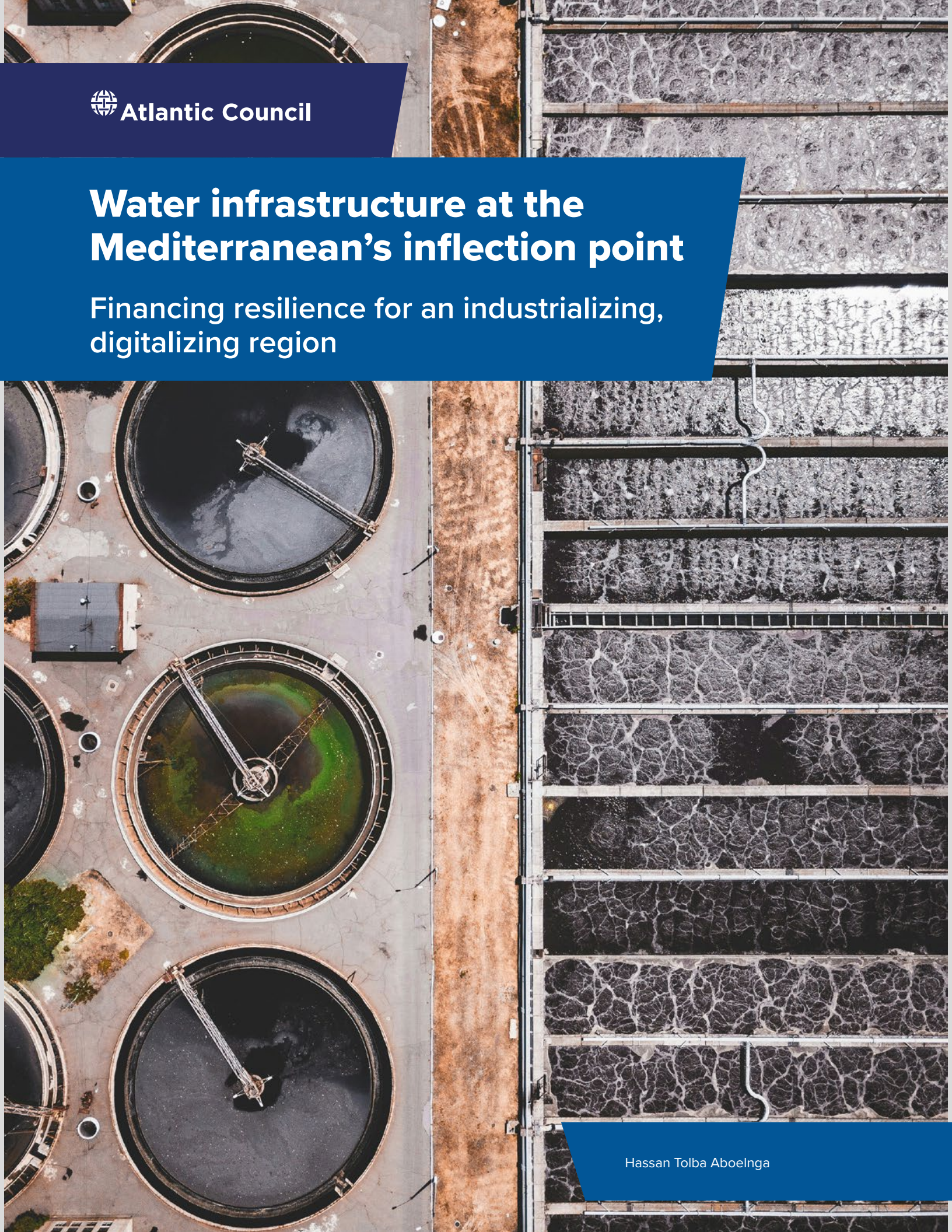


Atlantic Council

Water infrastructure at the Mediterranean's inflection point

Financing resilience for an industrializing, digitalizing region

Hassan Tolba Aboelnga



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Please direct inquiries to:

Atlantic Council
1400 L Street NW, 11th Floor
Washington, DC 20005

Author
Dr.-Ing. Hassan Tolba Aboelnga,
International Water Security and Climate Resilience Expert
iWater Coordinator, TH Köln – Cologne University of Applied Sciences
Co-Chair, Water Security Bureau, International Water Resources Association (IWRA)

Limak

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Executive summary

The Mediterranean basin is entering a period in which infrastructure and institutions increasingly determine whether physical water scarcity becomes a binding constraint on economic development. For decades, the dominant narrative about Mediterranean water scarcity has centered on agriculture: irrigation demand, food security, and the slow depletion of aquifers and rivers. That narrative remains true but is no longer complete and no longer the most useful frame for policymakers and investors deciding where to put capital in the next five years.

An additional, potentially fast-growing source of pressure is emerging: the water and energy footprint of industrialization, construction, and digital infrastructure. Ports, petrochemical and manufacturing corridors, tourism-driven coastal construction, and a wave of data center investment across North Africa, the Levant, and southern Europe can place concentrated and growing demands on water systems that were designed for an earlier economic structure. Industrial and digital water requirements can be continuous and concentrated near cities and industrial zones, although their timing and intensity vary across facilities; agricultural demand also varies across crops and locations. That coupling means water planning in the Mediterranean can no longer be separated from energy planning or from the siting decisions of private investors.

This report argues that closing the region's water infrastructure gap requires three shifts in how governments, financiers, and development institutions approach the problem. First, infrastructure planning needs to incorporate industrial and digital demand within existing water-energy-food-ecosystems approaches, without diminishing agricultural water security. Second, financing needs to move decisively toward blended structures and public-private partnerships (PPP) that can absorb the capital intensity of desalination, wastewater reuse, and network rehabilitation, because public budgets alone are unlikely to meet the substantial water-infrastructure investment needs. Third, next-generation technology, from digital twins to advanced desalination to artificial intelligence (AI)-driven demand forecasting, should be treated as a tool for de-risking investment and extending the life of existing assets, not as a substitute for the governance and tariff reforms that make infrastructure bankable in the first place.

The report gives particular attention to data centers, the newest and least understood source of Mediterranean water demand. It applies the same technical metrics that the digital infrastructure sector itself uses—water usage effectiveness and power usage effectiveness—so that policymakers can evaluate data center investment with the same analytical rigor applied to desalination or irrigation projects. It closes by situating these findings within the negotiating agenda converging on Antalya for COP31—where climate finance, adaptation, and industrial decarbonization are set to dominate discussion—and by proposing a set of policy recommendations for governments, multilateral development banks, and private investors.

The report's added analytical contribution is to distinguish three risks that conventional supply-demand planning tends to collapse into a single deficit: demand-shape risk, when continuous and spatially concentrated industrial or digital loads change the system load profile; sequencing risk, when water-intensive investment is permitted before the water and energy capacity needed to serve it is secured; and Rio-alignment risk, when an infrastructure response improves water security while shifting costs to climate, biodiversity, land, or drought resilience. A Water-Rio infrastructure alignment screen is proposed as a practical way to test these trade-offs at the project-preparation stage.

1. A region under compounding pressure and a demand curve that is changing shape

The Mediterranean and the wider Middle East and North Africa region is the most water-stressed region in the world. World Bank analysis projects that by 2030, renewable water availability per capita across the Middle East and North Africa will fall below the internationally recognized absolute scarcity threshold of five hundred cubic meters per person per year, and that by 2050 the region will need an additional 25 billion cubic meters of water annually just to meet demand under current trajectories—a volume equivalent to building roughly sixty-five desalination plants the size of Saudi Arabia's Ras al-Khair facility, used as a benchmark in the 2023 World Bank analysis.[1] WRI's Aqueduct analysis identifies multiple Middle Eastern and North African countries among those experiencing extremely high water stress.[2] This regional context shapes every infrastructure decision discussed in this report.

For most of the last half-century, the policy conversation about this scarcity has rightly centered on agriculture. Across the wider Middle East and North Africa (MENA) region, agriculture accounts for more than 80 percent of water withdrawals, compared with a global average of roughly 70 percent; this share should not be read as a Mediterranean-wide estimate. Irrigation expansion, groundwater depletion, and the food-water nexus remain first-order concerns and nothing in this report should be read as minimizing them. Meanwhile, industrial and digital demand is emerging as a spatially concentrated source of pressure in selected markets, with distinct financing and governance implications: the water and energy needs of industrialization, urban construction, and digital infrastructure.[3]

Three trends are converging. First, a construction boom tied to urban expansion, tourism, port modernization, and industrial free zones across North Africa and the Levant is placing sustained, high-volume demand on municipal and industrial water networks in coastal and peri-urban areas where freshwater is already scarce. Second, manufacturing and petrochemical corridors are expanding cooling and process-water demand in places where municipal supply and electricity systems are also under pressure. Third, and most novel, a wave of data-center and artificial-intelligence (AI) investment is moving into the wider region. One commercial market estimate projects Middle East and Africa data-center water consumption to rise from approximately 119.34 billion liters in 2025 to 535.71 billion liters by 2031; this should be read as a directional market forecast rather than an official regional inventory.[4] A Gulf-focused policy analysis likewise estimates that AI-related water demand in the United Arab Emirates could reach about 61 billion liters annually by 2030.[5]

This digital and industrial demand differs from agricultural demand in ways that matter enormously for infrastructure planning. It is continuous rather than seasonal, so it does not ease the pressure on supply during the dry months when agriculture typically does. It is geographically concentrated near cities, ports, and power infrastructure rather than dispersed across irrigated land, which means it competes head-on with municipal drinking water supply in the places where populations are densest. And it is tightly coupled to electricity demand: cooling systems for both industrial processes and data centers

1. Dominick de Waal et al., The Economics of Water Scarcity in the Middle East and North Africa: Institutional Solutions, World Bank, April 2023, https://openknowledge.worldbank.org/entities/publication/ab35b03a-23fa-4457-aebd-0f4a89848be1; World Bank, 'Water Scarcity in MENA Requires Bold Actions, Says World Bank Report,' April 27, 2023, https://www.worldbank.org/en/news/press-release/2023/04/27/water-scarcity-in-mena-requires-bold-actions-says-world-bank-report.

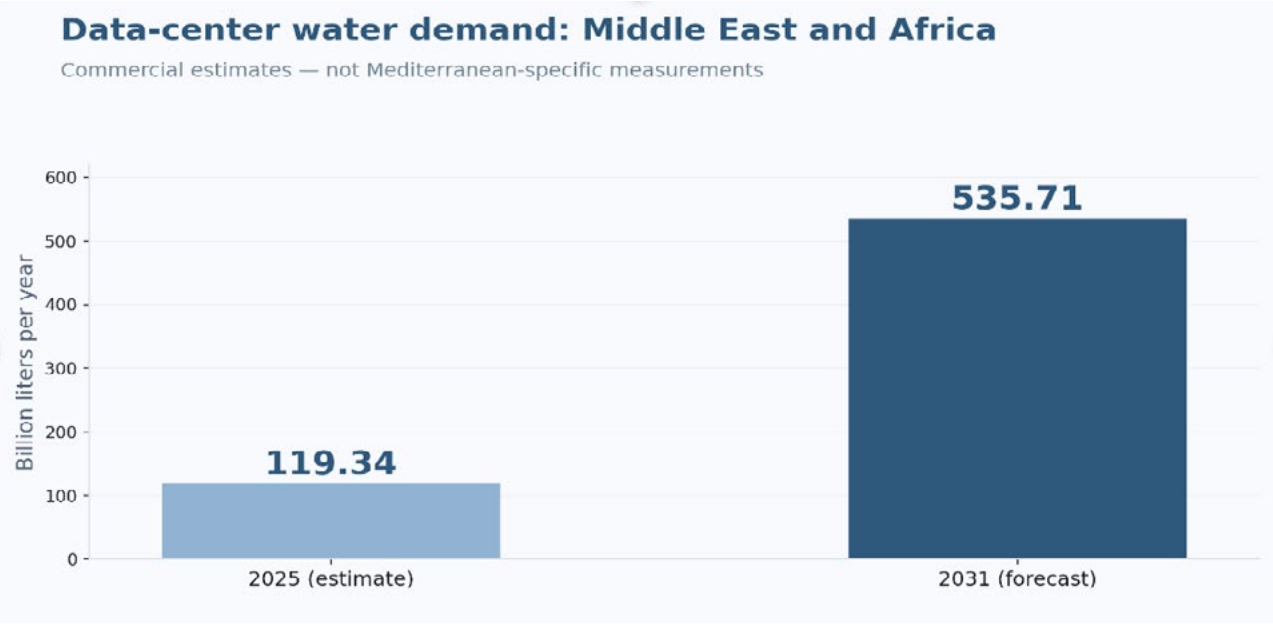
2. World Resources Institute (WRI), '25 Countries Face Extremely High Water Stress,' Aqueduct 4.0 analysis, August 16, 2023, https://www.wri.org/insights/highest-water-stressed-countries; International Water Management Institute (IWMI), 'Middle East and North Africa,' https://www.iwmi.org/where-we-work/mena/.

3. UNICEF, 'Running Dry: Unprecedented Scale and Impact of Water Scarcity in the Middle East and North Africa,' August 22, 2021, https://www.unicef.org/press-releases/running-dry-unprecedented-scale-and-impact-water-scarcity-middle-east-and-north.

4. Mordor Intelligence, 'Middle East and Africa Data Center Water Consumption Market: Growth Trends and Forecast (2026–2031),' 2026 edition, https://www.mordorintelligence.com/industry-reports/study-of-data-center-water-consumption-in-the-middle-east-and-africa. Estimates of 119.34 billion liters in 2025 and 535.71 billion liters in 2031; the 2026–2031 CAGR is 28.43%. Commercial forecast, not a Mediterranean-specific inventory.

5. Abdalftah Hamed Ali and Mohammad Abu Hawash, 'Desert Bytes: Why Gulf AI Ambitions Must Align with Energy and Water Realities,' Middle East Council on Global Affairs, April 9, 2026, https://mecouncil.org/publication/gulf-ai-data-centers-water-energy/.

Figure 1. Illustrative Middle East and Africa data-center water consumption, 2025 and 2031 (commercial market estimate).



Source: "Middle East and Africa Data Center Water Consumption Market," Mordor Intelligence (2026). 2026-2031 forecast CAGR: 28.43%

are among the most power-intensive uses in any economy, so a water-stressed utility now often finds itself managing an energy-stressed grid at the same moment. In Saudi Arabia, data-center electricity demand is projected to grow at approximately 29 percent annually, a separate metric from the forecast growth in water consumption shown in Figure 1; such electricity growth may increase water demand—even where operators adopt more efficient cooling technology.[6]

The policy implication is direct. Infrastructure planners across the Mediterranean can no longer treat water strategy, energy strategy, and industrial zone permitting as three separate processes run by three separate ministries. A desalination plant sized for today's municipal and agricultural demand could become undersized as demand expands if it does not account for the industrial and digital load that economic diversification strategies are actively courting. Conversely, governments that get this sequencing right, permitting new water-intensive investment only where added water and energy capacity is already committed, have an opportunity to turn what looks like a scarcity constraint into a competitive filter that steers investment toward the most efficient, best-governed projects.

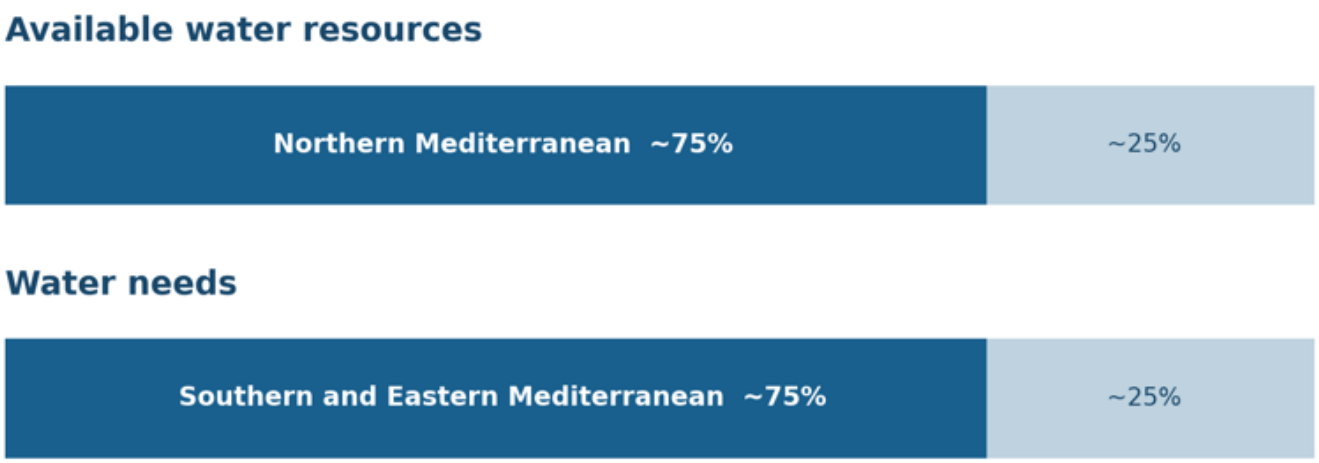
A methodological note is warranted here. Mediterranean-specific information on industrial and digital water demand remains fragmented. Much of the quantitative benchmarking in this report—on data-center water intensity, non-revenue water reduction, and desalination-PPP structuring—therefore draws on selected Gulf or wider Middle East and Africa examples, which are not representative measurements for the Mediterranean. These regions have different climates, water systems, energy mixes, institutions, and investment conditions. Nevertheless, their experience offers relevant, testable lessons on desalination, reuse, demand planning, and infrastructure finance. European Mediterranean countries already face substantial drought and water-scarcity risks, which climate change can intensify; this does not mean their conditions or projected demand are identical to those of the Gulf (EEA, 2024). Mediterranean water-energy-food-ecosystems interactions have also been assessed by MedECC (2024). Building on that literature, this report focuses on the implications of industrial and digital load for project sequencing, financing, and Rio-alignment. External benchmarks are therefore illustrative, not substitutes for Mediterranean-specific inventories or forecasts (see note 7).

The Mediterranean water-resource imbalance offers a region-specific context for the infrastructure choices discussed here. MedECC reports that approximately three-quarters of the basin's water resources are found in its northern countries, while approximately three-quarters of water needs are concentrated in the southern and eastern Mediterranean. These indicative regional shares demonstrate

6. Ali and Abu Hawash, 'Desert Bytes: Why Gulf AI Ambitions Must Align with Energy and Water Realities,' Middle East Council on Global Affairs, April 9, 2026, https://mecouncil.org/publication/gulf-ai-data-centers-water-energy/.

Figure 2. Mediterranean distribution of water resources and water needs (approximate regional shares).

A Mediterranean-specific structural mismatch



Source: Fader et al., 'Water,' in MedECC, First Mediterranean Assessment Report (2020), pp. 181–236, https://doi.org/10.5281/zenodo.7101074. Approximate regional shares, not annual inventories.

why uniform investment prescriptions across the basin would be misleading.

Governance adds a further layer of difficulty, and the Mediterranean's cross-border geography is distinctive. According to MedECC, more than 60 percent of surface water resources in the southern and eastern Mediterranean are transboundary. This means infrastructure planning cannot be purely national. In shared basins such as the Nile and Jordan and across the Eastern Mediterranean, water-supply, energy, and other infrastructure decisions intersect with ongoing transboundary management and diplomatic arrangements. The point here is not to adjudicate those disputes, but to recognize that projects drawing on shared rivers, aquifers, or coastal systems carry regional governance risk. Interministerial coordination therefore needs a cross-border lens: a project can be technically sound yet remain institutionally fragile if it is disconnected from basin-level arrangements.[7]

An applied tool: sizing infrastructure against demand, not against history. Much of the region's infrastructure planning still starts from historical supply-demand balances rather than from a forward-looking diagnostic of where new pressure is concentrating. A more useful starting point is a composite, basin- or city-level security diagnostic that tests water availability, infrastructure capacity, and governance readiness against four demand categories—municipal, agricultural, industrial, and digital—rather than an aggregate figure that obscures which category is driving new risk. Applied at city or industrial-zone level, such a diagnostic could flag a coastal free zone where current desalination capacity is adequate but a pipeline of data center and manufacturing investment would exhaust it before additional supply could realistically be financed and built. Utilities, investment-promotion agencies, and development finance institutions could use a shared diagnostic to align demand forecasts and infrastructure sequencing.

7. MedECC, Climate and Environmental Change in the Mediterranean Basin: Current Situation and Risks for the Future (2020), chapter 3.1, p. 184, https://www.medecc.org/wp-content/uploads/2020/11/MedECC_MAR1_3_1_Water.pdf (transboundary surface waters in the southern and eastern Mediterranean); MedECC, Interlinking Climate Change with the Water-Energy-Food-Ecosystems Nexus in the Mediterranean Basin (2024), doi:10.5281/zenodo.13365388 (existing nexus analysis); European Environment Agency, European Climate Risk Assessment (2024), https://www.eea.europa.eu/en/analysis/publications/european-climate-risk-assessment (drought and water security in Europe).

A Water-Rio infrastructure alignment screen: from nexus diagnosis to investment choice.

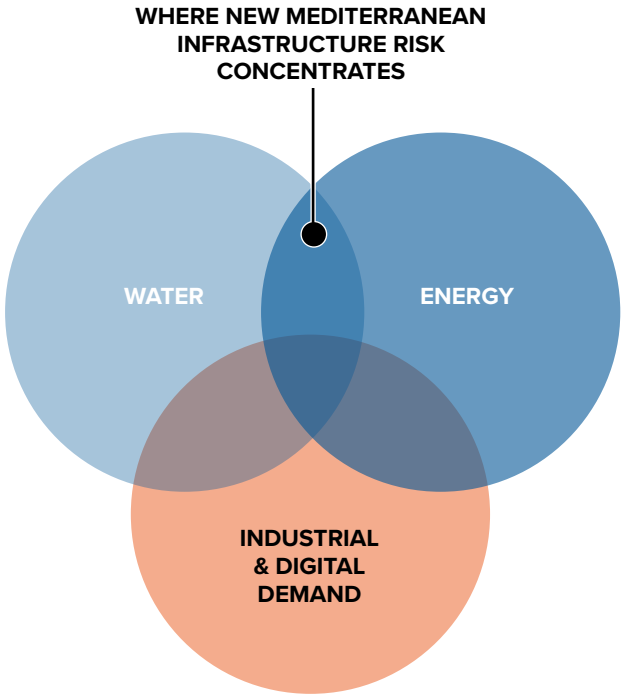
- Demand forecasting can show whether capacity is sufficient, but not whether the chosen response remains coherent with national climate, biodiversity, and land objectives. This report proposes adapting the Water-Rio Diagnostic and Action Framework, developed by the author and undergoing further methodological validation, as an early-stage infrastructure alignment screen. The four country cases illustrate the questions the screen would ask; they do not constitute a completed operational validation. Using water as the connecting lens across the three Rio Conventions, it asks whether a proposed investment creates co-benefits or shifts risk between climate, ecosystems, land and drought resilience, and water security.

- At concept or pre-feasibility stage, the screen asks four practical questions: does the project reduce a defined water-security risk under plausible future demand; what energy, emissions, and adaptation consequences accompany that gain; what effects arise for ecosystems, environmental flows, and pollution; and what consequences arise for land, drought, aquifers, distributional, or transboundary risk? The purpose is not a composite score, but to expose material trade-offs early enough to redesign or resequence a project before financial lock-in.

- The screen complements rather than replaces feasibility studies, environmental and social assessment, lender safeguards, and financial due diligence. Its value is institutional: giving water, energy, environment, investment, and finance actors a common set of front-end questions before each optimizes the project against a different objective.

Figure 3. The water-energy-industrial nexus.

New Mediterranean infrastructure risk concentrates where water, energy, and industrial or digital demand overlap.



2. Data centers and water: The technical picture

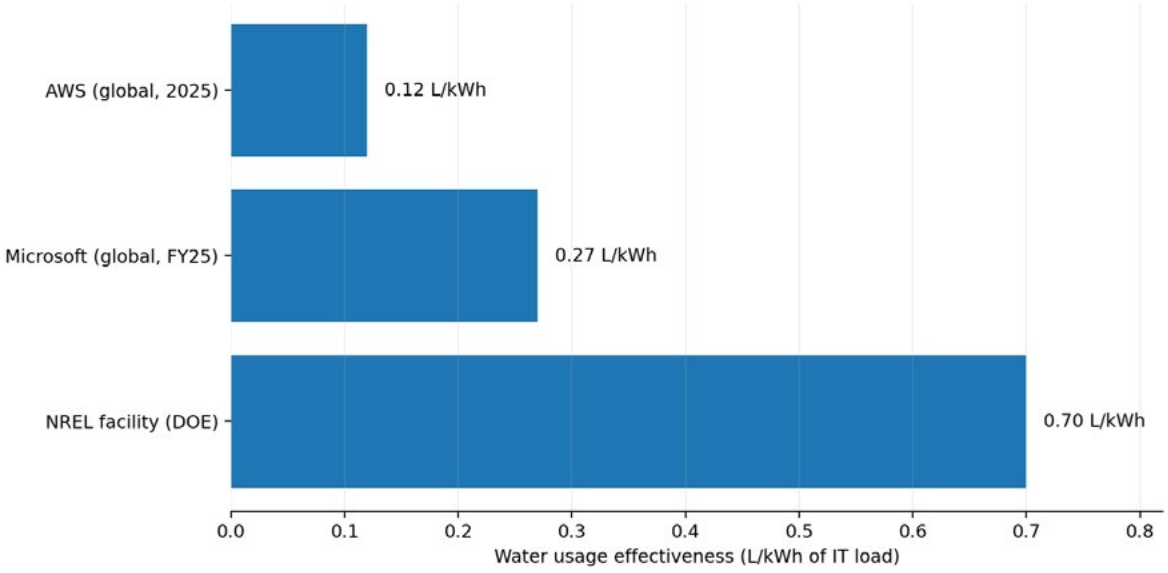
Data centers deserve separate, more rigorous treatment than they typically receive in water policy discussions because their water footprint is measurable with industry-standard metrics that most infrastructure planners have not yet incorporated into national water strategies, and because a meaningful share of that footprint is invisible at the facility gate.

The sector's primary efficiency metric is water usage effectiveness (WUE), measured in liters of water per kilowatt-hour of IT load; power usage effectiveness (PUE) measures total facility energy relative to IT-equipment energy. Both metrics are useful but context-dependent, particularly because WUE varies with climate, cooling architecture, and accounting boundaries.[8]

Recent operator and federal-facility data illustrate the range: AWS reported a global WUE of 0.12 L/kWh in 2025, Microsoft 0.27 L/kWh in FY25, and the US Department of Energy reports 0.7 L/kWh at NREL's high-efficiency data center, paired with a PUE of 1.06.[9] NREL's high energy efficiency (PUE 1.06) should not be interpreted as evidence of lower water consumption. WUE comparisons remain illustrative because climate, cooling systems, and reporting boundaries differ; consistent water and energy performance disclosure is therefore important at permitting and financing stages.

At the frontier, Microsoft has announced a next-generation data-center cooling design that uses a closed-loop system in-

Figure 4. Reported water usage effectiveness across selected data-center contexts.



Sources: AWS (2025), Microsoft (FY25), and US Department of Energy/NREL; see notes 8–9. Values are illustrative, not a direct ranking: AWS reports water withdrawn per kWh, whereas Microsoft reports consumption for cooling and humidification. Facility scopes and accounting boundaries differ.

8. Microsoft Datacenters, 'Measuring Energy and Water Efficiency for Microsoft Datacenters,' https://datacenters.microsoft.com/sustainability/efficiency/.

9. Amazon Web Services, 'Sustainable Cloud Computing,' https://aws.amazon.com/sustainability/ (AWS WUE defined as liters withdrawn per kWh of IT load); Microsoft Datacenters, 'Measuring Energy and Water Efficiency for Microsoft Datacenters,' https://datacenters.microsoft.com/sustainability/efficiency/ (water consumption for cooling and humidification); US Department of Energy, 'Cooling Water Efficiency Opportunities for Federal Data Centers,' https://www.energy.gov/cmei/femp/cooling-water-efficiency-opportunities-federal-data-centers. Metrics and facility boundaries are not identical.

tended to avoid water evaporation for cooling after initial fill.[10] This does not eliminate all water use at the facility or in the electricity supply chain, but it shows that direct cooling-water demand can be materially reduced through design choices.

The water implications of AI workloads should be stated cautiously. High-density AI clusters can increase power and cooling requirements, but actual water intensity varies widely with climate, cooling technology, server utilization, and electricity mix. A peer-reviewed estimate found that training GPT-3 in Microsoft's US data centers could consume about 700,000 liters of onsite freshwater under the study's assumptions.[11] The point for planners is not that every AI workload has this footprint, but that rapid growth in high-density computing can create concentrated, location-specific water demand that should be assessed before capacity is committed.

A second, frequently overlooked dimension is indirect or embedded water demand: the water consumed not at the data center itself but at the power plants generating the electricity it draws from the grid. Thermoelectric power generation, still the dominant source of electricity across most of the Mediterranean and the wider Middle East and North Africa region, itself consumes water for cooling, meaning that even a data center with a facility-level water usage effectiveness of zero carries an indirect water footprint proportional to its electricity consumption and the water intensity of the generation mix supplying it. This distinction matters directly for regional policy: a data center in a market still dependent on gas- or oil-fired thermal generation with water-cooled condensers has a larger true water footprint than its onsite metrics suggest, while the same facility paired with air-cooled combined-cycle generation or with dedicated solar and wind capacity—an increasingly common pairing in Gulf and North African renewable-plus-desalination projects—can approach a genuinely low water footprint on both counts simultaneously. Regional water strategies should therefore evaluate data center investment on a combined direct-plus-indirect water intensity basis, not on facility-level water usage effectiveness alone, and should treat co-located or contracted renewable generation as a water security criterion, not only a decarbonization one.

For the Mediterranean specifically, this technical picture supports three conclusions. First, WUE and PUE disclosure should become a standard permitting requirement for large data centers, using transparent and consistent accounting boundaries. Second, because water intensity can differ materially across cooling technologies, climates, and operating conditions, permitting requirements and tariffs should reflect actual resource use rather than a flat industrial category. Third, indirect water demand through electricity generation should be considered alongside onsite cooling demand; in water-stressed locations, pairing digital infrastructure with low-water electricity supply can be a water-security measure as well as a decarbonization measure.

10. Steve Solomon, 'Sustainable by Design: Next-Generation Datacenters Consume Zero Water for Cooling,' Microsoft, December 9, 2024, https://www.microsoft.com/en-us/microsoft-cloud/blog/2024/12/09/sustainable-by-design-next-generation-datacenters-consume-zero-water-for-cooling/.

11. Pengfei Li, Jianyi Yang, Mohammad A. Islam, and Shaolei Ren, 'Making AI Less Thirsty: Uncovering and Addressing the Secret Water Footprint of AI Models,' Communications of the ACM 68, no. 7 (2025): 54–61, https://doi.org/10.1145/3724499.

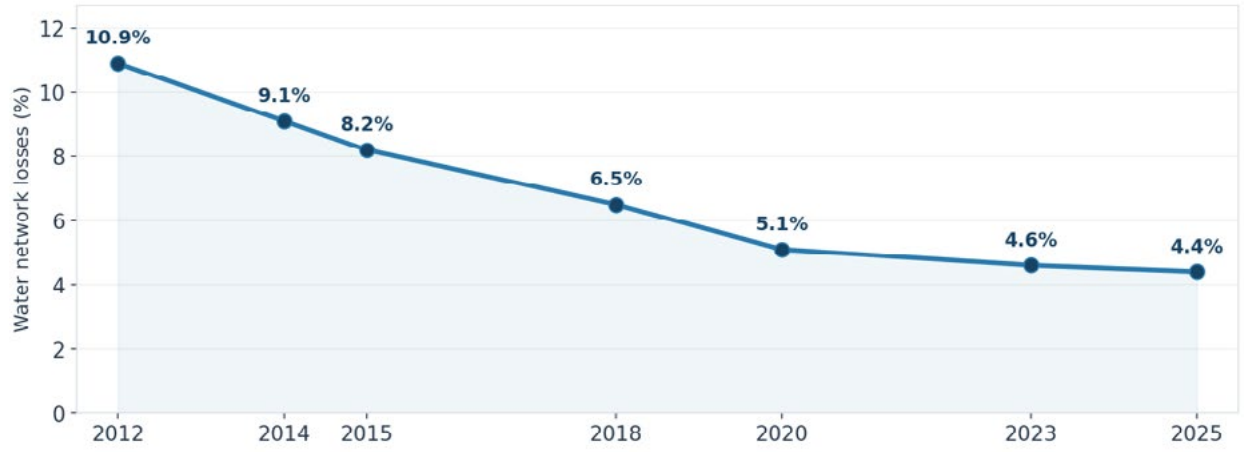
3. Infrastructure gaps: Aging networks, a desalination dependency, and an underused reuse opportunity

The region's water infrastructure gap has three distinct components and each requires a different financing and technical response.

The first is the conventional network gap: aging distribution systems, high physical and commercial losses, and underinvested wastewater collection. Water that is produced but never billed because of leakage, theft, or metering failure has already incurred pumping, treatment, and often desalination costs before it is lost. Reducing those losses is frequently among the least-cost ways to create usable supply and improve utility revenue predictability. Dubai Electricity and Water Authority (DEWA) reported a decline in its own water-network losses from 10.9 percent in 2012 to 4.4 percent in 2025. This within-utility trend illustrates sustained network improvement without assuming comparability with differently defined international leakage benchmarks.[12]

The second component is the growing dependency on non-conventional water sources—principally desalination and treated wastewater reuse—to close the gap that conservation and network rehabilitation alone cannot. The MENA region generates about 21.5 billion cubic meters of municipal wastewater annually. Approximately 10 percent is treated and reused directly, another 36 percent is reused indirectly (often without adequate treatment), and around 54 percent is discharged to the sea or evaporates without productive use. These represent wastewater fate and reuse categories, not treatment rates.[13] Wastewater reuse projects have doubled in number roughly every decade since 1990 but from a low base, and the region's institutions have historically treated reuse as a wastewater-disposal problem rather than as a supply-side infrastructure investment with its own dedicated financing track. Desalination, meanwhile, is expanding rapidly but carries capital and energy costs that dwarf conventional surface or groundwater development, meaning that every

Figure 5. DEWA water-network losses, 2012–2025: A within-utility trend.



Source: Dubai Electricity and Water Authority (DEWA), World-Class Results, 2012–2025; see note 12.

12. Dubai Electricity and Water Authority, 'World-Class Results,' 2026, https://www.dewa.gov.ae/en/about-us/strategy-excellence/world-class-results; DEWA, Annual Statistics 2025, https://www.dewa.gov.ae/en/about-us/strategy-excellence/annual-statistics.

13. Javier Mateo-Sagasta, Mohamed al-Hamdi, and Khaled AbuZeid, eds., Water Reuse in the Middle East and North Africa: A Sourcebook (IWMI, 2023), https://cgspace.cgiar.org/server/api/core/bitstreams/533f4156-9b0f-4c0d-8db6-8bf6d0b74b43/content; IWMI, ReWater MENA Dashboard, https://rewater-mena.iwmi.org/dashboard/. Direct and indirect reuse shares describe wastewater fate, not treatment rates.

new desalination commitment is also functionally an energy-sector commitment and a fiscal one.

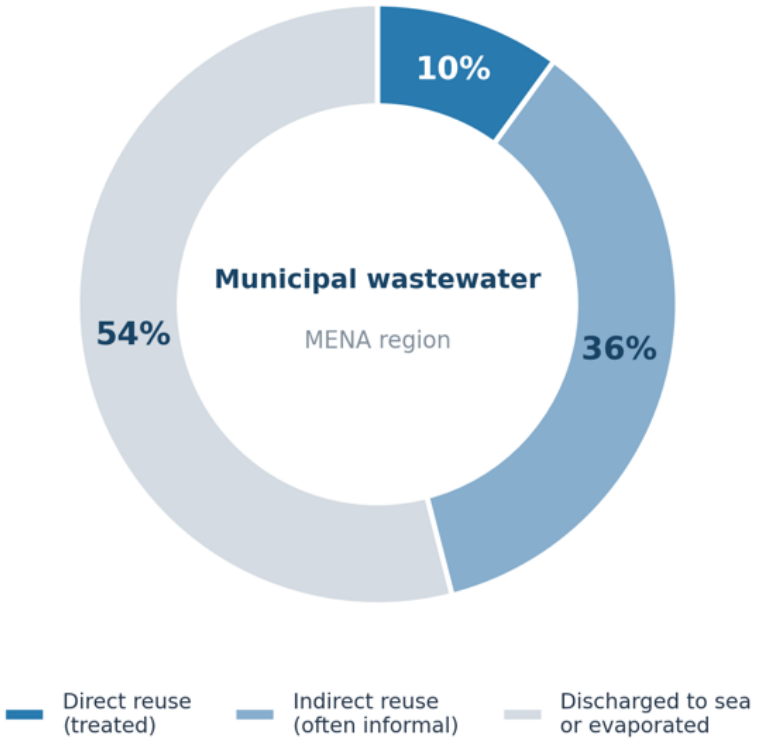
The Mediterranean coastal dimension reinforces the investment case: UNEP/MAP (2017) estimates that approximately 80 percent of Mediterranean marine pollution originates from land-based human activities, while MedECC identifies land-based pressures as a leading driver of Mediterranean coastal water pollution. Important sources include municipal wastewater, urban solid waste, agricultural runoff, and industrial discharges. These marine-pollution figures should not be conflated with wastewater treatment or reuse rates.

Sources for Mediterranean coastal pollution: UNEP/MAP, 2017 Mediterranean Quality Status Report, https://medqsr.org/land-based-pollution-sources/; MedECC, Coastal Risks Summary for Policymakers (2024), https://www.medecc.org/medecc-reports/med-coastal-risks/summary-for-policymakers-en/.

The third component—the one most exposed by the demand-side shift described above—is the absence of dedicated infrastructure planning for industrial and digital water users. Most national water strategies in the region were designed around municipal and agricultural demand projections and have not been systematically updated to incorporate industrial-zone expansion or data-center pipelines, in part because water-sector planning and investment-promotion agencies sit in different parts of government and rarely share demand data. The result is a structural mismatch: agencies may court water-intensive investment while the utilities meant to serve it are working from older demand forecasts.

Closing this three-part gap is not primarily a technology problem. Reverse-osmosis desalination, membrane treatment for reuse, and modern leak-detection systems are mature and commercially available. The binding constraints are often financial and institutional: utility tariffs that do not recover costs, fragmented permitting between water, energy, and industrial authorities, and too few well-prepared projects capable of absorbing private capital at scale. The remaining sections therefore focus on financing, risk allocation, and technologies that improve decision quality rather than substitute for governance reform.

Figure 6. Fate of municipal wastewater in the MENA region: Direct reuse, indirect reuse, and discharge or evaporation.



Source: International Water Management Institute (IWMI), ReWater MENA; Mateo-Sagasta, al-Hamdi, and AbuZeid, eds., Water Reuse in the Middle East and North Africa: A Sourcebook (2023). Approximate shares; not treatment statistics.

4 Case studies from across the basin: Four models for closing the gap

Abstract diagnosis is more persuasive when tested against what governments and utilities are actually building. Four projects—two from North Africa, one from southern Europe, and one from Turkey, this year's COP31 host—illustrate different aspects of the argument made in this report. They also demonstrate that Mediterranean countries have instructive, though geographically diverse, approaches to water-infrastructure investment; Morocco's Casablanca example is on the Atlantic coast.

Egypt: Scaling agricultural drainage-water treatment for the New Delta

Egypt's wider New Delta program was officially inaugurated in May 2026. Its El Hammam drainage-water treatment complex, completed in 2023, has a design capacity of 7.5 million cubic meters per day and is part of a wider conveyance scheme that was still under construction in 2026 for agricultural water reuse. The wider New Delta program targets about 2.2 million feddans of agricultural expansion; the El Hammam system is one component of that broader program.[14] In the terms of this report, the project is best read as a large-scale supply-side reuse investment. It also illustrates sequencing risk: treatment and long-distance conveyance create significant energy and operating requirements, so long-term water-security benefits depend on completion of conveyance, reliable inflows, energy and operating costs, and effective management of soils and salinity.

Morocco: Pairing desalination with dedicated renewable generation through a public-private structure

Morocco's Casablanca desalination plant, located on the Atlantic coast, is under construction with a planned total capacity of 300 million cubic meters per year. In 2026, Morocco's Ministry of Economy and Finance reported that the first 200-million-cubic-meter phase was 81 percent complete, with commissioning scheduled for February 2027; the project developer ACCIONA states that the plant is planned to be powered by dedicated renewable wind generation. The case therefore illustrates a useful design principle for water-stressed economies: new supply should be planned alongside the electricity needed to operate it. Morocco's broader desalination program also shows the importance of portfolio-level planning rather than one-off emergency projects.[15]

Spain: A wealthy, well-governed utility still forced into emergency diversification

Barcelona and the wider Catalonia region offer a useful corrective to any assumption that this report's argument applies only to lower-income parts of the basin. A multiyear drought pushed Catalan reservoirs below 20 percent of capacity in 2024, and the metropolitan water mix shifted rapidly toward a more diversified portfolio of desalination and regenerated wastewater.[16] Barcelona's experience underscores a financing point rather than an engineering

14. State Information Service of Egypt, 'Mega Projects: New Delta Project,' https://sis.gov.eg/en/egyptians-abroad-portal/mega-projects/; Guinness World Records, 'Largest water treatment plant,' July 26, 2023, https://www.guinnessworldrecords.com/world-records/86215-largest-water-treatment-plant; Egypt Ministry of Water Resources and Irrigation, official project update (2026), https://www.mwri.gov.eg/med/?p=628; Ministry statement reported by Shorouk, August 1, 2026, https://www.shorouknews.com/news/view.aspx?cdate=01082026&id=b23d0c41-650e-4c65-9106-d0325d59fa90.; Presidency of the Arab Republic of Egypt, "President El-Sisi Witnesses Inauguration of the New Delta Project," May 17, 2026, https://www.presidency.eg/EN/راب-خ-أ/راب-خ-أ-ا-م-س-ق-ة-ي-س-ا-ئ-ر/news1752026/; AmCham Egypt, Egypt Economic Report (2023), p. 174, https://www.amcham.org.eg/bsac/eer2023.pdf.

15. Morocco Ministry of Economy and Finance, 'Board of Directors of the National Office of Electricity and Drinking Water (ONEE),' 2026, https://www.finances.gov.ma/en/Pages/detail-actualite.aspx?fiche=7799; Kingdom of Morocco, 'Throne Day Speech,' July 2024, https://www.maroc.ma/fr/discours-messages-royaux/discours-royaux/sm-le-roi-adresse-un-discours-la-nation-loccasion-de-la-fete-du-trone-texte-integral. ACCIONA, 'ACCIONA Signs Financing for Casablanca Desalination Plant,' May 8, 2025, https://www.acciona.com/updates/news/acciona-signs-financing-casablanca-desalination-plant (projected wind-power supply and PPP structure).

16. Joseph Wilson, 'Drought-Struck Barcelona Quenches Thirst with Costly Desalination,' Associated Press, May 29, 2023, https://apnews.com/article/spain-barcelona-desalination-drought-climate-fcef13d68e8e1e760391408195e05804; Euronews, 'Worth Its Salt: Can Desalination Help Combat Europe's Water Crisis?' October 1, 2024, https://www.euronews.com/2024/10/01/worth-its-salt-can-desalination-help-address-europes-freshwater-needs.



Source: Pexels/Orhan Akbaba

one: emergency diversification can be technically feasible yet expensive and difficult to deliver quickly. That strengthens the case for preparing diversified supply and reuse options before drought turns them into urgent procurement.

Turkey: The COP31 host's own treatment-versus-reuse gap

Turkey has expanded wastewater treatment substantially over the past two decades, but reuse remains limited relative to technical potential. Türkiye's Seventh State of the Environment Report (2025) reports that reuse of treated wastewater reached approximately 5.5 percent in the first half of 2024 and identified a much larger reuse potential, while a 2026 EU-supported government project is examining reuse of treated urban wastewater for agriculture, industry, and environmental purposes.[17] The treatment-versus-reuse gap is important: treatment capacity produces resilience only when quality standards, non-potable distribution, and demand are developed alongside it. As COP31 host, Turkey offers a particularly relevant test of whether existing treatment assets can be translated into circular water supply and drought resilience.

Read together, the four cases support the report's central claim from a different angle: the Mediterranean already contains examples of large-scale reuse, renewable-linked desalination, drought-driven diversification, and treatment systems with unrealized reuse potential. The regional challenge is to turn these lessons into repeatable planning, financing, and project-preparation practice rather than isolated national responses.

A cross-case Water-Rio reading.

The four cases also show why added supply alone is not an adequate measure of resilience. Egypt's reuse investment raises water-recovery, energy, and land-use questions; Morocco's desalination-plus-renewables model reduces an energy trade-off while leaving marine and affordability issues; Barcelona shows the value and cost of diversification under drought; and Turkey shows that treatment capacity produces resilience only when reuse networks and demand align. The useful comparison is therefore not desalination versus reuse, but the combined water, energy, ecosystem, land, governance, and financing outcomes.

17. Republic of Türkiye, Ministry of Environment, Urbanization and Climate Change, Seventh State of the Environment Report of Türkiye (2025), p. 194, https://webdosya.csb.gov.tr/db/cis/edergi/7_State_Of_Environment_Report_Of_Turkiye/files/basic-html/page194.html (reported reuse of approximately 5.5%); Republic of Türkiye, 'Reuse of Treated Urban Wastewater for Different Alternatives,' June 25, 2026, https://cygm.csb.gov.tr/haberler/aritilmis-kentsel-atik-sularin-farkli-alternatifler-icin-yeniden-kullanimi-projesi-kapsaminda-proje-yonlendirme-kurulu-1-toplantisi-ve-eylem-koordinasyon-birimi-2-toplantisi-gerceklestirildi-305885. Different program baselines should not be conflated.

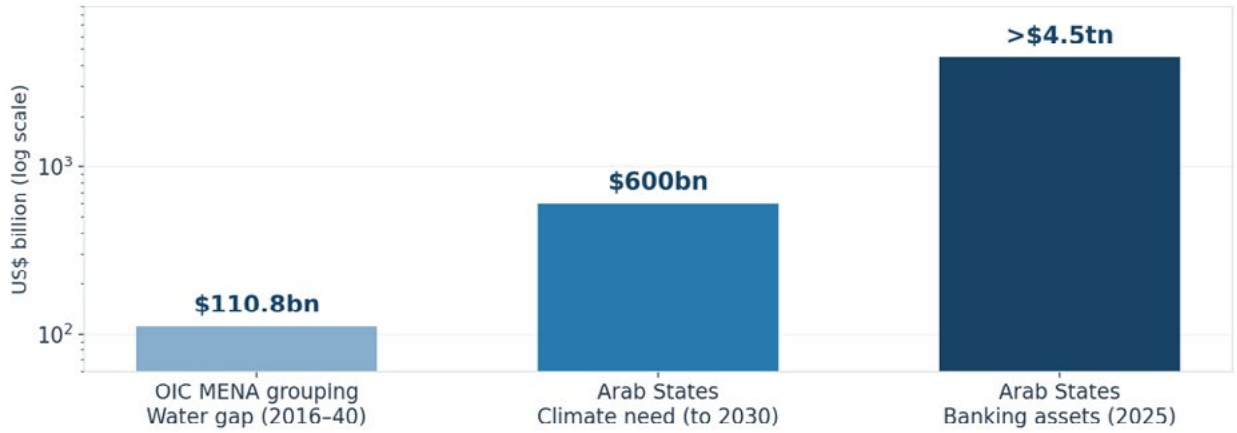
5. Financing the gap: From sovereign balance sheets to blended finance and PPPs

The scale of the region's infrastructure financing need exceeds what public budgets alone can carry. The ICD–Refinitiv OIC Infrastructure Outlook estimated the 2016–2040 infrastructure funding gap for the OIC member countries in its Middle East and North Africa grouping at about $994 billion, including $110.8 billion for water.[18] The comparison with available capital needs care because scopes and time horizons differ: UNDP estimates that Arab States need about $600 billion by 2030 to meet climate commitments, while the region holds more than $4.5 trillion in banking assets.[19] Taken together, these figures point less to an absolute absence of capital than to a project-preparation challenge: too few water investments reach a form that can credibly attract public, concessional, and commercial finance.

Three financing shifts are already under way and deserve to be accelerated deliberately rather than left to develop opportunistically.

Public-private partnerships are moving from pilot projects toward repeatable pipelines. Saudi Water Partnership Company's 2024 portfolio listed fifty projects across planning, tendering, construction, and operation, spanning independent water plants, sewage treatment, transmission,

Figure 7. Illustrative scale comparison of infrastructure and climate-finance needs with banking assets.



Sources: ICD–Refinitiv, OIC Infrastructure Outlook 2023; UNDP Regional Bureau for Arab States, 2025. Different geography, measures, and periods; figures are not directly comparable. Logarithmic scale.

18. Islamic Corporation for the Development of the Private Sector and Refinitiv, OIC Infrastructure Outlook 2023, p. 7, https://icd-ps.org/uploads/files/ICD_Refinitiv_OIC%20Infrastructure%2020231684234692_8787.pdf.

19. Abdallah Al Dardari, 'From Capital to Community: Scaling Green Finance in the Arab States,' UNDP Regional Bureau for Arab States, June 30, 2025, https://www.undp.org/arab-states/blog/capital-community-scaling-green-finance-arab-states.

and strategic storage.[20] Its developer-qualification program also creates a reusable route for private firms to participate across multiple water and wastewater projects.[21] The wider lesson for Mediterranean markets is not to copy one national model, but to institutionalize project preparation, standardized procurement, long-term offtake arrangements, and repeatable risk allocation.

Blended finance remains underused relative to its potential and structurally underweighted toward water. Across all Sustainable Development Goal sectors, annual blended finance flows have held at roughly $15 billion against an estimated global need in the trillions. Even within the smaller infrastructure blended-finance market, water and wastewater account for only about one-fifth of total allocations.[22] Where it has been deployed well, blended finance has proven capable of improving project bankability precisely because it combines concessional capital that absorbs early-stage and policy risk with commercial capital that demands the discipline of a real return. But current structures often over-index on de-risking the private investor while underinvesting in the underlying project pipeline and institutional capacity that would make de-risking unnecessary in the first place.[23]

Sustainable sukuk are increasingly being used to finance water and other environmental assets. Abu Dhabi Islamic Bank's inaugural $500 million green sukuk had allocated $451 million by the end of 2024, with 55 percent of allocated proceeds directed to sustainable water and wastewater management and 43 percent to renewable energy.[24] This is a more relevant regional signal than an unlabeled bond issuance: investors can channel Sharia-compliant capital toward water assets when use-of-proceeds rules, reporting, and verification are explicit.

For financing to keep pace with industrial and digital demand, three structural changes are needed beyond simply mobilizing more capital. First, industrial and digital water tariffs need to reflect the marginal cost of supply, including desalination or long-distance conveyance where relevant, while protecting targeted affordability measures for households. Second, project pipelines need realistic risk allocation: demand risk should not be transferred mechanically to private operators when revenues depend largely on public tariff policy. Third, development finance institutions can add value at the pre-construction stage by funding project preparation, feasibility work, tariff design, environmental and social studies, and legal structuring—the work that determines whether a project ever reaches financial close.

From project pipeline to investable, Rio-aligned pipeline.

Project preparation should therefore include the cross-sector alignment screen before concessional capital is used to de-risk a transaction. For financiers, its value is earlier identification of risks that can later appear as permitting delay, energy-price exposure, ecosystem opposition, or drought under-performance. Projects that manage these risks are stronger candidates for adaptation, resilience, or blended-finance structures; projects that merely transfer risk should be redesigned before financial lock-in.

20. Saudi Water Partnership Company, PPP Project Portfolio, September 2024, https://www.swpc.sa/wp-content/uploads/2024/09/SWPCF24_Sept24.pdf.

21. Saudi Water Partnership Company, 'Developer Qualification Initiative,' https://www.swpc.sa/en/developer-qualification-initiative/.

22. Organisation for Economic Co-operation and Development, 'Discussion Highlights, Twelfth Meeting of the Roundtable on Financing Water,' April 16, 2025, https://www.oecd.org/content/dam/oecd/en/events/2025/04/twelfth-meeting-of-the-roundtable-on-financing-water/Discussion-highlights-12th-Roundtable-on-Financing-Water.pdf.

23. OECD, 'Discussion Highlights, Twelfth Meeting of the Roundtable on Financing Water.'

24. Abu Dhabi Islamic Bank, Green Sukuk Impact & Allocation Report 2024, https://www.adib.ae/-/media/project/adib/adibsite/docs/esg-and-sustainability/disclosures/adib-green-sukuk-impact-allocation-report.pdf.

6. Next-generation infrastructure: Technology as a tool for de-risking, not a substitute for reform

Beyond the data-center technologies discussed above, a broader set of emerging tools can help close the Mediterranean's water infrastructure gap. Their greatest value is in making existing and planned infrastructure more efficient, resilient, and financeable—not in replacing the governance and financing reforms described earlier.

Smart metering, leak detection, and digital twins allow utilities to identify non-revenue water losses and test network interventions more quickly than manual inspection alone. Digital-twin modeling can also simulate the effect of new industrial or data-center connections on network pressure and supply reliability before capital is committed, helping close the planning gap between investment promotion and utility capacity.

Next-generation desalination is reducing, though not eliminating, the sector's historic energy penalty. Advances in energy-recovery devices and membrane efficiency have lowered the energy intensity of modern reverse-osmosis plants. Pairing desalination with renewable generation can also reduce exposure to fossil-fuel price volatility and grid constraints, while lowering the indirect water and emissions footprint of new supply.

AI-driven demand forecasting and industrial water accounting can help close the data gap between investment-promotion agencies and water utilities. A regional disclosure standard requiring large industrial and digital investors to report projected water and energy demand at the permitting stage, building on WUE and PUE disclosure, would give utilities and financiers better forward visibility and help governments sequence approvals behind credible water and energy capacity.

Decentralized and modular treatment technology, including containerized desalination and membrane bioreactor units that can be deployed faster and at smaller scale than conventional plants, is particularly well suited to industrial zones and data center campuses that need dedicated, non-municipal water supply on a timeline measured in months rather than years. This also reduces the risk that new industrial demand crowds out municipal supply during construction and ramp-up.

None of these technologies substitute for tariff reform, risk-sharing project structures, or interministerial coordination. A digital twin cannot fix a tariff that does not recover costs, and green finance cannot compensate for a permitting process that approves a data-center campus without confirming the water and energy capacity to serve it. Technology should be judged by whether it makes the underlying infrastructure investment more resilient and financeable and the governance decision better informed.

7. Relevance to COP31: Water infrastructure as climate finance and adaptation policy

COP31 convenes in Antalya, Turkey, from November 9–20, 2026. Turkey holds the presidency, with Murat Kurum nominated as COP31 President; under the Turkey–Australia partnership, Australia's Chris Bowen serves as President of Negotiations.[25] Three parts of the COP31 implementation agenda bear directly on this report: climate finance, the Action Agenda, and the connection between adaptation investment and cross-Rio implementation.

Climate finance and the New Collective Quantified Goal: The climate-finance architecture entering COP31 includes the New Collective Quantified Goal agreed at COP29: at least $300 billion annually for developing countries by 2035, alongside a broader call to scale finance from public and private sources to at least $1.3 trillion per year by 2035.[26] Mediterranean water projects should not be assumed to qualify automatically, but projects with a clear climate rationale, measurable resilience benefits, and credible safeguards can be structured to compete for adaptation and blended finance. Water infrastructure also offers measurable service and avoided-cost indicators—from reduced network losses to reduced exposure to variable freshwater supply—that can strengthen such proposals.

The Action Agenda and Rio Synergy: The official COP31 Action Agenda contains ten priorities, including Climate-Resilient Cities, Green Industrialization, Clean Energy Transition, the Climate Implementation Bridge, and Rio Synergy.[27] This creates a direct policy opening for the water-energy-industrial agenda developed here. A water-efficient data center paired with credible energy and supply planning can contribute simultaneously to resilient-city and green-industrial objectives; the Rio Synergy theme also provides a natural institutional home for testing how water investments interact with climate, biodiversity, and land objectives.

Adaptation finance: Water infrastructure has often been financed through development or municipal-service channels even when its primary function is to manage climate-related water risk. The Paris Agreement's Global Stocktake is the five-year process for assessing collective progress toward its long-term goals and informing stronger national action and international cooperation; the second stocktake begins at COP31.[28] This strengthens the case for treating qualifying water infrastructure as adaptation investment, but it does not create automatic eligibility for concessional finance. Projects still need a clear climate rationale, additionality, appropriate safeguards, and measurable resilience benefits. Where those conditions are met, adaptation framing can improve access to climate-finance instruments.

From climate-finance classification to Rio implementation.

The stronger proposition is not simply to relabel water infrastructure as adaptation. It is to use the same investment pipeline to connect implementation across national climate commitments and adaptation plans, biodiversity strategies, and land- and drought-related plans. A Water-Rio screen can make those intersections visible without claiming that every water project produces co-benefits across all three conventions. Where trade-offs are material—for example, energy-intensive supply augmentation, brine disposal, altered environmental flows, or land-development effects—the screen makes them explicit before a project is presented as climate-resilient infrastructure.

The practical recommendation is that governments and development finance institutions preparing for Antalya should arrive with costed, adaptation-framed pipelines of Mediterranean water-energy-industrial projects rather than treating water as a side conversation to finance and industrial-decarbonization discussions. The value of a COP31 launch is therefore not the event itself, but the opportunity to move a small number of credible projects from diagnosis to preparation, financing, and implementation.

25. UNFCCC, 'UN Climate Change Conference – Antalya, November 2026,' https://unfccc.int/cop31; UNFCCC, 'The Road to Antalya,' https://unfccc.int/cop31/the-road-to-antalya.

26. UNFCCC, 'UN Climate Change Quarterly Update: Q4 2024,' https://unfccc.int/about-us/reports-highlights/quarterly-updates/un-climate-change-quarterly-update-q4-2024; UNFCCC, 'New Collective Quantified Goal on Climate Finance,' https://www.unfccc.int/NCQG.

27. COP31 Türkiye, 'COP31 Action Agenda,' https://cop31.tr/action-plan.

28. UNFCCC, 'The Second Global Stocktake,' https://unfccc.int/topics/global-stocktake/about-the-global-stocktake/the-second-global-stocktake.

8. Policy recommendations

The following recommendations are addressed to four audiences converging at COP31 in Antalya: national governments across the Mediterranean and the wider Middle East and North Africa region; multilateral and regional development finance institutions; private investors in water, energy, and digital infrastructure; and COP31 negotiators and the Action Agenda secretariat.

For governments

1. Integrate industrial and digital water demand into national water strategies as a distinct, explicitly forecast category separate from municipal and agricultural demand, and require investment promotion agencies to share project pipelines with water utilities before industrial and digital investment is approved.

2. For large data centers and water-intensive industrial projects, establish site-specific, independently verifiable water-efficiency and, where appropriate, water-neutrality or water-positive requirements. Define the accounting boundary, source and quality of water, local basin impacts, verification period, and treatment of offset claims. Require transparent disclosure of water usage effectiveness and power usage effectiveness, evidence of committed water and energy capacity, and consideration of closed-loop or reuse-based cooling, with safeguards against shifting costs to households or ecosystems.

3. Reform industrial and digital water tariffs to recover the true marginal cost of supply, ending implicit cross-subsidies from municipal ratepayers, while protecting targeted, transparent subsidies for low-income domestic consumers.

4. Establish interministerial planning across water, energy, and industry using shared demand forecasts; invite private investors and operators at concept stage through transparent consultations that protect competition and the public interest.

5. Add a Water-Rio infrastructure alignment screen at the pre-feasibility stage for major desalination, reuse, storage, conveyance, industrial, and digital-water projects. The screen should document water-security additionality and material climate, biodiversity, land/drought, distributional, and transboundary trade-offs before permitting and financing decisions are locked in.

For development finance institutions

6. Launch a Mediterranean water-energy-industrial blended-finance facility for project preparation, feasibility, tariff design, and legal structuring; convene private investors and operators with governments and utilities early to test bankability.

7. Develop a standard risk-allocation template for regional water PPPs that assigns demand risk to the party best able to manage it—generally government for municipal tariff-dependent assets and private operators for dedicated industrial or digital off-take agreements—to reduce financing costs and deal-failure rates.

8. Strengthen the availability, quality, consistency, and accessibility of water-sector data across the Mediterranean to support evidence-based planning, improve project preparation, and enable more informed investment and financing decisions.

For private investors

9. Treat co-located renewable generation and closed-loop or reuse-based cooling as core underwriting considerations rather than optional compliance features. Water-efficient design, evaluated on a combined direct and indirect basis, can reduce regulatory, operating, and reputational exposure in water-stressed locations.

10. Engage with blended-finance and PPP structures at the project-preparation stage rather than only at financial close, because early engagement allows investors to help shape bankable risk allocation rather than simply responding to a structure already set by government.

11. Support regional capacity building for utility-level tariff reform and non-revenue water reduction, recognizing that a creditworthy public utility counterparty is frequently a precondition for a bankable private investment, not a competing claim on the same capital.



Source: Pexels/Kris Möklebust

For COP31 negotiators and the Action Agenda secretariat

12. Use the COP31 Action Agenda—particularly Climate-Resilient Cities, Green Industrialization, Clean Energy Transition, Rio Synergy, and the Climate Implementation Bridge—to register and showcase water-energy-industrial commitments that meet the relevant criteria.

13. Encourage multilateral development banks, climate funds, and bilateral development agencies to support project-preparation windows for eligible Mediterranean water infrastructure, including feasibility analysis, climate-risk assessment, environmental and social safeguards, and financial structuring. The New Collective Quantified Goal is a collective finance objective, not a dedicated facility with an earmarked water-infrastructure allocation. Projects seeking climate finance must demonstrate a credible climate rationale, additionality, appropriate safeguards, and measurable resilience benefits.

14. Use COP31 and subsequent regional platforms to pilot the Water-Rio infrastructure alignment screen in a small number of Mediterranean project pipelines. The objective should be practical learning, not country ranking: test whether a common front-end screen improves project sequencing, reveals cross-convention co-benefits and trade-offs, and strengthens the credibility of adaptation-finance claims.

Taken together, these recommendations rest on a single underlying premise: that the Mediterranean's water infrastructure gap is now as much a demand-planning and risk-allocation problem as it is a capital or engineering problem. Every desalination train, reuse plant, data center campus, or network rehabilitation program contemplated over the next decade should be sized against a demand forecast that treats industrial and digital growth as a first-order variable, financed through structures that place risk with the party best positioned to manage it and governed through institutions with an explicit mandate to look across the water-energy-industrial nexus rather than through any single ministry's traditional remit. None of this requires waiting for new technology or new capital. The instruments described in this report—blended-finance facilities, standardized PPP risk allocation, water-neutral permitting, and shared demand diagnostics—are available now. A recurring constraint is the lack of effective cross-sector planning incentives and implementation arrangements to sequence them consistently and a forum, such as the one converging at COP31, to establish them as a regional norm rather than a series of isolated national experiments.

Conclusion: From COP31 to delivery

The Mediterranean's water infrastructure challenge has changed shape faster than the region's planning institutions have adapted to it. Agricultural water security remains a central concern, while industrial, urban, and digital activities are adding new, location-specific infrastructure pressures. Industrialization, urban construction, and a genuinely new category of demand from digital infrastructure—measurable with the same water usage effectiveness and power usage effectiveness metrics the technology sector already uses—are reshaping where, how fast, and at what cost water and energy capacity must be built. The region has relevant technologies and financing instruments, but access to capital and implementation capacity varies widely across countries and utilities. Heading into COP31 in Antalya, what it needs most is the institutional coordination to size infrastructure against a demand forecast that reflects where the region's economies are actually heading, the financing discipline to allocate risk in ways that make bankable projects the rule rather than the exception, and a negotiating outcome in Antalya that recognizes water-energy-industrial infrastructure as core climate finance and adaptation policy rather than a sector-specific side conversation. Getting the sequencing right, with water and energy capacity first and water-intensive investment second, is not a constraint on the Mediterranean's industrial and digital ambitions. It is the condition on which those ambitions, and the climate commitments now being negotiated in Antalya, can be sustained.

The practical test proposed by this report is therefore threefold: plan for the shape of new demand, sequence water-intensive growth behind committed water and energy capacity, and test infrastructure choices for cross-sector climate, nature, and land trade-offs before capital lock-in. This shifts the Mediterranean debate from how much infrastructure to build toward which infrastructure produces durable water security without exporting risk to ecosystems, neighboring users, or future public budgets. The 2026 United Nations Water Conference in Abu Dhabi (8–10 December) offers a further opportunity to discuss practical partnerships and investment pipelines beyond COP31.[29]

29. United Nations Department of Economic and Social Affairs, 'About the 2026 UN Water Conference,' https://sdgs.un.org/conferences/water2026/about; UN-Water, '2026 UN Water Conference: revised dates,' May 25, 2026, https://www.unwater.org/news/2026-un-water-conference-revised-dates.

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