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Megacities and Digital Water Risks

16 NOVEMBER 2026

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WEBINAR INFORMATION – HOUSEKEEPING RULES

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WEBINAR INFORMATION – HOUSEKEEPING RULES



- **'Chat' box**: please use this for general requests and for interactive activities.
- **'Q&A' box**: please use this to send questions to the panelists. (We will answer these during the discussions)

Please Note: *Attendees' microphones are muted. We cannot respond to 'Raise Hand'.*

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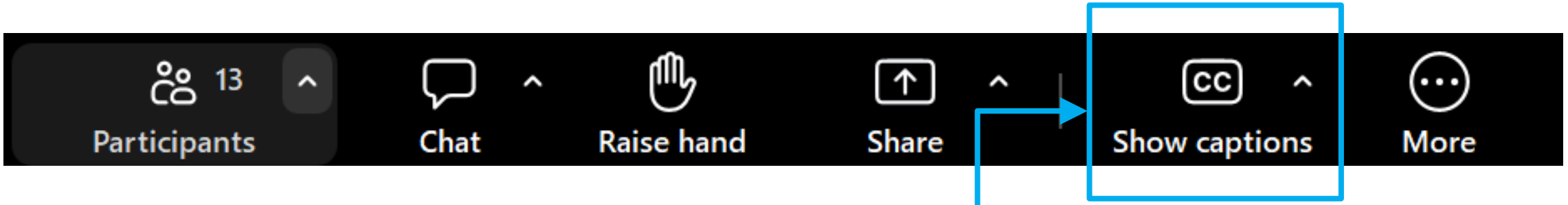

- **'Captions'**: Please use this function to translate Debora's presentation into English (Only captions)

Please Note: *Attendees' microphones are muted. We cannot respond to 'Raise Hand'.*

AGENDA

- **Welcome and Introduction to the Webinar**
  Bruno Nguyen (France)

- **MAWAC: Why a Megacities' Alliance is an evidence?**
  Denis Penouel (Paris); Pr. Ilan Juran (New York); Pr. Nilo Nascimento (Belo Horizonte)

- **Data Center Siting: Service to Urban Dwellers and Issues for Local Communities**
  Mary-Ann Dickinson (USA)

- **Improving Cyber Resilience at Water Utilities: the EU ATHENA Project**
  Bruno Nguyen (France)

- **Prospects and Challenges of Digital Transformation in Sanitation**
  Debora Pierini Longo (Sao Paulo)

- **Q& A and Panel Discussion**
  Speakers and Moderators

- **Closing Remarks**
  Bruno Nguyen (France)

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Why MAWAC is an evidence ?

MEGACITIES ALLIANCE FOR WATER UNDER CLIMATE CHANGE

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ARCEAU-IdF: A Pluralist Debate Platform

Connecting science, public policy, and water operations in the Paris region

- **Non-Profit Organization**

Founded in April 2013 by local authorities and research laboratories from the Paris region (Île-de-France).

- **Core Mission**

Oriented toward transferring both scientific data and pioneering operational actions in the water sector.

- **Unique Governance**

Acts as a pluralist debate platform connecting researchers, water service operators, and local elected officials.

April 2013

Founded in Île-de-France

3 Pillars

Research • Operators • Elected Officials

Water Sector

Scientific & Pioneering Data Transfer

Presentation of the ARCEAU-IdF Association

Founded in April 2013 by researchers and local authority representatives working in the water sector, ARCEAU-IdF pursues three objectives:

Networking of Stakeholders

› Organization of symposia, workshops, seminars, and conferences at national and international levels.



Knowledge Transfer

› Sharing of scientific and technical knowledge.

› Production of books, publication of thematic fact sheets, and release of booklets.



Mediation Between Researchers, Service Practitioners & Local Elected Officials

› Organization of Thematic Working Groups on issues related to the water cycle.

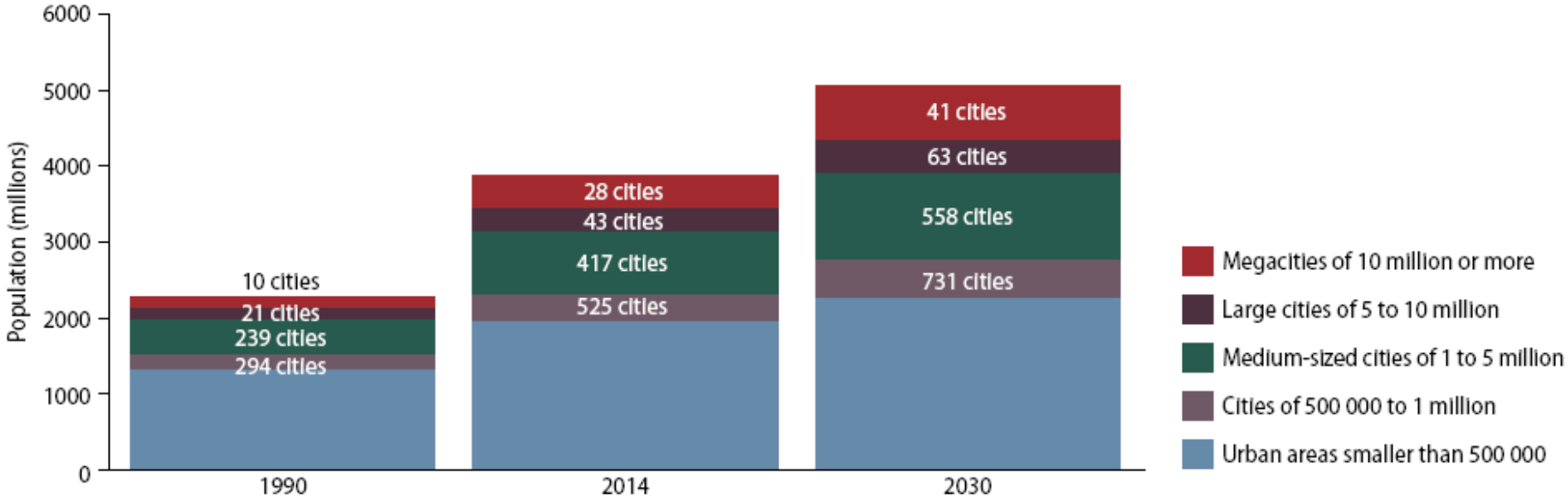
› Production of books and awareness-raising brochures.

WHY MEGACITIES ARE A TOPIC ?

- Megacities will host more than 1 billion inhabitants in 100 large cities and megacities in 2030
- 60 % of the world's population will live in urban areas

Figure 8.

Global urban population growth is propelled by the growth of cities of all sizes



Water Stakes & Megacities' Potential

Why megacities face unique water challenges — and hold the keys to solving them

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1. Major Sustainable Stakes

- **Water resources management**
- **Water supply and sanitation**
- **Natural risks: floods and drought**

2. Amplified Complexity

- In megacities, these stakes are far more complex, making them highly specific.
- Climate change will further strengthen and intensify these pressures.
- All megacities worldwide face these shared challenges.

3. Potential & Cooperation

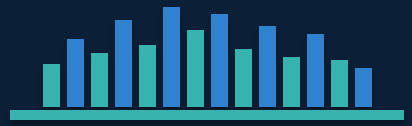
- With their resources, megacities hold huge potential in engineering, research, and water governance.
- Urgent need for a global cooperation platform involving operators, researchers, stakeholders, and civil society.



Two flagship UNESCO & ARCEAU-IdF milestones structuring the Megacities Alliance for Water and Climate (MAWAC)

WATER, MEGACITIES & GLOBAL CHANGE | UNESCO

— 1ST EDITION —



WATER, MEGACITIES AND GLOBAL CHANGE

1–4 DECEMBER 2015
UNESCO HQ, Paris • COP21

CO-ORGANIZED BY
UNESCO • ARCEAU-IdF
SIAAP • City of Paris

EAUMEGA 2015

Founding Milestone & Launch of MAWAC

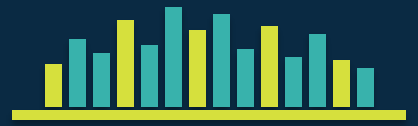
- **Context:** Held at UNESCO HQ in Paris during COP21 (Dec 1–4, 2015).
- **Key Outcome:** Adoption of the Paris Declaration launching the Megacities Alliance for Water and Climate (MAWAC).
- **Scope:** Comparative analysis of 15 iconic global megacities (Paris, Tokyo, New York, Lagos, Mumbai, etc.).

DOC

UNESCO Monograph Publication
Water, Megacities and Global Change: Portraits of 15 Emblematic Cities

WATER, MEGACITIES & GLOBAL CHANGE | UNESCO

— 2ND EDITION —



WATER, MEGACITIES AND GLOBAL CHANGE

11–14 JANUARY 2022
UNESCO Paris & Online

CO-ORGANIZED BY
UNESCO • ARCEAU-IdF
SIAAP • Métropole du Grand Paris

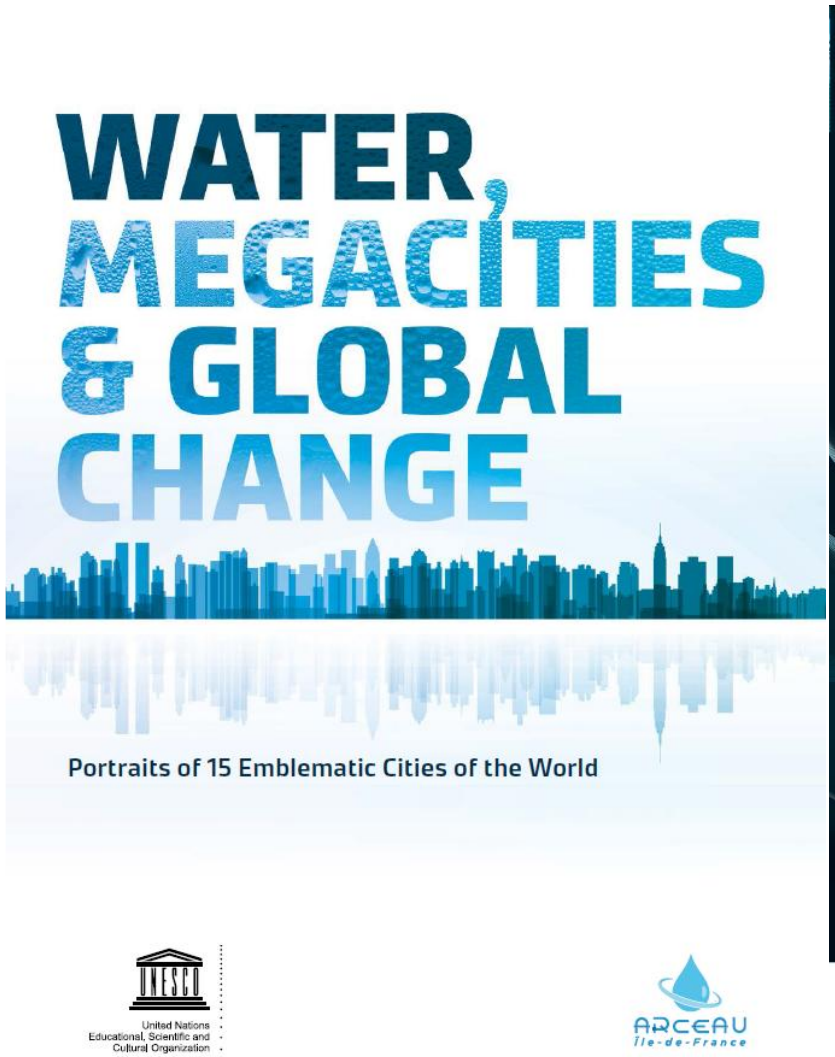
EAUMEGA 2022

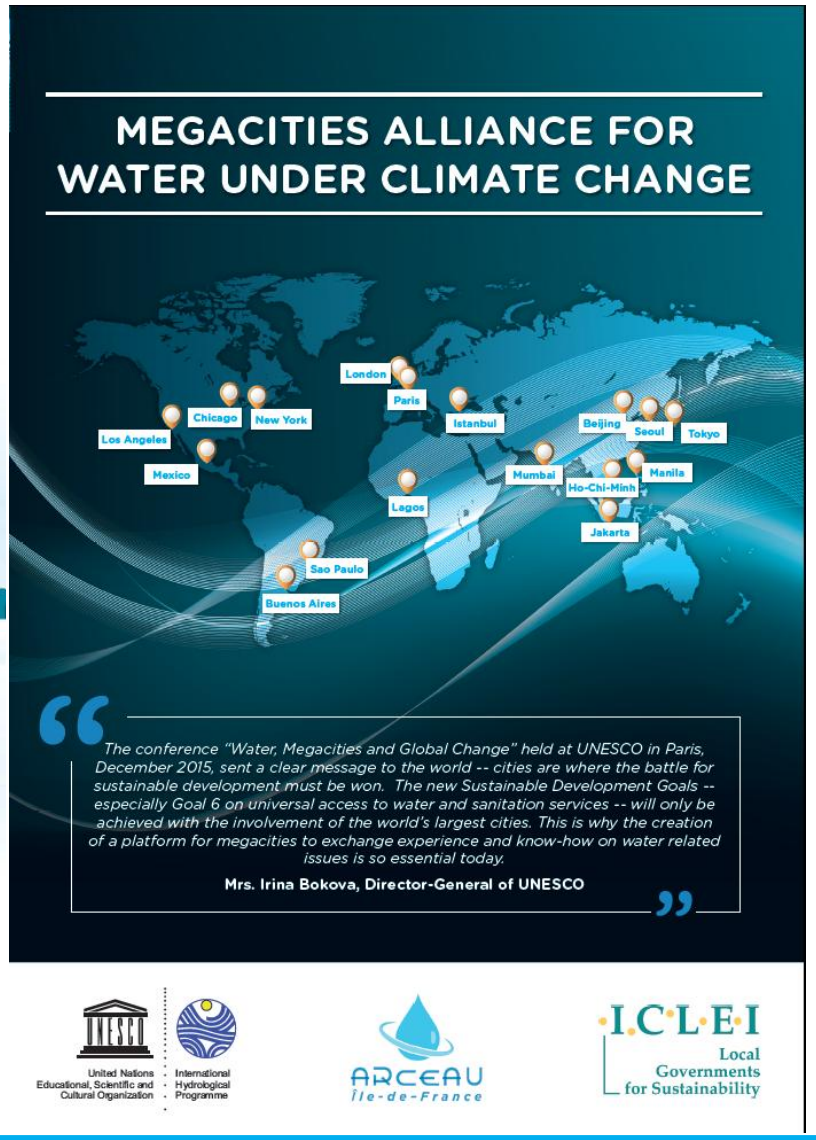
Operationalizing MAWAC & Global Scale-Up

- **Context:** 2nd International Conference (Jan 11–14, 2022) uniting 2,000+ researchers, operators & mayors.
- **Key Outcome:** First General Assembly of MAWAC & Mayors' Congress structuring 4 regional chapters.
- **Focus:** Technical innovations, governance models, and climate adaptation funding.

DOC

2022 Conference Proceedings
Proceedings of the 2nd International Conference (UNESCO / ARCEAU-IdF)





- **Megacities Alliance for Water under Climate Change**
- **Collect and disseminate information** at a worldwide scale on strategies and operational plans developed by local authorities and their water operators as well as results achieved by their implementation;
- **Facilitate experience sharing between the academic community and water operators** in improving adaptation through best practices assessments;
- Identify means and mechanisms for funding the adaptation of Megacities to the **impacts of climate change on urban water**

MEAGACITIES & DIGITAL WATER RISKS

IWA Webinar 16/11/2026

MAWAC: Megacities Alliance for Water & Climate

why a Megacities' Alliance is an evidence?

MAWAC-ENA: Europe & North America

CURRENTLY:

PROF. (RET.) ILAN JURAN – NEW YORK UNIVERSITY

CEO, W-SMART ASSOCIATION OF WATER & WASTEWATER UTILITIES' EXPERTS

UNESCO ASSOCIATE PARTNER NGO

SECRETARY, IWA SG WATER SECURITY & SAFETY MANAGEMENT

CO-FOUNDER OF MAWAC-ENA & HOST OF ITS 1ST MEETING MARCH, 2023

Strategic Partner

Created at the Aftermath of 9/11

Official UNESCO Partner

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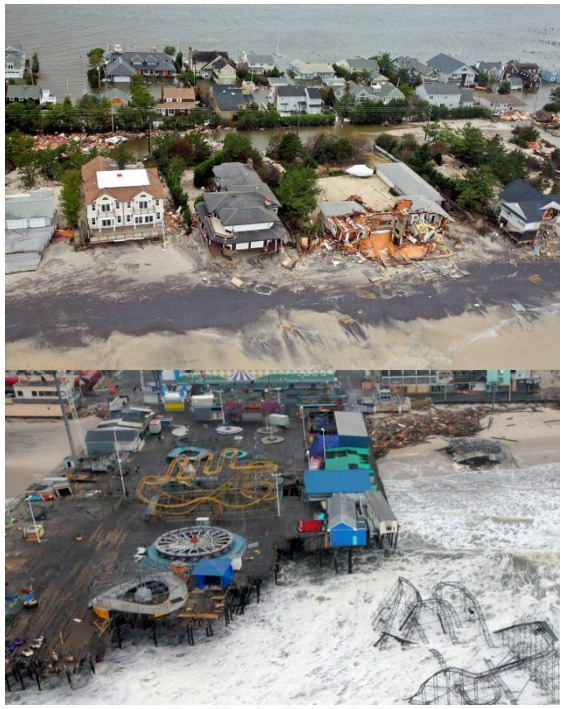
9/11 Attacks, 2001



Joel A. Miele Sr., P.E.,
Commissioner NYC-DEP, 1996-2001,
Rear Admiral (R), U.S. Navy
Founder of W-SMART



Superstorm Sandy, 2012

International Association of Water & Wastewater Utilities for Sustainable Water Security

Accelerating Response Capacity Building to Climate Change & Natural Disasters

EPAL
Grupo Águas de Portugal



CORPORATE AWARENESS

DEVELOPED EXERCISES

- **Pipe burst;**
- **Water contamination - *Cryptosporidium*;**
- **Bomb threats;**
- **Failure in the automatic operating system of the water treatment plant;**
- **Water contamination – *Legionella*.**

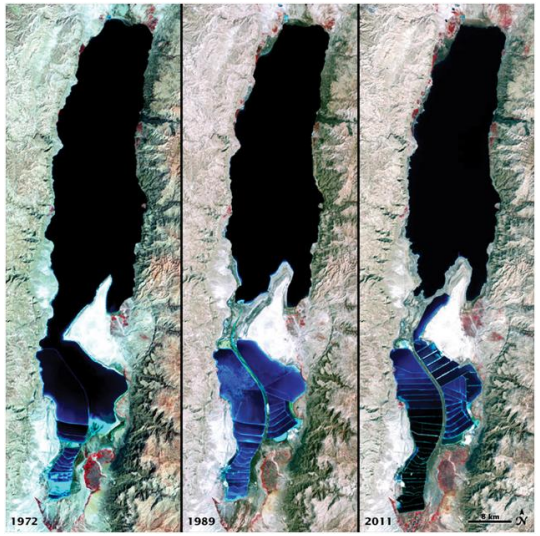
CILE – Cybersecurity 2019
ATHENA – EU Project 2023



MENA/MEDITERRANEAN SDG CHALLENGES
UNESCO ECOMED WORKSHOPS (2015 – 2019)

United Nations · International







ECOMED Workshop 2018





One of many outfalls of untreated sewage into the Mediterranean Sea

UNESCO-IHP "ECOMED ACADEMY NETWORK" OF CAPACITY BUILDING INSTITUTE IN MED-STATES

UNESCO Resolutions (2021; 2024) Welcome & Encourage

The Lebanese IHP National Committee to present a consensus based proposal to constitute the UNESCO-IHP "ECOMED" Academy Network of Capacity Building Centers at the MENA/Mediterranean M-States, with a secretariat based at W-SMART NGO, and the Cyprus Institute as "Host" Institute, to support:

a) **capacity building** through its Network of Member-States facing eco-sustainability challenges and extreme climate change impacts
b) **ecosystem pollution monitoring** for coastal eco-urbanization
c) **knowledge and databases sharing** to support local research, education, and professional development programs of the countries concerned facing the ever-growing climate impacts;





IHP-IX Strategic Plan
COP26 Recommendations

MAWAC-ENAR Water Research & Innovation (WRI) Workshop

NYC, 20 & 21 March, 2023

Co-organized by NYU, NYCDEP & NYCDDC under the auspices of UNESCO (MAWAC Secretariat)
with the collaboration of SIAAP, MGP, The ARCEAU-IdF Association, LEESU and the W-SMART Association

Proposed Themes Issues	NYC	Paris	London	Chicago	Los Angeles	Proposed Moderator
1) Storm Water Management – Best Practice, Modelling & Monitoring	Y	Y	Y	Y	Y	NYC
2) IWRM, Recycling & Circular Economy for Climate Adaptation	Y	Y	Y	Y	Y	Paris
3) Governance Policy, New Regulations & Climate Adaptation Urban Planning	Y	Y	Y	Y	Y	Los Angeles
4) Infrastructure Assets Management – Modeling & Technology Solutions	Y	Y	Y	Y	Y	London
5) Research Partnerships, Innovation Ecosystems, Community engagement & public education for Resilient Cities	Y	Y	Y	Y	Y	Chicago

Site Visit - Lower Manhattan Coastal Resiliency project, for site description NYCDDC Coastal Resiliency Project With our thanks to Eric MACFARLANE, Deputy Commissioner, NYCDDC, for registration before 03/17

EAST SIDE COASTAL RESILIENCY (ESCR)

PROJECT OVERVIEW



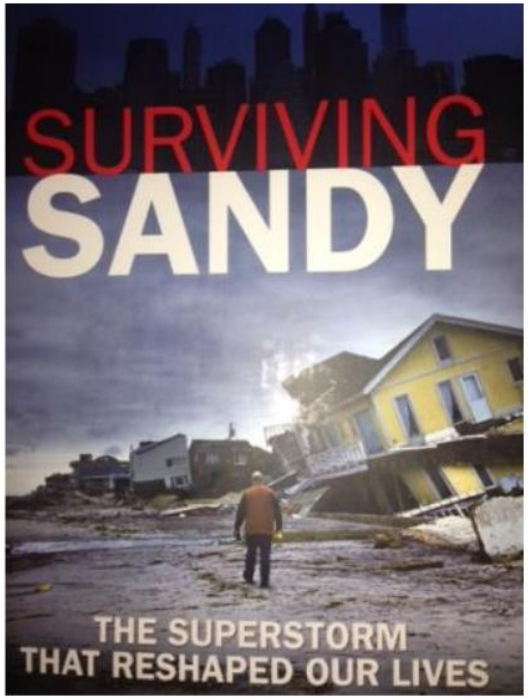
New York City Housing Authority (NYCHA) Housing Developments behind the ESCR Protection Alignment



The ESCR project is designed to protect a span of 2.4-miles along the East Side of Manhattan, against high water levels from coastal storms and up to 30-inches of sea level rise, using 2015 as a baseline.

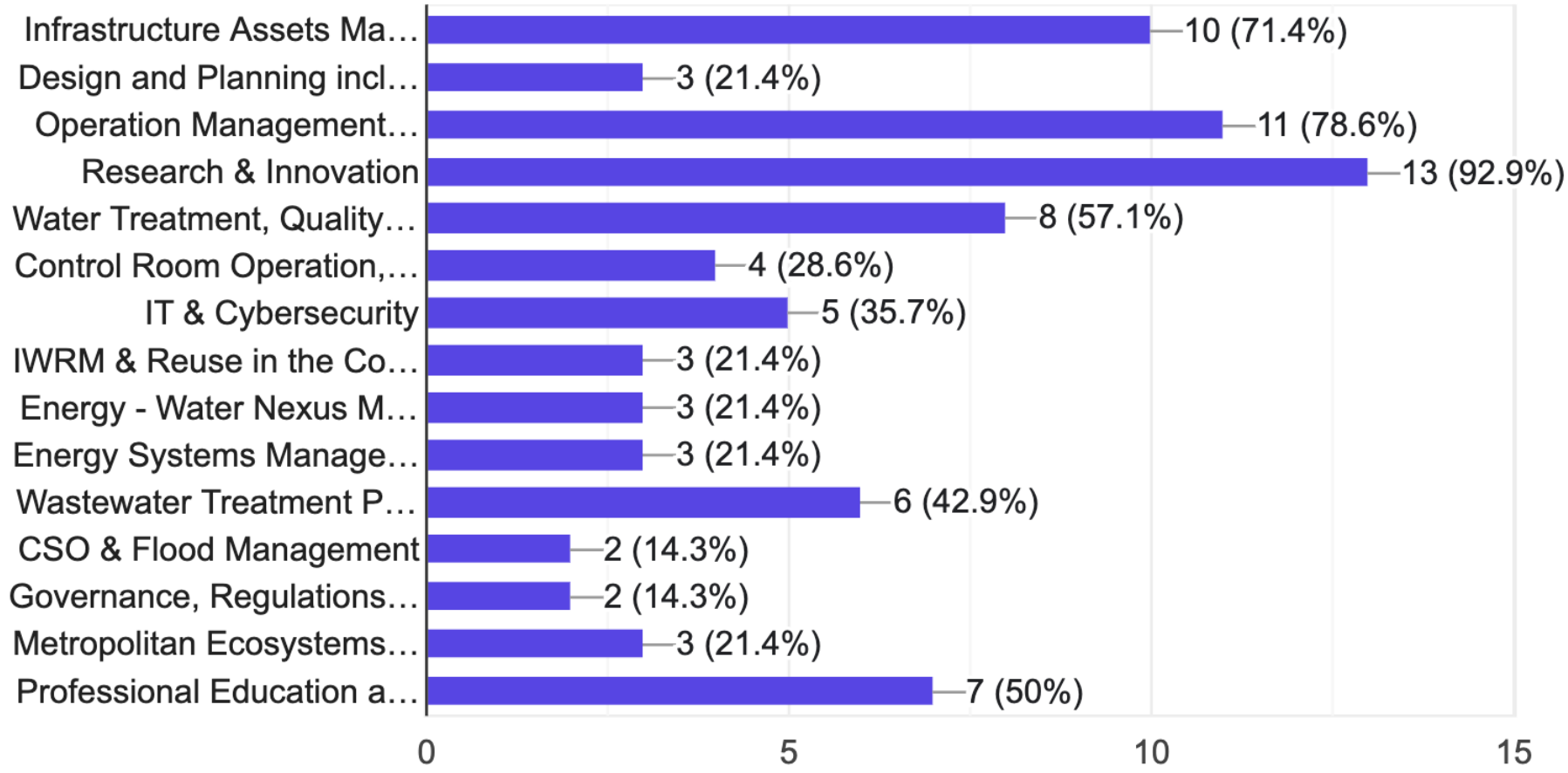
Located within the FEMA 100-year floodplain, the project area spanning from Montgomery St. to E. 25th St. includes a diverse residential community of over 110,000 New Yorkers, including appx. 28,000 NYCHA Public Housing residents.

10



MAWAC-ENAR Joint Projects - AI/ML State of Applications for Smart Urban Networks, Infrastructure Resilience & Sustainable Ecosystems Management (Questionnaire 2025, Paris)

14 responses



MAWAC-ENA SURVEY ON AI APPLICATION FOR SMART WATER MANAGEMENT - Paris 2025

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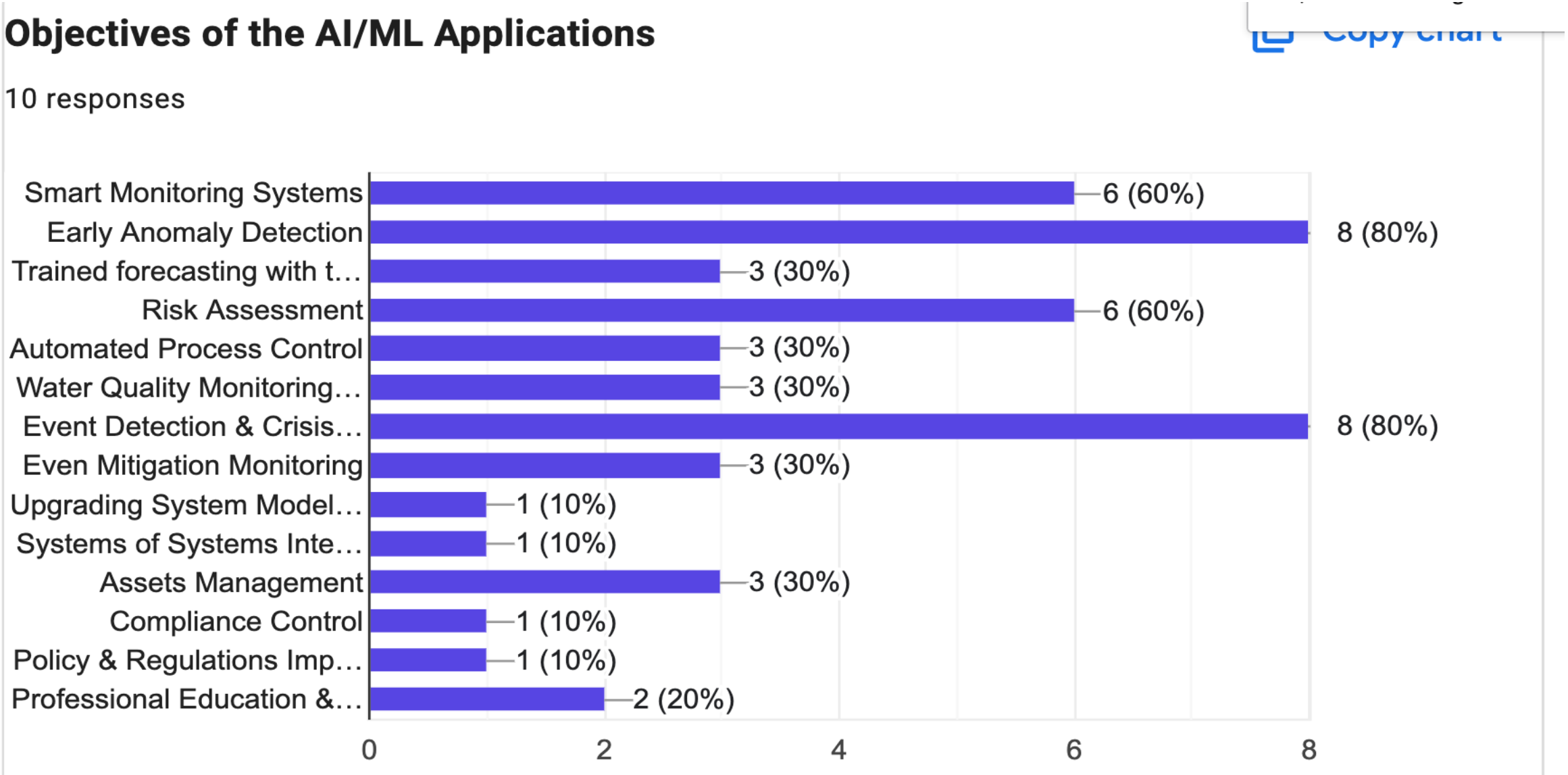

MAWAC: why a Megacities' Alliance is an evidence?
MAWAC-LAC: Latin America and the Caribbeans

PROF. NILO NASCIMENTO – UFMG (BRAZIL)

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London
Moscow
Paris
Chicago
New York
Istanbul
Los Angeles
Tehran
Cairo
Beijing
Nanjing, Wuhan, Xi'an
Tianjin
Seoul
Tokyo
Chengdu
Lahore
Shanghai
Chongqing
Delhi
Guangzhou
Karachi
Dhaka
Shenzhen
Ahmadabad
Mumbai
Calcutta
Manila
Hyderabad
Bangkok
Bangalore
Ho Chi Minh city
Kuala Lumpur
Jakarta
Mexico city
Lagos
Bogota
Kinshasa
Lima
Rio de Janeiro
Niteroi
Sao Paulo
Santiago
Johannesburg
Buenos Aires

MAWAC-LAC

1ST MAWAC-LAC MEETING: SÃO PAULO (BRAZIL)
7-9 MAY 2019

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Objectives and achievements:

- Introduce the MAWAC concepts and objectives and invite Megacity representatives to join the Alliance
- Knowing about the LAC Megacities water systems, challenges, emerging issues, planning and managing water in the future
- Mentioning the monographies co-edited by UNESCO and ARCEAU and discussing the preparation of new ones
- Conceptualising a tentative MAWAC-LAC Terms of Reference

1ST MAWAC-LAC MEETING: SÃO PAULO (BRAZIL)
7-9 MAY 2019







MAWAC-LAC FROM 2019 UP TO NOW



Belo Horizonte meeting (June, 2025)

- Relevant engagement role of
  - UNESCO office in LAC
  - IHP UNESCO Working Group on Urban Water and Human Settlements in LAC
- Several online meetings
- Mexico DF, Bogota, Lima, Santiago and Rio de Janeiro more involved in this period
- Huge impact of the post-pandemic period, requiring re-engagement

UNESCO IHP - Working Group on Urban Water and Human Settlements in Latin America and the Caribbean

Report of the IHP Council's Working Group on Megacities Alliance for Water and Climate Change (MAWAC)

27th Session of the IHP Council - **Agenda sub-item 5.6**

Paris, 02 June 2026

Nilo Nascimento (Chair), **Willian Veerbeek** (Vice-Chair), **Hifza Hasheed** (Rapporteur)



MAWAC Governance and Implementation

Implementation

MAWAC is implemented at two levels to facilitate collaboration among cities within and across regions

- **MAWAC Global platform** - the network of all member cities worldwide;
- **MAWAC Regional platforms -** networks of member cities in a specific region, as defined by UNESCO regional groups

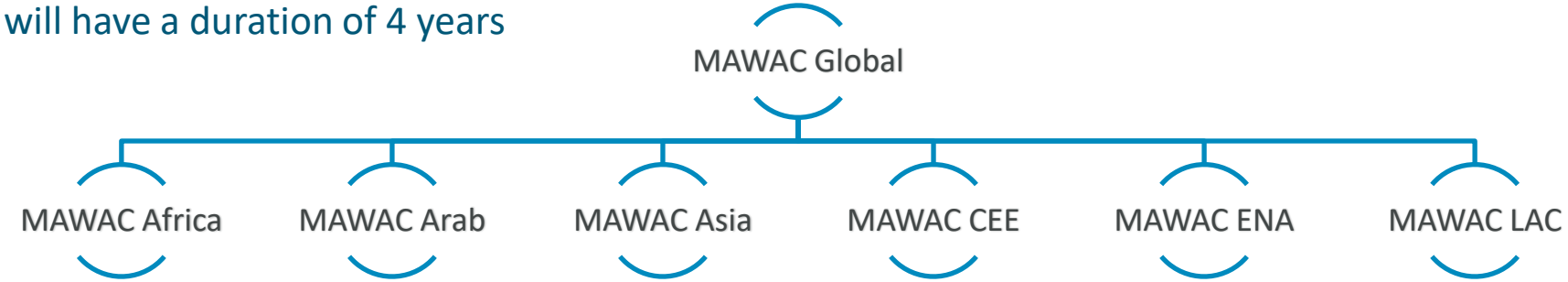
Inception phase

- The MAWAC implementation will start with an inception phase, which will have a duration of 4 years

Governance

The MAWAC governance structure will comprise the following bodies, at the global and regional levels:

- **MAWAC Assembly**
- **MAWAC Advisory Board**
- **MAWAC Secretariat**

















Thank you



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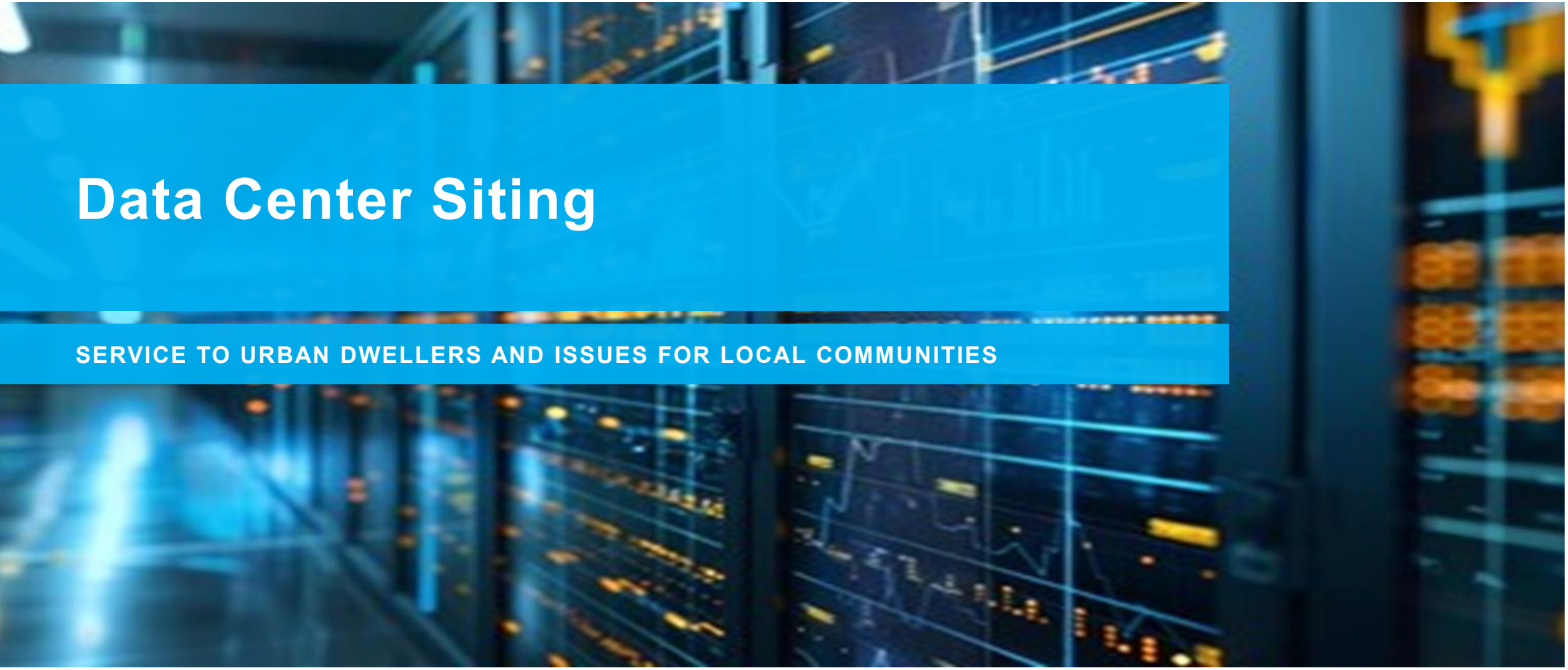

Data Center Siting

SERVICE TO URBAN DWELLERS AND ISSUES FOR LOCAL COMMUNITIES

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DATA CENTERS SNAPSHOT

- Data Centers aren’t new. It's the AI data centers and their enormous appetite for computing power that’s new and a little frightening
- AI and Digital solutions will be a major tool in the development and management of Smart Cities and many other uses
- This increasing use of AI will require expanded construction of data centers, which are also growing in bulk and size – over 11,800 data Centers globally, 5,400 in US
- Electricity demand for data centers projected to be130 GW by 2030
- Large data centers can consume 5 million gallons/day or more for cooling
- The data center footprint impact will get much larger, according to estimates by the US Department of Energy and the Los Alamos National Laboratory

BUT….ARE WE REALLY USING AI THAT MUCH?

- Here are the figures for the United States.
- Average usage is 32.9% in metropolitan counties versus 16.2% in rural areas.
- Counties with a higher share of 18-24 year-olds have higher rates (28.6% versus 20.3%). College towns are a driving force: Williamsburg, Virginia, leads with 73.7%.
- More than half of urban respondents think AI will act in the public interest, compared with under 40% in rural areas.
- Professional use of AI varies. Over 50% of rural workers have never used AI at work, versus 31% of urban workers
- *(Sources: Microsoft, AI Diffusion Report, May 2026, Axios, Indeed January 2026)*

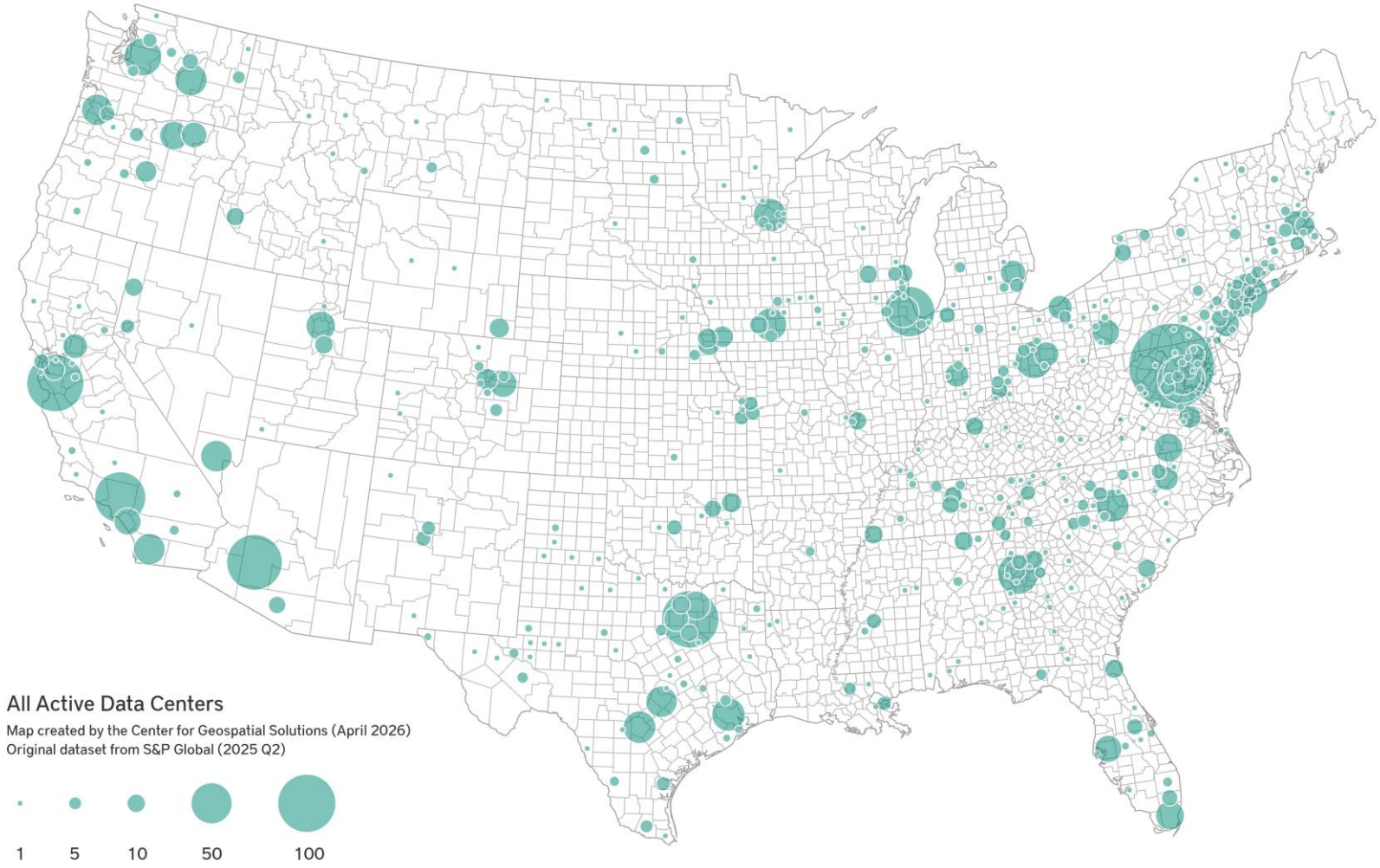
THE QUESTIONS TO ANSWER ON DATA CENTERS

- What are the impacts of data centers at the local level?
- If the negative impacts can’t be completely eliminated, what can communities do to manage them?
- How can we generate valuable policy insights to aid communities in their decision-making?
- Can communities be given specific guidance based on their local energy and water resource availability?
- Thus, can the data center be sited sustainably?

Currently Active Data Centers

CENTER FOR
GEOSPATIAL
SOLUTIONS

LINCOLN INSTITUTE
OF LAND POLICY



POTENTIAL LAND AND ENERGY IMPACTS

- Hyperscale Data Center (50-100+ MW IT load)
- Land footprint: 40-120 hectares (often larger)
- Building footprint: 46,000 – 138,000 square meters
- Mid-Size Enterprise Data Center (5-20 MW)
- Rule of Thumb: 506 hectares per MW of IT capacity (varies by design & expansion plans
- A data center running continuously: 1 MW = 8,760 MWh/year. 100 MW can power 75,000 – 100,000 homes



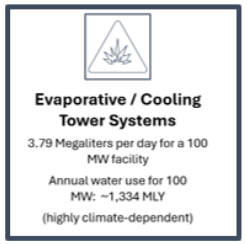
POTENTIAL WATER IMPACTS



Air-Cooled (Minimal Water)

Near zero operational water use

Higher electricity use



Evaporative / Cooling Tower Systems

3.79 Megaliters per day for a 100 MW facility

Annual water use for 100 MW: ~1,334 MLY

(highly climate-dependent)



Liquid Cooling for AI

Can increase water intensity if cooling towers are used

Some facilities are shifting to closed-loop or recycled water systems

ISSUES ANALYSIS LIST

- **Energy:** What is the stability of the existing electric grid and the availability of additional generation capacity on site?
- **Water cooling:** What is the source of the water and the amount withdrawn? Is it consumptively used? Where is it discharged? Can the remaining water be recovered and continually reused onsite? Is there an opportunity for close-loop cooling?
- **Water rates/tariffs:** Is the water acquisition cost for the data center being paid for in the community water system? Or can all costs be assessed directly to the user? What rate/tariff structure modifications would be required to do that?
- **Property Taxation:** How to recover the full cost of this facility to the community? (Since there are really no jobs to boost the local economy except construction.) How to calculate the overall community impact that might be recoverable in property taxation?

ISSUES ANALYSIS LIST

- **Land value capture**: Once the data center is built, it will lower the value of land around it and will disincentivize other development. Or will it?
- **Municipal approval options**: What might these be? Special Zoning districts? Negotiated MOUs? Specific planning and zoning ordinances? Are there good case examples of communities that have handled this well?
- **Indirect land use impacts:** How are data centers being sited on lands with competing uses (e.g., agriculture, tribal lands, solar farms), and what are the indirect impacts (e.g., are they crowding out other kinds of development?)

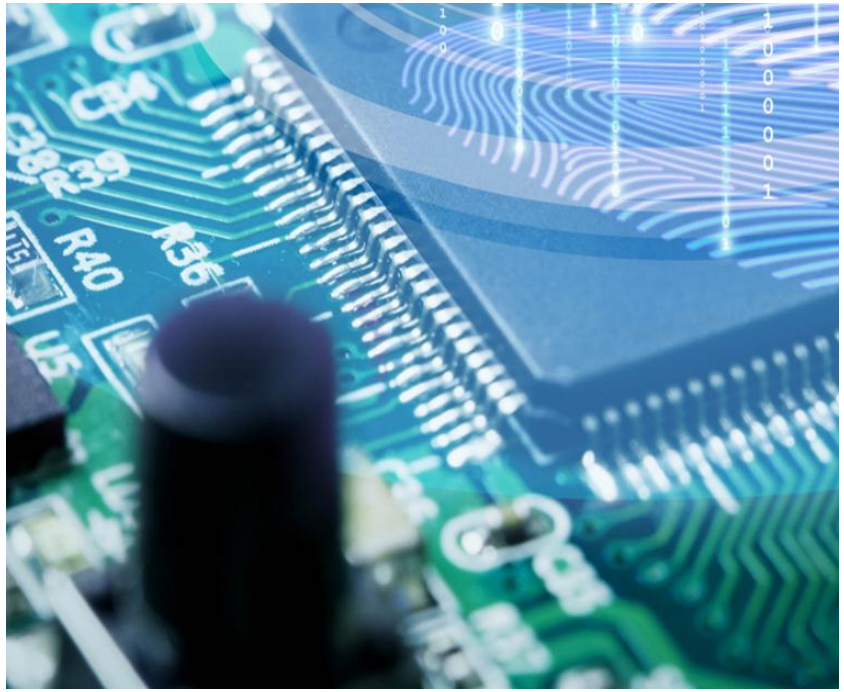


ISSUES ANALYSIS LIST

- **Governance / oversight issues:** Are these centers being located in fragmented jurisdictions? How transparent is the application process? What are the overall regional cumulative impacts?
- **Offset accounting:** Usually a mismatch between corporate "water-positive" pledges and local scarcity. Nearly all major cloud companies have pledges to be "water positive" by some future date, but their “offsets” are often not within the same watershed. Whether offsetting schemes actually result in reduced aggregate withdrawals in water-stressed basins must be evaluated.
- **Water permitting:** Water permitting and reporting/compliance frameworks are generally lacking and not integrated into tax incentives. Groundwater permitting more specifically is often weak and/or opaque, especially in rural areas. Negative externalities of water table drawdown ("dewatering") on neighboring groundwater users is a serious risk. What kinds of monitoring and regulation are in place?

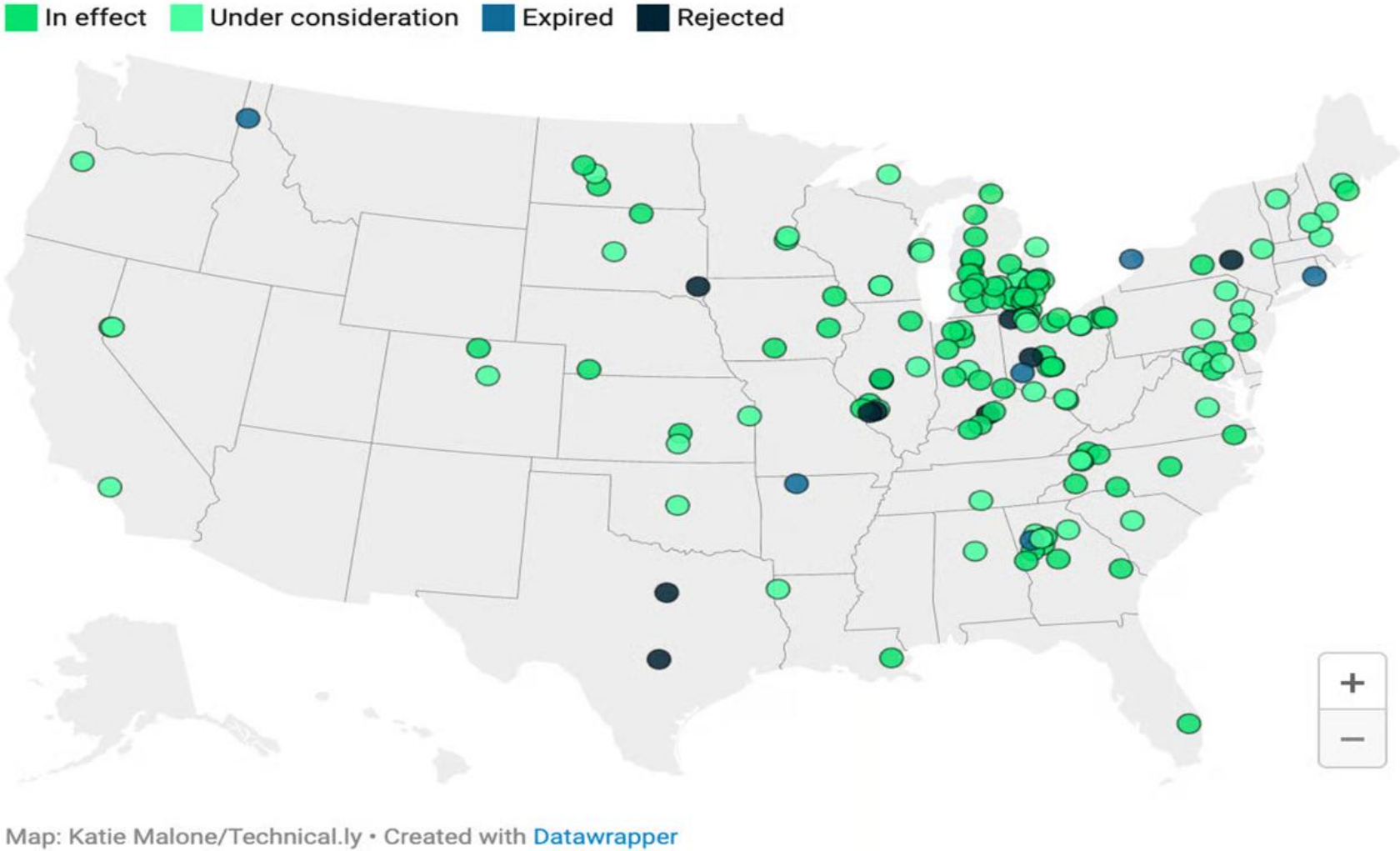
TRANSPARENCY IN DATA CENTER SITING & OPERATIONS

- Limited public disclosure of energy use, water consumption, emissions and supply chains
- Complex corporate structures and nondisclosure agreements obscure operational impacts and accountability
- This opacity limits community awareness, meaningful participation, and informed public decision making
- Communities need to have open discussions



150+ legislative bodies across the US have taken action on data center moratoriums

Of these, most are at the local level. 16 of the efforts are at the state level, marked on the map by their respective state capitals.



Map: Katie Malone/Technical.ly • Created with Datawrapper

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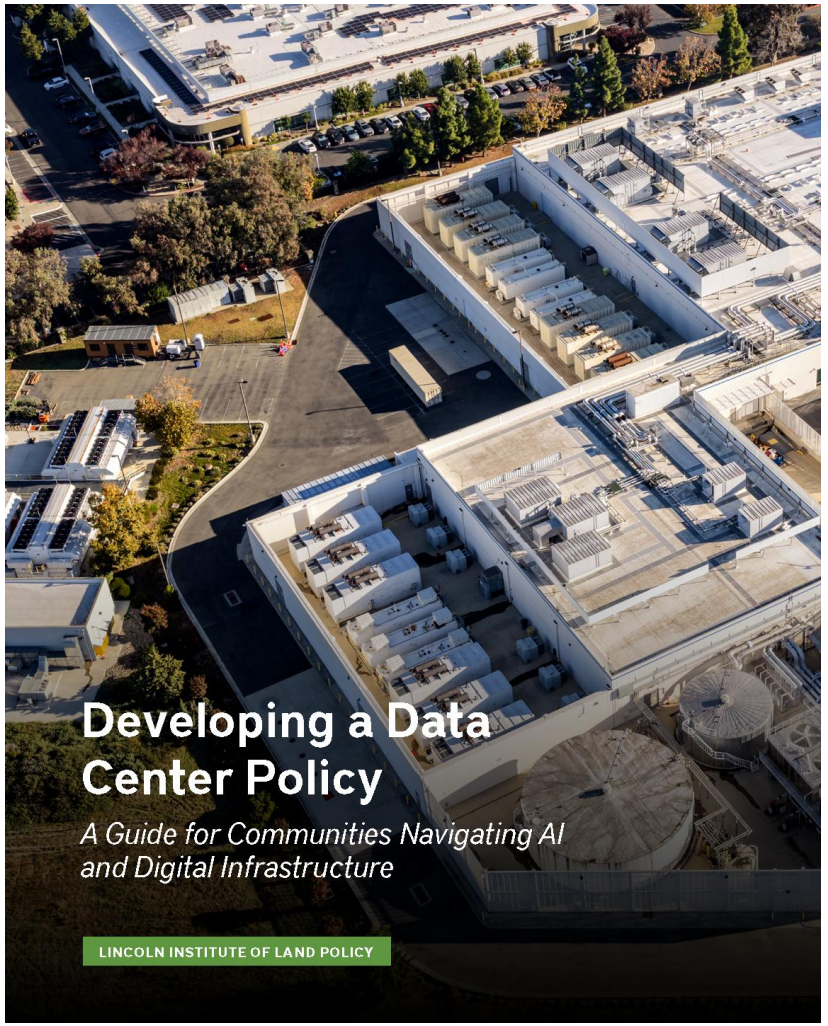
WHAT DO COMMUNITIES NEED?

- Adequate local authority to make the right decisions
- Accurate analyses of the LOCAL energy and water availability
- Strategies for avoiding energy and water rate shock
- Advice on taxation revenues and possible fiscal impact
- Ability to negotiate community benefits
- Tools for addressing the financial risk of resource overconsumption and potential abandonment

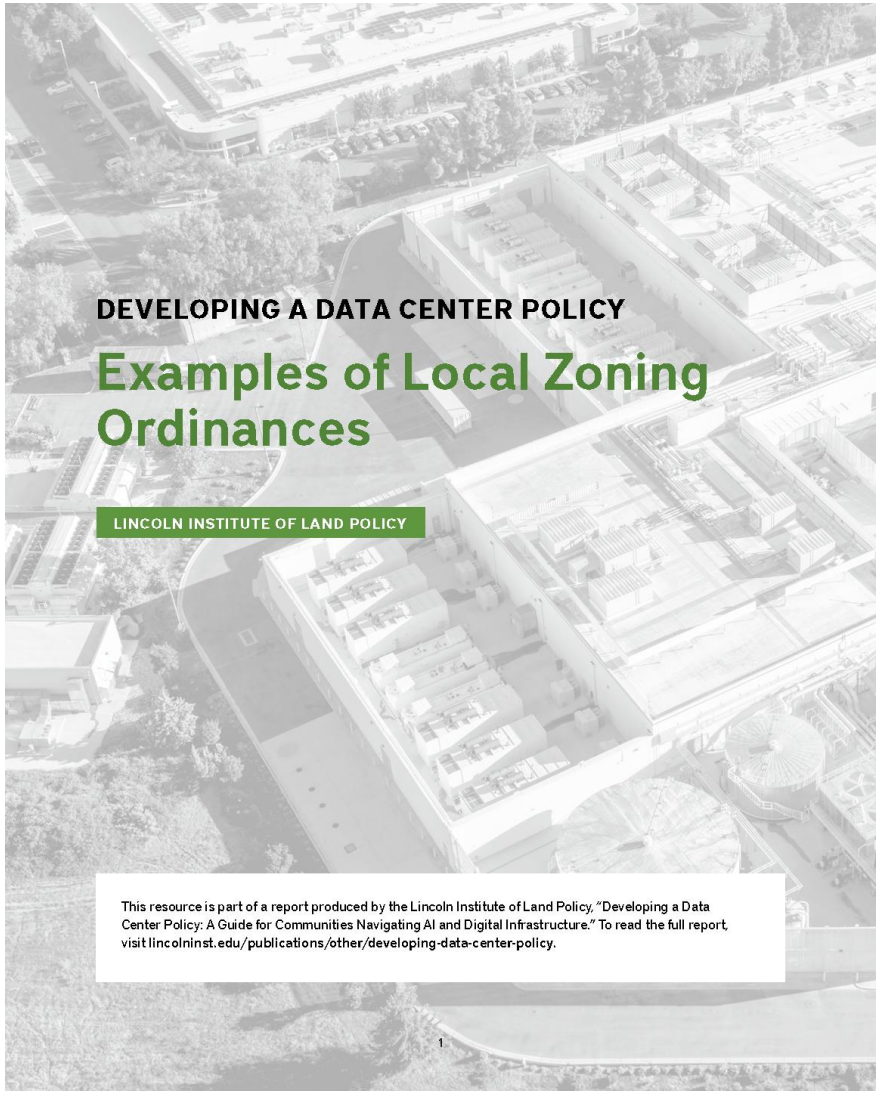
Lincoln Institute Guide

- 57-page Guide for local communities
- Free of charge to download
- Analysis of the resource issues needing to be examined
- Recommendations for community engagement in the decision-making
- A strategy for avoiding water rate shock impacts to household ratepayers



Guide Appendices

- Recommendations and example language of zoning tools for communities to use and modify as needed
- Based on data center local ordinance analysis by the Environmental Law Institute



Guide Appendices

- A process for creating community benefit agreements
- Setting terms for what the community needs and desires
- Creating trust



Guide Appendices

- Risk abatement must be part of local approvals, and communities can require protection by the applicant
- Guide gives examples and procedures:
  - Insurance policy
  - Derivative contract
  - Surety Bond
  - Special Purpose Vehicle



How to Get the Data Center Guide



ANOTHER GOOD RESOURCE

- Alliance for Water Efficiency Primer for Water Utilities
- Guide to how to evaluate data center applications and requests for service
- Free to download, just request it on a form
- Access it on the home page at www.a4we.org



THANK YOU!

MARY ANN DICKINSON

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Improving Cyber Resilience at Water Utilities: the EU ATHENA Project

BRUNO NGUYEN



inspiring change

Information importante concernant vos données personnelles – Point Vision

GP

Groupement Point Vision <noreply@pointvision.com>

vendredi 23 octobre 2026 à 18:01

À : Bruno NGUYEN

Hello,

We have been informed that a service provider we use for managing and scheduling appointments has been the victim of a cyberattack.

Point Vision's data is not hosted on this service provider's compromised environment; however, an unauthorized individual exploited a vulnerability in the provider's systems to gain access to our IT environment for appointment management and downloaded databases containing some of your personal data.

The data involved includes your first and last name, your date of birth, and the contact information you provided when scheduling an appointment (mailing address, email address, and/or phone number), as well as certain communications regarding the organization and instructions for your appointment.

...

What the incident does not involve: The compromised environment is separate from the systems in which Point Vision stores its patients' medical records; investigations conducted to date have not revealed any unauthorized access to these systems in connection with this incident.

What we have done: As soon as we were alerted to this incident, we took precautionary measures to protect our systems.

A message received recently in my mailbox from my optician

Something not so unusual regarding the past few months….

cyber attack on IT



October 12th, 2026

- **BBC News :** *« Fridges in French supermarkets hit by cyber attack »*
- **The Guardian :** *« Hackers force French supermarket fridges to heat up to 50C in 'unprecedented' cyber-attack »*
- **CNN :** *« Thousands of refrigerators were hacked across France. How worried should you be? »*
- **Reuters / NBC News :** *« Hackers heat French supermarket fridges, sparking fires and spoiling food »*

Millions of Euros of goods wasted after a cyber attack hit more than 700 supermarkets in France

A simple unsophisticated attack…
Yet very efficient and used again in Europe these very last days

cyber attack on OT

TARGETS OF CYBERATTACKS

Like all critical infrastructure sectors, the water sector is an attractive target for cyberattackers.

2 Categories of cyberattacks against water utilities

IT

Attacks against water utilities' information technology systems, also known as "enterprise systems." These include email systems, websites, and billing databases.

- Most common attacks.
- they do not require specific expertise in the targeted industry.
- Can disrupt daily operations and compromise sensitive data.
- Do not, on their own, impact drinking water or wastewater systems.

OT

Cyberattacks against a water utility's industrial control systems. Industrial control systems continuously manage, in real time, treatment processes, sensors, valves, pumps, and other infrastructure for water and wastewater services.

- These attacks are more rare compared to IT attacks.
- They require expertise in the targeted services and industries.
- They can have serious consequences for the continuity of water services, especially if detection is not immediate.

TWO DISTINCT ENVIRONMENTS

The skills required for mitigating cyber-attacks combine 2 sectors, both for the treatment of the causes and of the effects:

- The Information Technology (IT), hardware and software sector
- The Operation Technology (OT) for water services continuity (SCADA..), eventually in downgraded mode

OT and IT are less and less independent from one another

Quick restoration of one can be at the detriment of the other

The difficulty often lies in deciding whether the CIO or the COO should take the lead in cyber resilience



ATHENA

Co-funded by the European Union

ECCC EUROPEAN CYBERSECURITY COMPETENCE CENTRE

IWA the international water association

Wide spectrum of OT security experts, users and academia

Hochschule Albstadt-Sigmaringen
Albstadt-Sigmaringen University

Rijkswaterstaat

TAL TECH ESTONIAN MARITIME ACADEMY

De Vlaamse Waterweg nv

W SMART Water Security Management Assessment Research and Technology

hetWaterschapshuis

Østfold University College

LUXEMBOURG INSTITUTE OF SCIENCE AND TECHNOLOGY | LIST

VIRTUAL RANGERS

Advisory board members

dcypher

Aston University BIRMINGHAM UK

digital trust center.

suez environnement

Security advisory board

Ministerie van Infrastructuur en Waterstaat

UPDATE ON THE ATHENA PROJECT

November 2026

- **Part of the Digital Europe Programme**
- **Total budget Programme: 32 Million €**
- **2-5 Million € EU Grant per project**
- **At least 6 partners from 3 EU Countries**

- **3 years project, 2024-2026**
- **Final partner meeting 25/11/2026**
- **3.0 M€ total budget**
- **Funding rate: 50% (SME 75%)**

In summary:

- 9 webinars
- **3 Virtual Reality Scenarios** available in 5 languages (English, Dutch, French, German, Portuguese, plus Spanish and Italian in development), and the apk downloadable on PICO/QUEST stores
- 1 E-learning exercise
- 1 Table-top exercise
- A cyber security competency model for Water Operators and Leaders
- A Moodle platform with a learning path
- PC versions for the VR scenarios
- 800+ trainees have already tested ATHENA materials with excellent feedback

All accessible for free

ATHENA OT CYBER RESILIENCE TRAINING IN VR

- Reflecting the 3 stages defined as: Prevention, Detection, Mitigation
- Referring to the 2 types of trainees: Operators & Leaders
- Focusing on water specific activities or not specific (general) scenario
- Exercises with increasing complexity
- Credible scenario exercises based on real cases
- Clear objectives for each training with expected improved competencies for the trainees

ATHENA OT CYBER RESILIENCE TRAINING IN VR

the international water association

Virtual Reality Scenario Characteristics

ID	Scenario objectives	Scenario title	Stage	Type	Target group	Description of the scenario
1	Identifying risks in a control room	Identification of risky behavior	Prevention	General	Operators	Finding possible security risks in an OT work environment
2	Search and identification of anomalies on SCADA	Water Quality Deterioration resulting from a cyber attack	Detection	Specific	Operators	Some of the data arriving at SCADA has been altered and the information is incoherent
3	Setting priorities & Decision-making activities	Partial Blackout of the SCADA	Mitigation	Specific	Leaders	Deciding mitigation and restoration strategy after successful cyber attack impacting the real-time control of the service via the SCADA

ATHENA

SCENARIO 1 Prevention

- Type: Virtual Reality Training
- Duration: 5 minutes
- Difficulty: Easy
- Target group: All employees
- Script

You are a former employee of a water utility who was laid off for economic reasons and wants to take revenge on the company that employed you.

You know an experienced hacker who will be your accomplice in your criminal scheme: Sam will stay in touch with you via walkie-talkie while you break into the temporarily unoccupied control room and search for vulnerabilities that will help you carry out your crime.



CONCLUSION

- The ATHENA training program uses various and complementary tools for improving cyber resilience primarily for Operators and Leaders in the water operations of critical infrastructures.
- The trainees using Virtual Reality App are guided into progressive scenarios complexity focusing on the 3 stages of Prevention, Detection, and Mitigation.
- Each of the 3 stages has its own training objectives, and the performance of the trainees is collected and explained at the end of each scenario.
- An individual learning path is proposed and recorded for each trainee consistent with a competence model specially developed in ATHENA for Leaders and Operators.
- Other professional profiles may take advantage of discovering what their colleagues in operations may experiment during a cyber attack.
- Most of the takeaways can be extended to other types of services (energy, telecoms, crisis management…).

WILL YOU DARE TRY THE EXPERIENCE?

the international











USEFUL LINKS TO THE ATHENA PROJECT

https://athena-digitalwater.eu

https://www.youtube.com/@ATHENA-digitalwater

https://www.linkedin.com/company/athena-digitaleurope/

THANK YOU FOR YOUR ATTENTION





Prospects and Challenges of Digital Transformation in Sanitation

Implementation of the COI

OCTOBER 2026

sabesp

Agenda

COI: Innovation in Water and Sanitation

Challenges of Transformation in Operations

Agenda

- COI: Innovation in Water and Sanitation

Challenges of Transformation in Operations



New disruptive technologies are transforming water and sanitation around the world

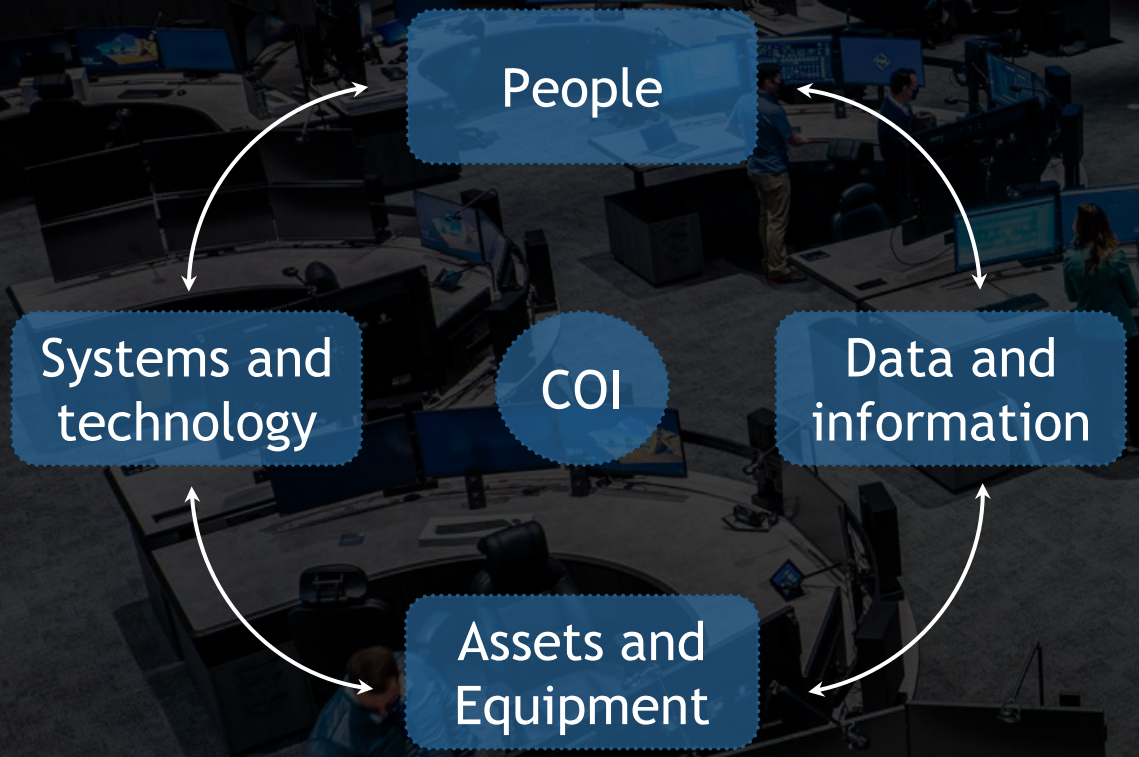
Source: Sabesp

New technologies can change the way we plan, invest, and operate in the water and sanitation sectors

New data sources and ways of analyzing them increase transparency and pave the way for new business models in the sector

IoT, artificial intelligence, *machine learning*, *big data* and *blockchain* are among the technologies with **the greatest potential for disruption in water and sanitation**

At Sabesp, we are implementing an Integrated Operations Center (COI) that connects various dimensions



What is a COI?

1. **Monitoring and/or control** center for operational assets...
2. ... connecting and integrating **data, people, information, and processes** in real time
3. A **collaborative and organized** environment that ensures synergy across departments...
4. ...providing **a comprehensive view of processes** across the entire company, including senior management

Source: Interviews with experts; BCG analysis

Implementing a COI enables the organization to reach a new level of excellence

Non-exhaustive

Integrated view of the business
reduces information silos and promotes alignment among regional offices

More assertive decision-making
centralizes data and analytics to support rapid strategic decisions



COI

Increased operational efficiency
Promotes automation and sensor integration, enabling a reduction in manual labor

Agility and service quality
Increases operational effectiveness based on real-time data and coordinated actions

Proactive action
Anticipates potentially critical situations, runs through scenarios, and evaluates solutions proactively

Enabling analytical models:
enables the systematic incorporation of predictive models, AI, and ML into the decision-making process

Source: Interviews with experts; BCG analysis

Sabesp's COI will rank as the world's largest in terms of population served, daily volume, and network coverage

	Concession	Service Area	Population served	Volume of water and sewage (m^3 /day)	Length of the water and sewage network (km)
Large-Scale	Water and Sewage	London and surrounding areas	16M	2.7M / 4.4M	32k / 109k
	Water and Sewage	14 states	14M	3.8M / 2.3M	86k / 13k
	Water	Ho Chi Minh City (Vietnam)	10M	2.4M	11k
	Water and Sewage	Rio de Janeiro	10M	4.6M / 3.5M	19k / 7k
	Water	Dakar & Region (Senegal)	10M	0.5M	18k / 18k
	Water and Sewage	Santiago	9M	3.3M / 3.0M	14k / 11k
Medium-Sized	Water	Shanghai	6M	1.6M	5k
	Sewage	Ceará	4M	0.4M	4k
	Water and Sewage	Aguas Calientes	1M	0.3M / 0.3M	8k / 8k
	Water	Macau	1M	0.3M	1k
	Sewage	Toulouse	1M	0.2M	4k
	Water and Sewage	São Paulo	28M	6.3M / 5.3M	85k / 61k

Caption: Water Sewage

Source: Interviews with experts, web research, CapitalIQ, BCG Analysis

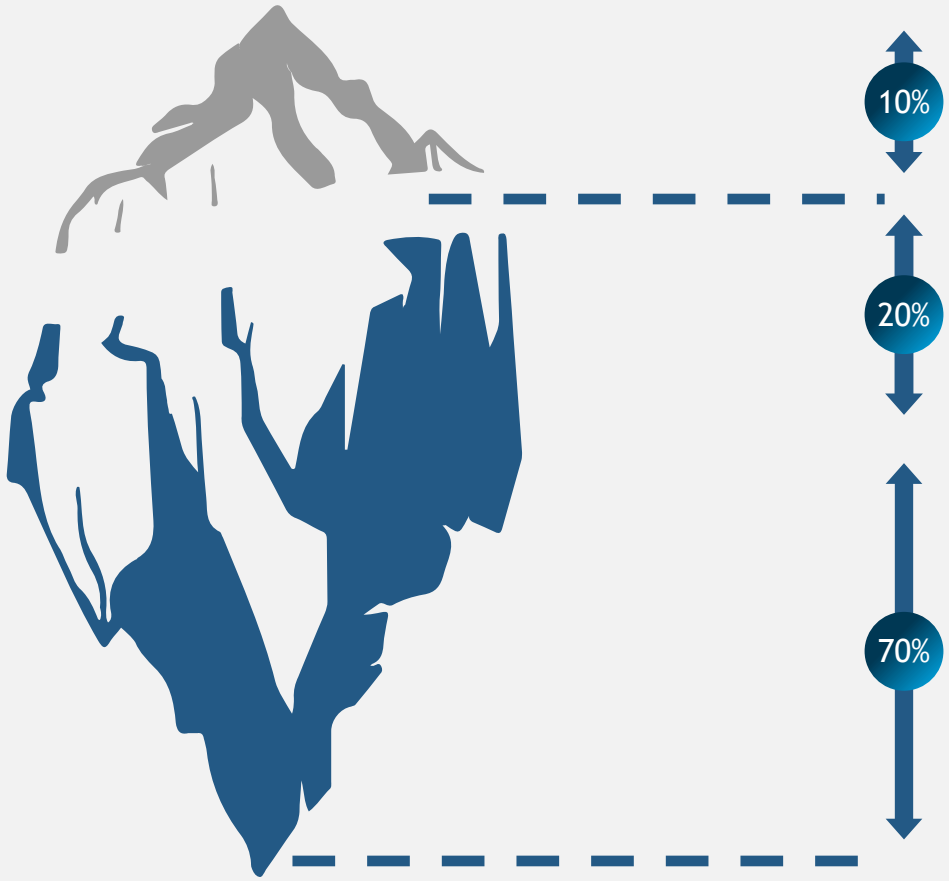
Agenda

COI: Innovation in Water and Sanitation

- Challenges of Transformation in Operations

Digital transformation goes beyond the implementation of AI-powered solutions, requiring systems, data, processes, and governance

x% Level of Relevance for Transformation



Building a Portfolio of AI-Driven Solutions for Operations

Using AI and analytics for data-driven operations, with pilot projects that demonstrate real gains and clear criteria for scaling

Develop an integrated systems and data architecture

Ensure that systems and data support the new solutions by integrating a fragmented legacy of systems and SCADAs into a single architecture

Transform processes and governance

Redesign processes and the operational model to incorporate the solutions into daily operations and standardize execution

Support the cultural shift toward a data-driven operation and prepare teams for the new model through training and phased migration

Source: Sabesp

Digital transformation goes beyond the implementation of AI-powered solutions, requiring systems, data, processes, and governance

x% Level of Relevance for Transformation



10%

Building a Portfolio of AI-Driven Solutions for Operations

Using AI and analytics for data-driven operations, with pilot projects that demonstrate real gains and clear criteria for scaling

20%

Develop an integrated systems and data architecture

Ensure that systems and data support the new solutions by integrating a fragmented legacy of systems and SCADAs into a single architecture

70%

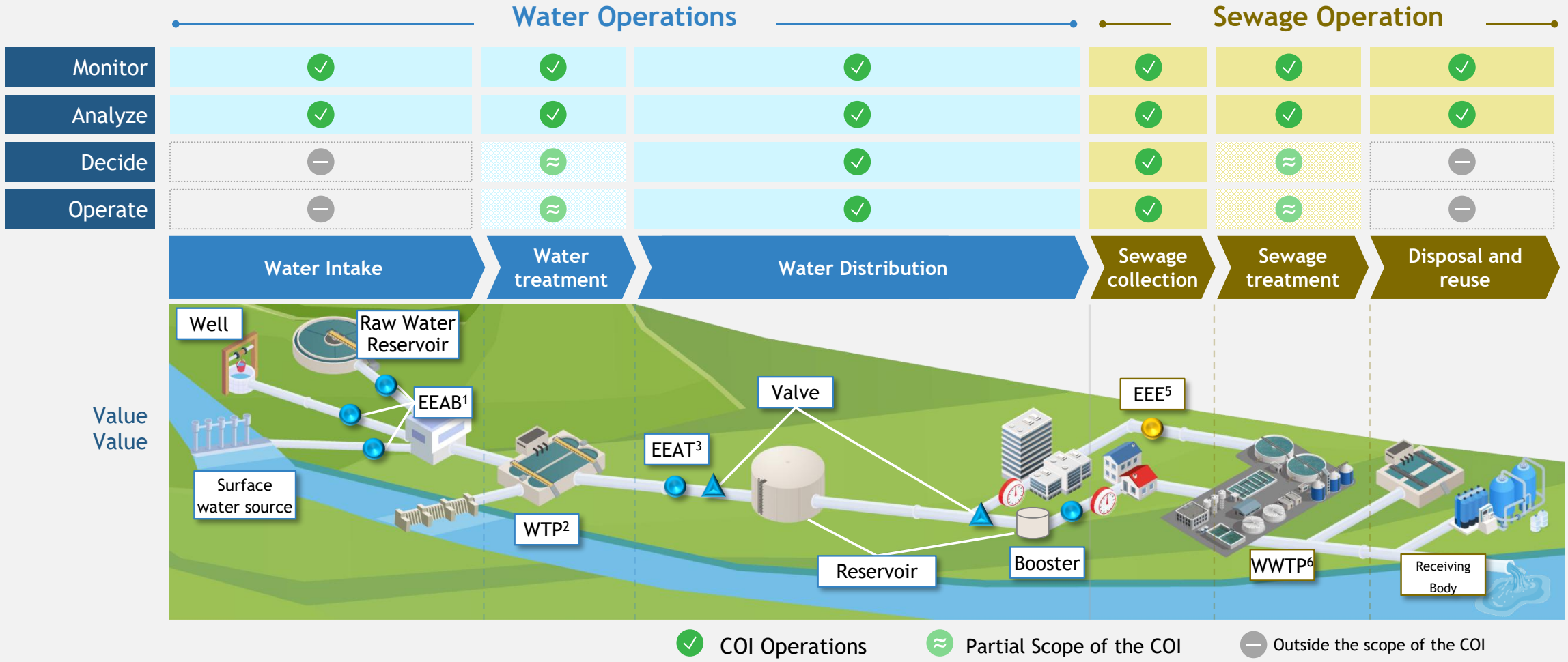
Transform processes and governance

Redesign processes and the operational model to incorporate the solutions into daily operations and standardize execution

Support the cultural shift toward a data-driven operation and prepare teams for the new model through training and phased migration

Source: Sabesp

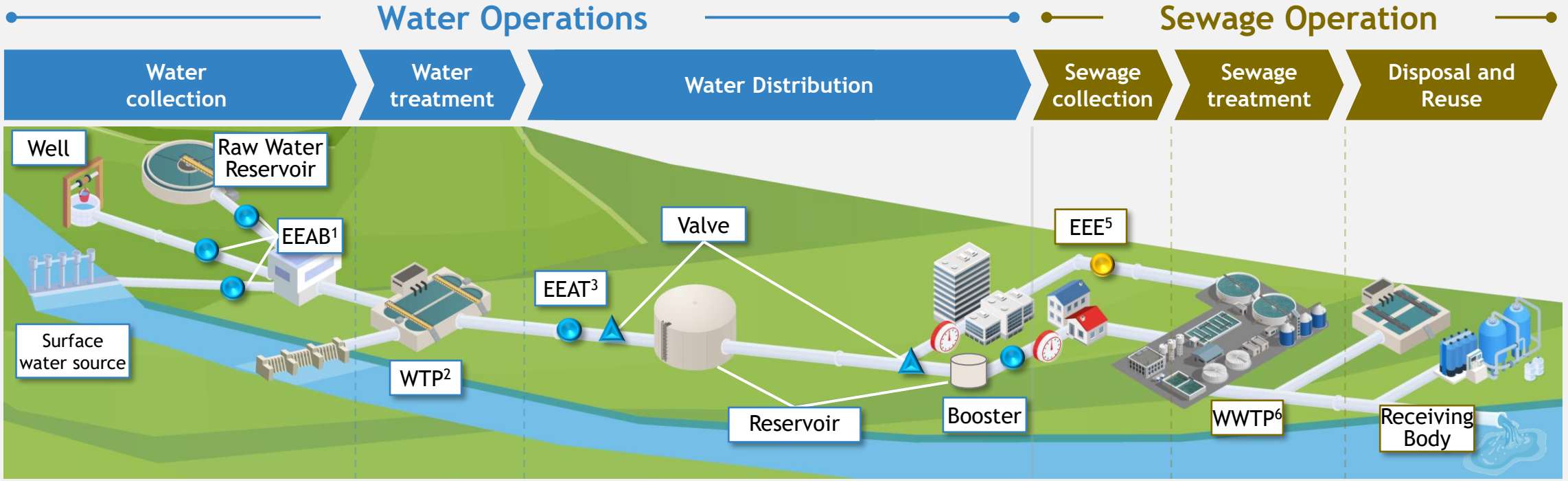
COI will operate across the value chain, providing end-to-end monitoring and managing water distribution and wastewater collection



1. Raw Water Pumping Station 2. Water Treatment Plant 3. Treated Water Pumping Station 4. Pressure-Reducing Valve 5. Sewage Pumping Station 6. Sewage Treatment Plant Source: Interviews with experts; BCG analysis

At every stage of the value chain, we are implementing innovative solutions enabled by the COI

Non-exhaustive



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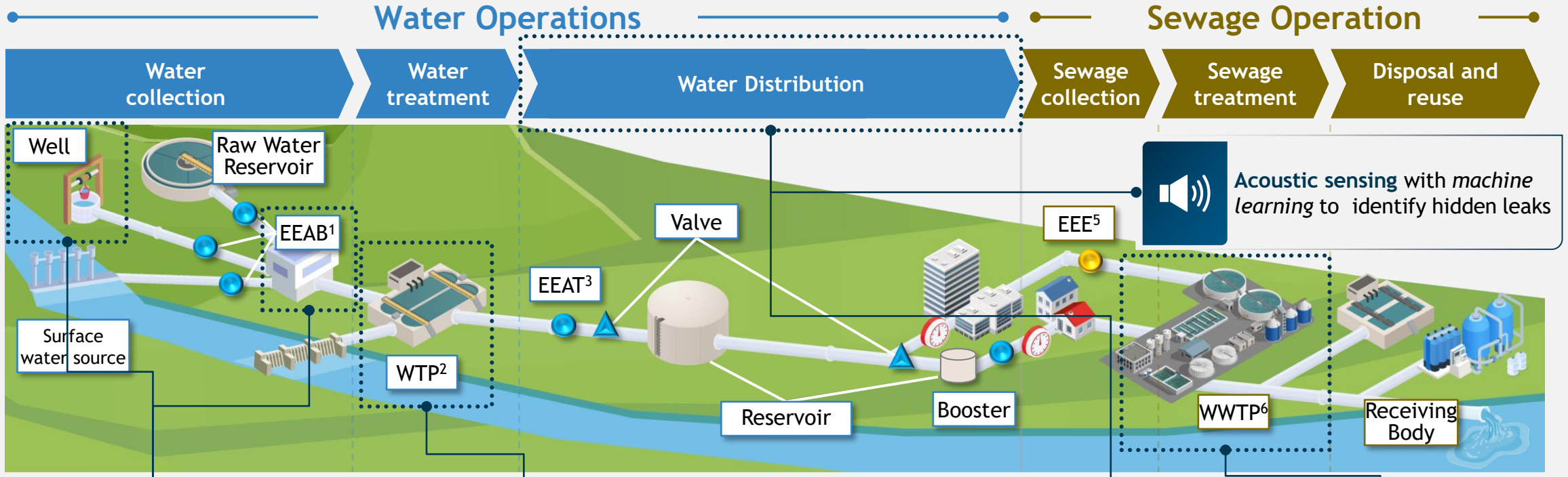


Details on the next slide

1. Raw Water Pumping Station 2. Water Treatment Plant 3. Treated Water Pumping Station 4. Pressure-Reducing Valve 5. Sewage Pumping Station 6. Sewage Treatment Plant Source: Interviews with experts; BCG Analysis

Example – Chemicals | Solutions are tested in pilot studies to measure results before a decision to *scale up*

0 Baseline and training of the solution

1 Operation in DSS[1] mode

2 Operation in DCS mode[2]

Installation of optimization software



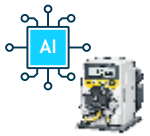
Dosing with fixed setpoints

Model trained



Manual application of optimized setpoints

Model model



Automatic application of optimized setpoints

Baseline: *creation of a consumption baseline using historical data*

Test: *Measurement of compliance with the DSS[1] recommendation against expected quality factors*

Measurement: *chemical consumption with optimization in DCS[2] mode*

Go/no-go process ation of solutions following a period of measurement and validation of results

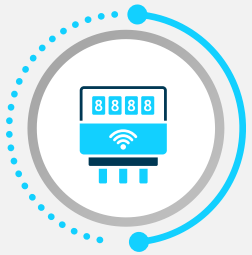
1. DSS = Decision Support System 2. DCS = Direct Control System
Source: BCG Analysis



Appendix I: Technology in the Water and Sanitation Sector

Digitalization in water and sanitation is a trend that falls into five categories of solutions...

Non-exhaustive



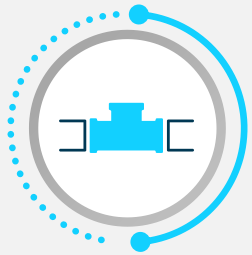
Metering and customer management

Smart metering, customer engagement, and billing (e.g., smart water meters, telemetry (AMI), automatic meter reading)



Management of equipment

Data and analysis of asset condition to plan maintenance (e.g., CMMS, network modeling)



Network management

Monitoring the condition and performance of water and wastewater networks (e.g., SCADA, satellite leak detection, acoustic sensing)



Management of treatment plants

Management and optimization of water and wastewater treatment plants (e.g., SCADA at the plants)



Management of information

Platforms for integrating, analyzing, and protecting data across departments (e.g., data integration)

Source: Sabesp



... generating gains across the entire value chain and making regulation more effective

Production and distribution

- **Distribution:** simplified management with real-time data and predictive models
- **Water quality:** continuous and more accurate monitoring
- **Water security:** agile response to droughts and extreme events

Consumption

- **Losses:** reduction of leaks and demand management
- **Billing:** greater accuracy and customer consumption tracking
- **Metering:** Simplified consumption readings

Regulation

- **Water resources:** more efficient management
- **Rates:** more flexible and adaptable mechanisms
- **Competition:** encouraging competition in the sector

Source: Sabesp

Appendix II: References to Integrated Operations Centers (IOCs) Around the World

We mapped several Integrated Operations Centers (IOCs) at leading *organizations*



Panel Discussion and Q&A



UPCOMING IWA WEBINARS & EVENTS



https://www.iwa-network.org/learn/nitrous-oxide-a-global-guide-for-monitoring-and-quantifying-emissions

UPCOMING IWA WEBINARS & EVENTS



https://www.iwa-network.org/learn/data-about-data-a-primer-on-metadata-for-people-in-a-hurry

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