city as a map grid and service requests that they are designed to optimize – so they travel from destination to destination without any bias or opinion.

Unlike humans who have biases that we are slow to recognize and even slower to change, AVs can be objectively tested for bias (by measuring distributions, outcomes, and customer experiences). Humans may deny being biased and refuse to adjust their behavior. But any

8 https://www.aarp.org/pri/topics/livable-communities/transportation/older-adults-new-mobility-and-automated-vehicles/
9 Ibid.
10 https://www.aarp.org/pri/topics/livable-communities/transportation/older-adults-new-mobility-and-automated-vehicles/

systematic bias can be detected in machines and then eliminated. Through monitoring and de-biasing, AVs can be programmed to ensure equitable and inclusive service to underserved communities.

In addition, AVs will be more affordable – creating greater access for financially disadvantaged people, who often live in underserved areas. EV/AVs substantially reduce some of the most costly aspects of traditional ridehail – salaries for human drivers, insurance and liability expenses, and fuel costs. Some models already predict that AV rides will be well under the prices for traditional ridehail based on its reduced labor costs, collision risks, and fuel costs.

AVs can serve as a reliable form of door-to-door transportation. AVs do not cancel on customers because the destination is too far away or the ride is too short; and AVs make no judgment of or distinction between the passengers they transport. Everyone is equal to the AV and everyone should have the right to be transported to wherever they want to go.

Restoring Something More Valuable Than Money: Time

While there are times that driving is enjoyable, a lot of the time it isn't. Driving slowly through grinding traffic, dealing with rude or reckless drivers, or feeling stressed over the work that you can't do, make a lot of time behind the wheel miserable. Based on a 2019 study, most Americans wasted an average of 54 hours a year sitting in traffic, which cost a total 190 billion dollars in lost productivity.[11] In our most congested cities, a 2017 study found that daily commuters wasted an average of 83 hours in traffic.[12]

With AVs, commuters can now receive the precious gift of time making driving trips they have to do, rather than ones they want to do. Commuters no longer have to sacrifice months of their productive life to gripping the steering wheel, staring at the bumper in front of them, and cursing traffic. Instead, they can catch up on work, watch a movie, have a meal, play video games, meditate, plan a family trip, or just sleep.

Even for passengers who are simply trading off between traditional ridehail and AVs, AVs let them do these things without feeling judged or self-conscious. AVs provide a private space for the rider to sing along to their favorite music – something few of us feel like doing with a cab or Uber driver in the vehicle. So passengers not only get time back, but they can enjoy it more. As one of our customers said, besides having time to do what she wanted to do: "As a woman, the fact that there is no strange driver that you have to be concerned about is a huge benefit."

Reimagining Cities with more Open Space

As AVs catch on, they will likely reduce the demand for personally owned vehicles. That in itself could fundamentally transform urban areas and make cities less congested and more livable. An extraordinary amount of urban space is configured solely to store people's cars. LA County has 200 square miles of paved parking lots, or nearly 100,000 football fields.[13] In fact it has nearly 5 times as many parking spaces as housing units, with 18.6 million parking spaces.[14] AVs would allow cities to reclaim vast spaces to create community spaces or meet a desperate need for housing. As AVs scale and become a routine method of transportation, it will liberate city planners to conceive of all new ways to convert parking structures and metered stalls into housing, greenspaces, and community centers.

Every once in a while, a technology comes along that can solve multiple issues at once. Before automobiles became commonplace, most routine travel was limited to the distances horses could travel, the movement of goods was slow and unreliable, and cities were beset with animal waste and associated risks. Automobiles solved these concerns and many others, but in the process they eventually generated new ones including death and injuries from high-speed collisions, as well as new

11 https://static.tti.tamu.edu/tti.tamu.edu/documents/mobility-report-2021.pdf
12 https://www.cnn.com/2019/08/22/us/traffic-commute-gridlock-transportation-study-trnd/index.html
13 https://www.its.ucla.edu/portfolio-items/when-cities-have-too-much-parking/
14 https://www.its.ucla.edu/portfolio-items/when-cities-have-too-much-parking

environmental hazards, and social inequities. AV/EVs offer a way to preserve the advantages of traditional automobiles human-piloted, internal-combustion-fueled, private vehicles while eliminating many of their challenges.

We will have a more robust understanding about AVs' effects as their use increases. But the potential for AV technology is so great — whether in terms of saving thousands of lives on US roads, sparing our atmosphere from billions of tons of carbon, making mobility more accessible, equitable and inclusive, adding years of pleasant and productive time to commuters' lives, and reinvigorating American cities – that their mass adoption seems likely. With that will come a quantum leap forward in how we transport ourselves.

ABOUT THE AUTHOR

Jeff Bleich is the Chief Legal Officer of Cruise LLC and served as the US Ambassador to Australia from 2009 to 2013. His legal career has included serving as White House Special Counsel, Special Master for the US District Courts, court-appointed federal mediator, trial and appellate counsel, adjunct professor of law, and a managing partner of two international law firms. Also, Jeff is a member of the Technology and Innovation Pillar of the Dentons Smart Cities & Connected Communities Think Tank.

Every Face You Scan: Regulating Facial Recognition Technologies in New Zealand

By Güneş Haksever

In a world where advanced aging software locates missing children and deep learning uncovers the cringiest pictures on your phone, facial recognition technology (FRT) blurs the lines between sci-fi and reality. Amid this rapid evolution, privacy concerns surrounding FRTs, a staple of dystopian tales, are growing more pressing than ever.

According to MIT scientist Karen Hao, the largest-ever study of facial recognition data found that FRTs, particularly with the increasing need for data and use of deep learning, have eroded our privacy. Amba Kak, Executive Director at AI Now Institute pointed out that deep learning has "thrown up all these issues that we now are quite familiar with: consent, extraction, IP issues, privacy."

While discussed frequently in massive urban settings, these technologies are touching lives in all communities across the globe. Recently, New Zealand Privacy Commissioner Michael Webster urged for tighter regulation on the use of biometric information to ensure that New Zealanders can harness the benefits of biometric technologies in a safe and equitable manner. An example is the incorporation of FRTs in the provision and enforcement of public safety by the New Zealand Police.

Every breath you take–The New Zealand Police updates its manual

The New Zealand Police actively work to develop a policy framework for its use of emergent policing technologies including making sure appropriate approvals are sought and given. The use of new technologies should be based on a demonstrable fair and transparent balancing of policing requirements and public safety concerns against privacy interests and other impacts, and should incorporate public discourse on the involvement of technology-enabled capabilities in policing throughout New Zealand.

Every move you make–The Police halt the use of FRTs

As part of the Policy updates, the Police halted FRT use and commissioned experts to undertake a six-month review of FRT and its use. The review revealed a general lack of awareness among the Police of their obligations under relevant privacy laws. It also exposed concerns about accuracy and bias with the use of FRTs. FRTs are notorious for being less accurate in black and brown faces, leading to the arrest of people who have been misidentified by the tech. As a result, it was recommended that the Police revise and enhance their policy, procedures, and training to ensure the lawful and effective collection and retention of personal information, including photographs, to ensure transparency, and to ensure that there is no infringement of principles under a treaty with the indigenous Māori.

Every bond you break – Police use FRTs anyway

Despite recommendations for extending the halt on FRTs and warnings and suggested mitigating steps outlined in their own Privacy Impact Assessment, New Zealand Police have been using a new technological tool to match unknown suspects and people of interest in firearms-related offenses with databases of photographs that include people previously arrested and firearms license holders. This was especially concerning because a year earlier, the government launched an investigation into

the way the Police took, used, and retained photographs or video recordings of members of the public in a variety of policing contexts following complaints and media reports that Police officers were photographing rangatahi (young people) in circumstances they felt were unfair or unjustified. The report found that the Police had developed a "widespread" and "systemic" unlawful practice of taking duplicate sets of "voluntary" fingerprints and photographs from youths in custody for suspected offending and keeping the fingerprints and photographs for longer than legally allowed. The Police were instructed to take more than a dozen specific actions by December 2023 in order to alleviate the concerns raised by these practices.

Every step you take, we'll be watching you – Regulation is coming

New Zealand privacy officials are looking into what can be done to further regulate the use of biometric technologies, such as facial recognition, and are planning to engage with interested parties to discuss the potential contents and implementation of a Code of Practice the future. Recent events show that New Zealand's privacy laws are highly tectonic, just like New Zealand itself. They particularly highlight the challenges and concerns surrounding the use of biometric information in New Zealand.

As the use of biometric technology continues to grow, so too does the need for a balanced approach that respects privacy, human rights, and cultural concerns while harnessing the potential benefits of these technologies.

Organizations using or planning to use biometric technology should:

- consult with experts,
- conduct thorough analyses for compliance, and
- ensure their practices are future-proofed against upcoming regulatory changes.

The Te Tiriti aspect in terms of collecting, using, and disclosing biometric information of the indigenous Māori in the context of FRTs is an important consideration as the Maori are disproportionately impacted by the use of these technologies. For example, their use of facial tattoos, such as tā moko, mataora, and moko kauae, as a means of connecting with their cultural history and ancestry, lead to a range of challenges from misidentification in police photograph databases to difficulties setting up and using face ID on cellular phones, computers and so forth. The disproportionate impact on Māori has also been highlighted in relation to law enforcement agencies becoming increasingly reliant on biometric technology as a surveillance tool in crime fighting. The Office of the Privacy Commissioner has recognized that FRTs may perpetuate biases for groups that are already overrepresented in biometric databases and lead to increased racial tensions. Moreover, personal information, particularly biometric information is sacred to the Māori, for it is taken from the mauri they carry. As it is a taonga, it should be protected according to tikanga and mātauranga, including taking care when disposing of biometric samples and ensuring data of the living is not stored together with that of the dead. The OPC is partnering with Māori to develop a Kaupapa Māori (Māori-informed) approach to privacy.

ABOUT THE AUTHOR:

Güneş Haksever is a senior associate in the Dentons Auckland office where he is a member of the Commercial, Technology, and Privacy team. A self-declared "proud tech nerd," he advises some of the most prominent and fastest-growing media companies in the world on complex technology infrastructure matters. He also served as an in-house legal advisor to Māori Television and is a passionate supporter of numerous organizations operating at the intersection of technology, humanity, culture, and social justice.

More information about Māori data sovereignty can be found at https://www.temanararaunga.maori.nz/

Federal Policymakers Bet on Hydrogen

By Linda Willard

Hydrogen is a clean fuel source with great potential, particularly in the power, industrial and transportation sectors. Currently, 10 million metric tons (MMT) of hydrogen are generated in the United States each year.[1] Although the primary demand for hydrogen today is for petroleum refining and ammonia production, plans are in place for the use of hydrogen across multiple sectors to enable zero or near-zero emissions in other chemical and industrial processes, integrated clean energy systems, and transportation.

Recent US policy, including incentives in the Infrastructure Investment and Jobs Act (IIJA) and the Inflation Reduction Act (IRA), has created an ideal environment for the development of hydrogen as a clean fuel source. While it is uncertain whether the generation of clean hydrogen will be able to reach a scale significant enough to be a viable climate tool, federal legislative and regulatory developments over the past 18 months have prioritized hydrogen as a real solution in helping the US achieve decarbonization. A more detailed overview of the key provisions in recent federal laws and regulations is provided below.

1 See https://www.energy.gov/eere/fuelcells/h2scale#:~:text=Ten%20million%20metric%20tons%20of,as%20electrolysis%2C%20are%20rapidly%20increasing,with links to DOE reports on its H2@Scale initiative.

Hydrogen Hubs:

The IIJA provides up to US$7 billion for the US Department of Energy (DOE) to establish six to 10 regional hubs to accelerate the use of hydrogen as a clean energy carrier that can deliver or store tremendous amounts of energy. The bill includes an additional US$1 billion for the implementation of the regional clean hydrogen hub program. The IIJA includes several requirements for regional hydrogen hubs:

- Feedstock diversity. At least one of the hubs should demonstrate the production of clean hydrogen from fossil fuels, at least one from renewable energy, and at least one from nuclear energy. To the maximum extent practicable, at least two of the hubs shall be located in regions of the US with the greatest natural gas resources.
- End-use diversity. At least one hub shall demonstrate the end use of clean hydrogen in the power generation sector; at least one hub shall demonstrate the end use of clean hydrogen in the industrial sector; and at least one shall demonstrate the use of clean hydrogen in the transportation sector.
- Geographic diversity. To the maximum extent practicable, each regional climate hub shall be located in a different region of the US and shall use resources abundant in that region.
- Employment. The Secretary of Energy shall give priority to regional clean hydrogen hubs that are likely to create opportunities for skills training and long-term employment for the greatest number of residents of the region.

The DOE is currently in the process of reviewing applications for the regional clean H2 hub funding. Concept papers for the program were due on November 7, 2022. Full applications were due on April 7, 2023, and DOE is now reviewing the applications.

New Hydrogen Technology:

In addition to the US$8 billion in funding for regional hydrogen hubs, the IIJA provides two new hydrogen technology programs. The Clean Hydrogen Electrolysis Program https://www.energy.gov/bil/clean-hydrogen-electrolysis-program provides US$1 billion for research, development, demonstration, commercialization, and deployment of technologies to improve efficiency, increase durability and reduce the costs of producing clean hydrogen using electrolyzers. Funds will be made available on a competitive basis through partnerships with eligible entities, as will be defined by DOE. The funding application process for this program opened in the 4th quarter of 2022.

The second program is the Clean Hydrogen Manufacturing and Recycling Initiative, which provides US$500 million (US$100 million annually from FY 22-26), and focused on enhancing domestic manufacturing of clean hydrogen use, storage, and related equipment and recycling equipment for clean hydrogen processing, delivery, storage, and use, including fuel cells. The funding application process for this program opened in the 4th Quarter of 2022 and is being administered by DOE EERE's Hydrogen Fuel Cells and Technology Office.

Clean Hydrogen Production Tax Credit:

The IRA, which President Biden signed into law in August 2022, provides a new Section 45V tax credit for the production of clean hydrogen at qualified clean hydrogen production facilities. The credit is available for all qualified facilities placed in service after December 31, 2022, and before January 1, 2033. The measure provides a credit of up to US$3/kg of hydrogen produced with a lifecycle greenhouse gas emissions intensity of less than 0.45 kg carbon per kg hydrogen. This credit is reduced to 33.5 percent of the full credit amount if the taxpayer produces between 0.45 kg and 1.5 kg CO_2 per kg hydrogen. It is reduced to 25 percent of the full credit amount if the taxpayer produces between 1.5 and 2.5 kg CO_2 per kg of hydrogen. It is reduced to 20 percent if the taxpayer produces between 2/5 and 4 kg of CO_2 per kg of hydrogen. Guidance from the US Department of the Treasury, which is expected soon, will clarify how emissions are calculated.

EPA Proposed Rule on Carbon Dioxide Emissions from Power Plants:

On May 12th, the US Environmental Protection Agency (EPA) announced proposed new CO_2 emissions standards, under Section 111 of the Clean Air Act (CAA), for coal and gas-fired power plants. The proposed standards would require reductions in CO_2 pollution based on cost-effective control technologies. The new limitations would apply to new gas-fired combustion turbines; existing coal, oil, and gas-fired steam generating units; and certain existing gas-fired combustion turbines. In the proposed rule, EPA has included the co-firing with low-greenhouse gas (GHG) hydrogen as a technology to use in reducing emissions from natural gas power plants.

For new gas plants, EPA is proposing to update New Source Performance Standards (NSPS) for greenhouse gas (GHG) emissions from new and rebuilt fossil-fuel-fired stationary combustion Electric Generating Units (EGUs or units). For intermediate plants (with a capacity of up to 50 percent) and baseload units operating at more than 50 percent, EPA proposes a Best System of Emissions Reduction (BSER) approach which utilizes co-firing with low-greenhouse gas hydrogen as an option. Intermediate plants choosing the hydrogen option by 2032 would be required to meet a Phase 2 standard based on 30 percent low-GHG hydrogen. New base load plants choosing the hydrogen options by 2032 would be required to meet a Phase 2 standard based on co-firing 20 percent low-GHG hydrogen. By 2038, baseload plants would be required to meet a Phase 3 standard based on co-firing 96 percent low-GHG hydrogen. For existing natural gas plants that are larger than 300 MW and have a capacity factor greater than 50 percent, units could pursue a pathway based on co-firing 30 percent by volume low-GHG hydrogen starting in 2032 and co-firing 96 percent by volume low-GHG hydrogen starting in 2038.

National Clean Hydrogen Strategy:

In early June 2023, the Biden administration announced its National Clean Hydrogen Strategy, which is intended to deploy clean hydrogen technologies as a means to cost-effectively reduce greenhouse gas emissions. The Department of Energy, which is leading the strategy, predicts that a five-fold increase in clean hydrogen use by 2050 could reduce US emissions by 10 percent. The administration further asserts that the new technology could help in the decarbonization of sectors using carbon and contribute significant amounts to national emissions. The strategy also outlines remaining challenges to accelerate the deployment of clean hydrogen, including the lack of infrastructure and manufacturing at scale, as well as reliability and availability challenges in the supply chain.

In addition to the recent policies discussed above, the larger geopolitical issues that have created a global shortage of natural gas have fueled the momentum behind hydrogen. Many energy producers are hoping to utilize existing natural gas infrastructure to produce hydrogen. It is too early to tell if the new policies will yield a reliable, affordable, and effective hydrogen market. The policy framework within which hydrogen must operate, however, is ideal for its development.

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Linda Willard is a member of the Dentons Energy practice in Washington, DC. She represents clients before Congress, the executive branch, and other government entities. Her experience as a government affairs lawyer and public policy advisor spans the public and private sectors. She has served as a counsel to the US Senate Committee on Environment and Public Works; a lawyer in the Energy and Environment practice of a global law firm based in Washington; and counsel and senior policy advisor in a DC-based lobbying firm.

Putting People at the Center of Water Technology Adoption

By Christine E. Boyle, PhD

"Put people at the forefront of the digital journey or your technology will sit idle," Reginald Joseph, Assistant Commissions for Digital Transformation for the New York City Department of Environmental Protection, warned a room of utility managers and leaders from around the world at this year's Smart Water Networks ("SWAN") annual forum.

I felt a shiver of recognition at these words. Both as a technologist and entrepreneur, I've come to realize that technology is critical, but no innovation will have an impact without the right people to drive it forward. For too long, the water sector has focused on water leak technologies, smart meters, sewer monitoring and the like–all important, but all limited in terms of propelling the sector into the future. However, murmurings of change are growing into much larger rumbles with some real action behind them. The shift in this year's plenary session themes to focus on the crucial connection between technology and people reflects that recognition. After at least a decade of meager adoption of digital technology by water utilities, the message is now resounding. Put people-your staff, customers and partners-at the center of a digital strategy to realize the manifold benefits of such technologies. Technology is powerful, but people make all the difference.

We veterans of the water sector are well aware that water utilities adopt technologies...a little slowly. In contrast to their energy utility counterparts, in 2020 just 13 percent of US water utilities had implemented smart meters, while 78 percent of US electric utilities had adopted equivalent technologies. There are many understandable reasons for this distinction. Regulatory frameworks, the fragmented nature of the water utility market and varying economic drivers all impact the pace at which technology adoption occurs. Water operates in a challenging environment, but the same imperatives to meet the needs of our customers still apply. With the prevalence of floods, droughts, pollution events, and workforce shifts, the need for new technologies has never been more pronounced. Neither a strong human workforce nor technology is enough, on its own, to meet the demands of the water sector of the future. We need technology to enable the superpowers of our water superheroes. Predictive flood control technologies, automated incident response for leaks, electro-chemical PFAS destruction, and many more types of technological interventions, implemented and monitored by utility operators and engineers, are the solutions to providing more resilient water systems. "People, not pipes, are our biggest asset," Louise Meadows, the Chief People Officer for Greater Western Water, Australia, added to the 3-day conversation at SWAN. She's absolutely right.

Many water systems have reached an economic tipping point of water supply shortages, which has prompted better supply-side pipe maintenance in the last 5 years. Pipe leak detection is a well-established set of technologies with sufficient proof points and case studies. However, we can't afford to waste time and money as infrastructure ages and problems continue to grow. New and emerging technologies face many challenges. If there

is a lack of operator buy-in, insufficient staff training, skepticism, lack of integration, poor user interface or poorly executed onboarding, a brilliant piece of technology will sit on the shelf collecting dust, unused. Too often, technology companies lob the technology over the fence and move onto their next projects. Technology providers are critical to bridge the gap between the technology that exists and the people that will use these solutions. Often, sophistication around change management and the psychology of technology adoption is the key to implementation-what we call building the "Whole Solution". From training to simpler user interfaces, to the hard work of change management, technology providers put the people first to design the implementation around their workflow and their standard operating procedures. A solution finder with great empathy to the problem they work to solve is aware of this aspect and will integrate these aspects into the implementation process. That integration starts with getting the critical staff involved in early technology decision making and continually focusing the tech on the people. Change management experts, user experience professionals and industrial-organizational psychologists play a crucial role to help navigate skepticism/change and integrate new processes into workflows at utilities or industrial companies. Successful adoption means investing in experiments around how the tech is used by professionals on the ground. This can happen at the enterprise level, but it also is an opportunity to share collective learning.

New technologies move the dial for optimizing systems but they will have zero impact if no one invests in how the team will implement the technology in their quotidian work. We need to accelerate adoption to protect our water supplies, which means we must invest time in understanding them, and act accordingly. Fortunately, we are not starting entirely from square one. Daupler's automated response management system means teams don't have to spend time sifting through phone calls and reams of paper to respond to a main break or outage. Ziptility consolidates all of a utility's operations and asset management information into one place. But these are just the start.

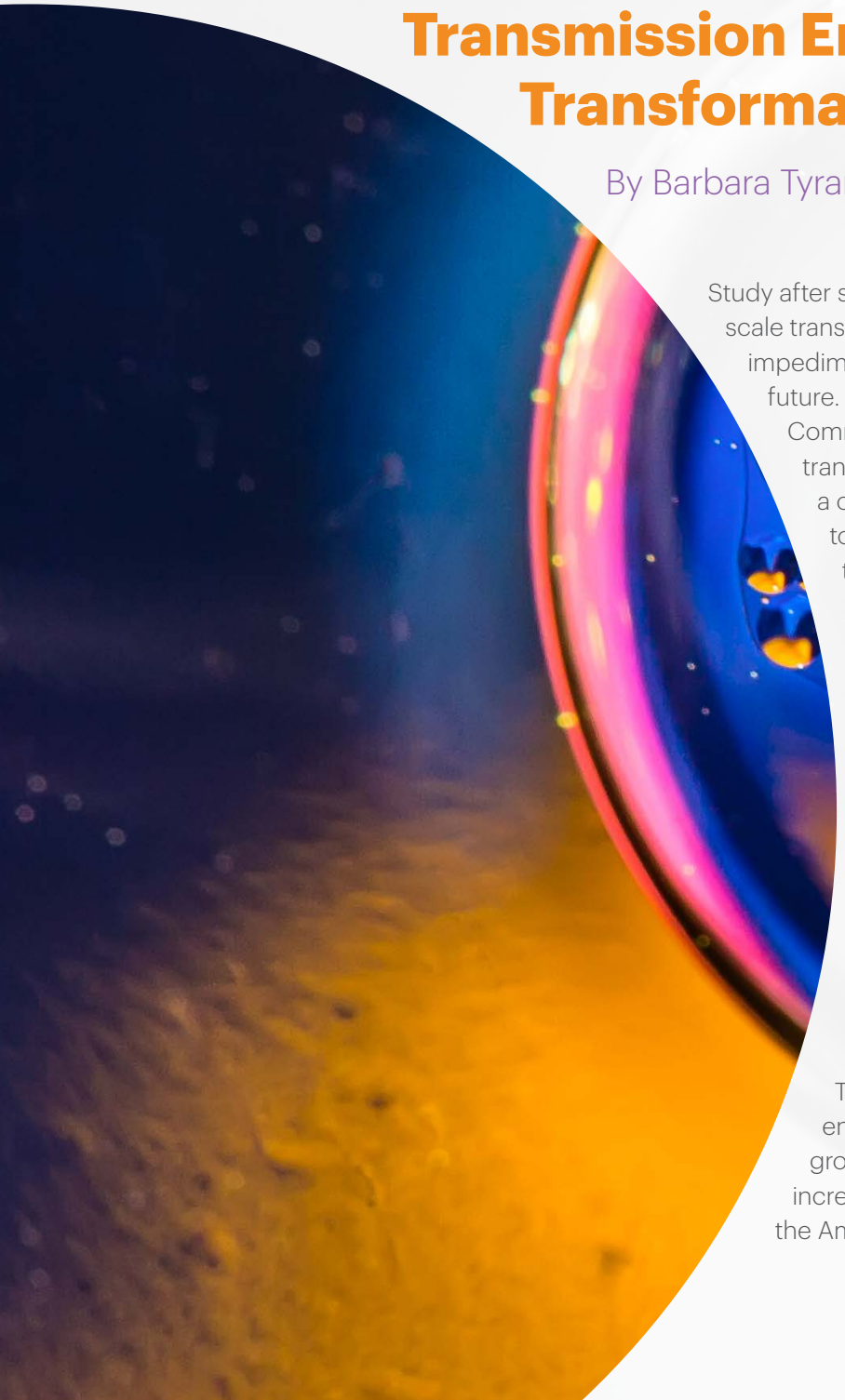
As an industry, we spend a lot of time discussing products and innovation, but products without the context of the people that will use them are useless. Good innovation may be a new way to solve an old problem or a way to solve a new problem. Importantly, we need to appreciate the quality of the entrepreneur as a core unit of analysis in the market. Better entrepreneurs figure out problems to a degree of nuance that allows them to build products that will actually be used, because they consider human elements such as incentive structures, behaviors, decision making structures, etc.

There is also a structural change at play which is to the advantage of entrepreneurs and solution providers. The water industry is on the verge of a significant generational shift. As our industry faces mass retirement, there is a window of opportunity to bring in new people who can learn from however that generational change is happening. The contributions of multi-decade water professionals but bring in new ideas to attack head-on the looming problems of the future. As a new generation steps into their shoes, interesting things can happen, including ushering in a new mindset to speed the widespread adoption of new technologies.

We need to run many more experiments to level-up the performance of water and wastewater systems. But that crucially starts by focusing on and understanding the needs of people that are doing the hard work every day and building the technologies to supercharge them. Put people at the forefront of the digital journey and your technology will fly.

ABOUT THE AUTHOR:

Christine Boyle is a water economist and entrepreneur who is a partner at Burnt Island Ventures. In 2013, she founded her second company, Valor Analytics, to provide in-depth analytics to water utilities working to build financial resilience amidst rapidly changing water use landscapes. Prior to joining Burnt Island, she served as Vice President of Xylem, Inc. She is a trustee of the Management and Leadership Division of the American Water Works Association and the Vice Chair of the California-Nevada Section American Water Works Association.



Transmission Enables a Clean Energy Transformation

By Barbara Tyran

Study after study shows that the lack of large-scale transmission lines in the US is the primary impediment to achieving a clean energy future. The US Federal Energy Regulatory Commission's (FERC) proposed electricity transmission rulemaking represents a once-in-a-generation opportunity to address some of the challenges that have hindered sufficient, proactive regional grid planning, which is vital for keeping costs low for consumers and delivering clean energy.

FERC's action came at the urging of a bipartisan group of nine former FERC chairs, among other interested parties. In initial comments on FERC's advanced notice of a proposed rulemaking, 174 organizations supported an increased focus on proactive planning for future system needs.

The US has abundant, low-cost clean energy resources that can meet the growing demand for electricity in an increasingly dynamic economy. But the American power grid currently lacks sufficient transmission capacity to deliver those resources to homes and businesses.

Since 2014, energy customers have voluntarily purchased more than 64 gigawatts (GW) of renewable energy, representing more than a quarter of all US wind and solar capacity. The addition of clean energy resources, and the transmission to support them, is driving economic growth in rural areas across the country: every US$1 billion invested in large-scale transmission infrastructure generates US$2-3 billion in customer benefits and creates approximately 7,000 jobs.

There is an opportunity to create even higher value. The two terawatts (TW) of total wind, solar, and battery storage capacity in the interconnection queues across the seven regional transmission planning organizations (RTOs) and 35 utilities not in RTOs at the end of 2022 was greater than America's current generating capacity of 1.2 TW. These technologies account for over 95 percent of all proposed capacity.

Unfortunately, the existing transmission system is congested. FERC's rulemaking process should spur improvements in regional and interregional planning that can enable these projects currently

clogging the queues to connect to the system. Therefore, American Council on Renewable Energy (ACORE) recommends that FERC:
(1) establishes a minimum set of benefits for all transmission planning and cost allocation;
(2) includes greater stringency in the consideration of key drivers of future transmission needs;
(3) requires planners to evaluate portfolios of new lines and upgrades, rather single projects and
(4) incorporate a wider scope of grid-enhancing technologies, which should include advanced conductoring and topology optimization.

These reforms should apply not just to Regional Transmission Organizations and Independent System Operators (RTOs/ISOs) but to all transmission providers to maximize the achievable benefits. With the passage and signing of the Inflation Reduction Act of 2022, most analysts project the clean energy resources will only increase in the years ahead. It is essential that the needed transmission is built to deliver those resources to consumers.

As we have learned, federal, state, and local government collaboration is crucial to the success of any transmission project or suite of policy reforms. FERC established a Federal-State Joint Task Force on Transmission, comprised of the four FERC commissioners and 10 state public utility commissioners. Acknowledgement of this vital interaction is commendable, particularly at the outset of the rulemaking process. The task force bodes well for more efficient, cross-jurisdictional decision-making ahead, as well as support for the final rule.

Federal and state governments must work with industry, consumers, and other stakeholders to expeditiously finalize this important rule and start developing the grid of the future. Now is the opportunity to fulfill our clean energy transformation.

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STUDENT NOTE:
Waste Not Want Not - Embracing New Technologies to Reduce Water Losses

By Hannah Rochford

Integrating smart technologies into water utilities comes with significant benefits. As cities face decreasing water supplies due to population growth and climate change, embracing these technologies becomes that much more crucial. Information and Communication Technologies, or "ICT," provide important tools to help water utilities manage these growing challenges. One such technology that is already familiar to many is Advanced Metering Infrastructure, "AMI" or "smart meters," which allows for remote meter reading as well as detailed consumption information for individual consumers. But AMI is only the beginning. ICT can help reduce loss of "non-revenue water," the treated water that is lost before getting to the consumer. These losses can be real, physical losses through leaks or apparent losses through inaccurate meter readings. The Federal Government estimates that water loss from leaks amounts to 16 percent or 2.1 trillion gallons of non-revenue water per year.[1] Other sources claim this loss to be much higher, and for some utilities as high as 50 percent.[2]

ICT also can improve demand management, allowing utilities to strategize how to better use existing water supply based on consumer data. When combined with the water saving benefit that smart meters offer, the cost savings potential from ICT deployment is huge.

Many US utilities have embraced technologies like smart metering, but many have not. According to David McGimpsey, co-lead of Dentons' US Region Energy practice and host of the Water Values Podcast, there are several reasons why, despite the huge cost savings potentials, water utilities generally are moving "at a snail's pace" towards a digital future. There is a lack of a sense of urgency where the current system is operational and perceived as sufficient.

Compounding this lack of urgency is often a genuine lack of resources necessary to support the change to a digitized environment. Most of the US water system is made up of smaller utilities, many of whom are essentially in subsistence mode. They are focused on trying to keep water flowing, ensuring that mains do not break and repairing those that do. For these utilities, their biggest concern is to keep the system operational and compliant. Also, many utilities invested in automated meter reading, or "AMR,"

1 Gregory Korte & Ian James, *White House Launches 'Moonshot for Water,'* USA TODAY, December 15, 2015, https://www.usatoday.com/story/news/politics/2015/12/15/obama-administration-launches-all-out-push-water/77356070/.

2 William Atkinson, *Non-Revenue Water: How Much is Lost?*, Water World.com, February 2, 2016 https://www.waterworld.com/home/article/14070043/nonrevenue-water-how-much-is-lost. See also https://www.epa.gov/watersense/fix-leak-week#:~:text=Household%20leaks%20can%20waste%20nearly,during%20Fix%20a%20Leak%20Week. (household leaks alone can lead to waste of a trillion gallons of water a year in the US); Danielle Torrent Tucker, February 27, 2020, *Stanford researchers develop a better way to detect underground water leaks,* https://news.stanford.edu/press/view/32538

which allows for "drive by" meter readings. Some of those utilities are still grappling with the cost of implementing AMR. Still others believe they can get more life out of their existing systems.

Finally, and importantly, it can be extremely complicated–and unpopular–politically for a water utility to make changes that would require any increase in customer rates. For many state and local politicians, there is tremendous incentive to not address municipal water systems unless truly necessary because they don't want to be blamed for increased rates. When a politician has a host of issues on their plate, like crime or inflation, water is often not a priority unless there is a known, serious problem. If the water utility is privatized, there may be some reprieve from the polarization of increasing rates, however, investments that increase customer rates may still be met with skepticism by regulators who question if the investment is necessary or if the utility is motivated to seek a higher return.

You do not have to look far to see how this unfolds in real life. Salt Lake City, Utah is one of the fastest growing cities in the US. By 2060, it is expected to see its current population of 2.5 million to nearly double. Its water resources are already strained. Salt Lake City gets its water from the snow melt which feeds into rivers that in turn feed into the Great Salt Lake. Extended drought conditions combined with increased municipal water use are causing the Great Salt Lake to dry up at a rapid rate. Crucially, the Great Salt Lake protects the population from high levels of arsenic and other heavy metals located under the lakebed which would become airborne if the lakebed turned to dust, and which will, in turn, impact the quality of the municipal water supplies that serve the region's residents, not to mention the economic impact on the city and on nearby ski resorts and the potential environmental harm to migratory birds and other wildlife. The stakes could not be higher for Salt Lake City to conserve as much water as possible. However, Salt Lake City has the lowest water rates per gallon of all major US cities and consumes more water for residential use than other desert cities, averaging "96 gallons per person per day last year, compared with 78 in Tucson and 77 in Los Angeles."[3] The city has slowed permitting of water-intensive businesses, but measures that would have a more immediate impact on water use have met with opposition, and politicians and utility executives alike are reluctant to discuss increasing water rates for customers or implementing efficiency requirements.

We can expect to see similar scenarios play out in expanding urban areas across the country. Populations will grow, putting ever-increasing pressure on water infrastructure. If water utilities are to have any hope of keeping up with this growth, they will need to deploy smart technologies at an equal, or faster rate.

ABOUT THE AUTHOR

Hannah Rochford is a third-year law student at Brooklyn Law School. She was a 2022 Summer Associate at Dentons in the Corporate practice group. She attended the University of Akron where she received her BA in Political Science in 2018. At Brooklyn Law School, Hannah is an articles editor on the *Brooklyn Law Review*. She is passionate about a sustainable future and the critical role that fresh, safe and accessible drinking water plays in seeing that future come to fruition.

3 Christopher Flavelle, As the Great Salt Lake Dries Up, Utah Faces An 'Environmental Nuclear Bomb,' NEW YORK TIMES, June 7, 2022, https://www.nytimes.com/2022/06/07/climate/salt-lake-city-climate-disaster.html.

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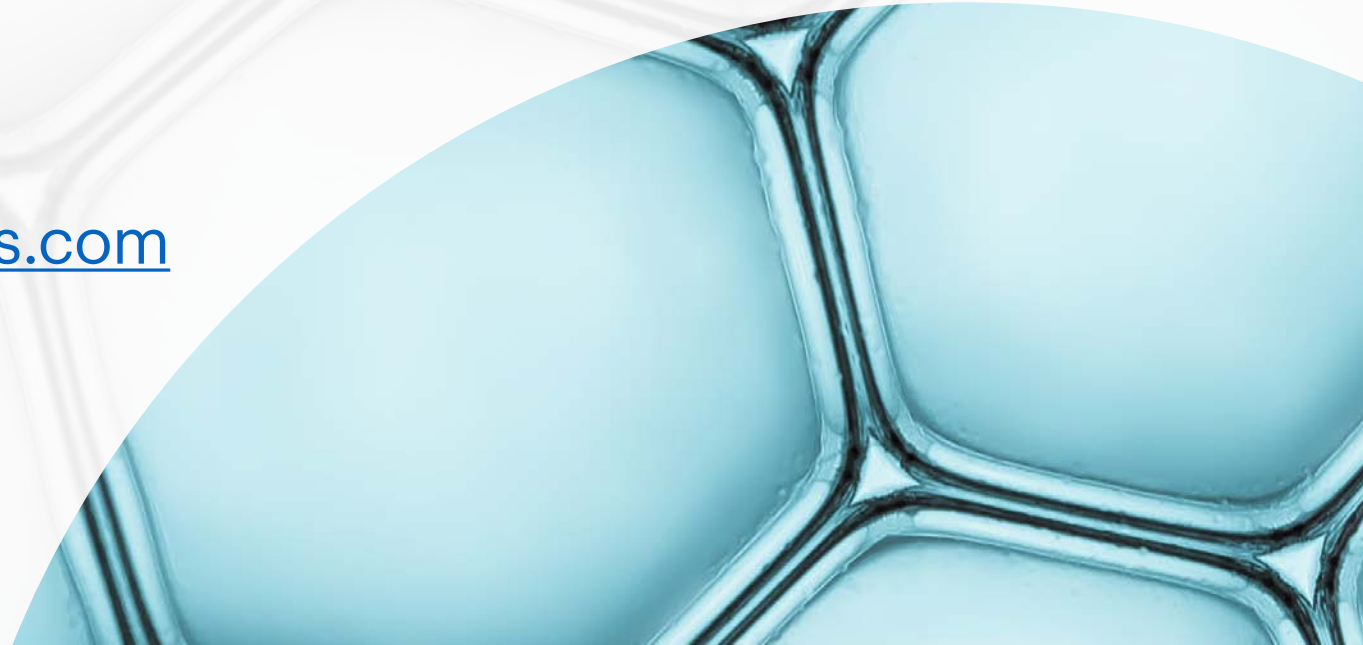

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