



# Digital as a Key Enabler for Climate Action

The Middle East & North Africa (MENA) Perspective

# Introduction

As an addition to our global study “The Road to Sustainability: Digital Technologies as a Key Enabler for Climate Action” this **regional chapter** further explores how digital technologies can be leveraged to meet the challenges across the three pillars of climate action (Mitigation, Adaptation & Resilience, Setting Foundations). As one out of six regional deep dives, this chapter is intended to adapt global recommendations to the local context and distinct regional dynamics within **the Middle East & North Africa**.

The Middle East & North Africa (MENA) is a diverse region with different outlooks, capabilities, and objectives when it comes to combating climate change. Broadly speaking, MENA is composed of three sub-regions in MENA: the Gulf Cooperation Council countries (GCC) which include countries with important resources and an appetite for sustainability but limited consumer activism, North African countries whose agricultural sector is particularly exposed to climate change and the Levant region, home to comparatively more water resources but also significantly more political instability and conflicts.

**For the purposes of this chapter, an overview of the challenges faced by each of the three sub-regions will be provided; however a particular focus, backed by detailed statistics when available, will be placed on the United Arab Emirates (UAE), the Kingdom of Saudi Arabia (KSA), and Egypt. Nevertheless, it is important to keep in mind that the significant diversity in this region requires location-specific solutions.**

# Climate Action in MENA – the current state

As the coming years will have the greatest influence on future climate stability, there is little time left to deploy and implement climate protection actions. One key component, though not sufficient on its own, is the reduction of greenhouse gases (GHG) (mitigation) to meet the Paris Agreement commitments to **limit overall global warming to 1.5°C**.

The MENA region was responsible for **4.08 Gt CO<sub>2</sub>eq in 2022 or 7.6% of the total global GHG emissions**.<sup>1</sup> Iran is the highest GHG emitter in the region (952 Mt CO<sub>2</sub>eq), followed by Saudi Arabia (811 Mt CO<sub>2</sub>eq), Egypt (378 Mt CO<sub>2</sub>eq), Iraq (368 Mt CO<sub>2</sub>eq) and the United Arab Emirates (295 Mt CO<sub>2</sub>eq). Together, these five countries account for 69% of the region's emissions. **In GCC economies such as those of the KSA and the UAE, the extraction of oil reserves combined with an increasingly modern lifestyle is leading to particularly high GHG emissions per capita, with the average Qatari emitting close to 10 times more than the average world citizen** (67.4 t CO<sub>2</sub>eq per capita vs 6.8 t CO<sub>2</sub>eq per capita globally).

Libya, Yemen and Iran, all located in MENA, are the only countries in the world which have not yet ratified the Paris Agreement. By contrast, other MENA countries in North Africa and the GCC play an active role on the international stage in advancing action against climate change: Egypt hosted the COP27 in 2022 in Sharm El Sheikh, the 2023 MEDCOP Climate Summit on Mediterranean climate issues was held in Morocco, and the UAE took the lead in organizing the Abu Dhabi Climate meeting in 2019 and COP28 in late 2023, at which it pledged to give \$30 billion to fight climate change.<sup>2,3</sup>

In the same spirit, some MENA countries have set ambitious goals to reduce their environmental footprint. The UAE for instance has committed to achieving by 2030 a 19% reduction in net GHG emissions compared to 2019 levels and reaching net zero by 2050.<sup>4</sup> Saudi Arabia published its Saudi Green Initiatives, a strategic plan of over 80 initiatives aimed at addressing climate change through three different channels: reducing emissions, greening Saudi, and protecting land and sea. It also updated its Nationally Determined Contribution (NDC) in 2021, committing to lower emissions by 278 Mt CO<sub>2</sub> eq. by 2030 (56% of 2018 emissions)<sup>5</sup> and to reach net zero by 2060.<sup>6</sup> However, these targets have left many observers unimpressed because of their lack of credibility and the absence of a concrete action plan. In North Africa, Egypt lacks a net zero target despite recently submitting a second revision of its NDC in which it committed to reduce emissions by 37% in the electricity sector, 65% in the oil & gas sector and 7% in the transportation sector by 2030 compared to a business-as-usual scenario in which no significant changes are made to reduce carbon dioxide emissions or transition away from high reliance on fossil fuels.<sup>7</sup>

## Climate KPIs MENA

Measure and KPI's	Unit
<b>Climate Indicators<sup>8</sup></b>	
Expected rise in average surface temperatures by 2050 in a business-as-usual scenario <sup>9</sup>	4°C
Expected rise in average surface temperatures by 2050 if all NDCs are achieved	1.5 – 2°C
<b>Activity Indicators<sup>10</sup></b>	
Absolute emissions per year (O <sub>2</sub> e)	UAE: 204 / Egypt: 249 / KSA: 672
GHG per capita (t CO <sub>2</sub> e) (world average: 6.8)	UAE: 29.3 / Egypt: 3.6 / KSA: 22.6
Projected 2050 net emissions if all NDCs are achieved (CO <sub>2</sub> e)	UAE: 0 / Egypt: N/A / KSA: 142
Renewables in energy mix (%) <sup>11</sup>	UAE: <1% / Egypt: 6% / KSA: <1%

**Due largely to the region's endowment in fossil fuels, renewable energy makes up less than 2% of energy consumption in the MENA region overall.**

In Egypt, the KSA and the UAE, crude oil and natural gas account for almost all the energy consumed. In the KSA and the UAE, renewable energy still represent less than 1% of the electricity consumed<sup>12</sup> whereas Egypt has made some progress towards its energy transitions, reaching a renewable energy share of 6% through clean energy projects like Benban, for example.<sup>13</sup> All three countries have set ambitious goals for their renewable energy share, with Egypt committing to achieve 42% renewable energy in its generation mix by 2030,<sup>14</sup> while Saudi Arabia and the UAE have set targets of 50% and 30%, respectively, by 2030.<sup>15</sup> In addition, the UAE has embarked upon a nuclear power programme in close consultation with the International Atomic Energy Agency. In line with this, Dubai's Integrated Energy Strategy 2030 targets 12% of its electricity supply capacity to be nuclear by 2030, primarily from the Barakah plant, but also possibly from a Dubai plant in the future.<sup>16</sup>

In the MENA region, environmental policy development often follows a top-down approach, with industry responding to the direction set by governments. A key factor in this dynamic is the significant governmental control over critical economic sectors, particularly regarding natural resources like oil and gas. The governments' vested interest in these sectors, which are major revenue sources, could be a contributing factor to their hesitation to enact stringent environmental regulations. This reluctance might stem from a concern that such regulations could impact the profitability of these industries. As a result, many high-level environmental goals and targets remain unlegislated, and the push for environmental action is often spearheaded by voluntary organizations like EmiratesGBC, rather than through formal government mandates.<sup>17</sup> However, this may begin to change with the UAE regulations introducing new efficiency standards (such as energy efficiency and LED) through the Ministry of Industry & Advanced Technology (MoiAT).<sup>18</sup>



**Case Study**

The Libra Project is a pioneering initiative in the renewable energy sector that utilizes Web 3 technology for the tokenization of renewable energy and carbon credits. This innovative approach democratizes access to renewable energy markets and carbon offset programs by converting carbon credits into digital assets, creating a new class of assets. The project's goal is to directly fund renewable energy projects, managing and operating them with advanced technology to ensure economic success and fostering a sustainable approach.

Investments in the Libra Project are used to acquire and enhance these renewable energy projects, ensuring they meet the highest Environmental, Social, and Governance (ESG) standards. State-of-the-art remote monitoring technology connects the projects to the Libra Project's dashboard, providing investors with live data streams. This feature enables investors to track the real-time impact of their investments, moving beyond traditional annual reports to live updates. This strategy highlights the Libra Project's dedication to building a community of impact investors and advancing the shift towards a low-carbon economy through tech-driven solutions.

**While awareness of climate issues is growing in the region, climate activism still barely exists.** In Saudi Arabia, 91% of the population believes the environment is in danger and 83% say they have done something to preserve it<sup>19</sup> but only 73% of UAE youth<sup>20</sup> recognize the effects of climate change and 35% think they need to change their way of life. In Egypt, 63% of people feel that climate change negatively affects their income or source of livelihood, but only 54% say they or people they know have taken action to adapt to the impact of climate change.<sup>21</sup> The significance of these statistics lies in their potential to guide digital technology strategies in addressing climate change. For instance, understanding the varying levels of climate awareness and activism can help tailor digital campaigns or applications that resonate with specific regional attitudes and experiences. Digital technology can play a pivotal role in raising awareness, promoting sustainable practices, and encouraging more proactive climate action. This is particularly important in the MENA region, where scarce climate activism can be attributed to political restrictions and limited freedom of expression in some countries,<sup>22</sup> coupled with economic dependence on fossil fuels. Additionally, immediate socio-economic challenges and conflicts in North Africa and the Levant subregions often overshadow climate concerns, limiting public engagement and grassroots activism. Therefore, leveraging digital platforms for environmental education and advocacy could effectively bridge these gaps, encouraging more widespread and effective climate action.

### Sustainable Cities

The UAE has been at the forefront of building smart cities, with Abu Dhabi and Dubai recognized globally as some of the most advanced urban centers. The Dubai Smart City Project and the Zayed Smart City in Abu Dhabi exemplify the integration of cutting-edge digital technologies, such as IoT, AI, and advanced data analytics, which enhance efficiency and sustainability. Abu Dhabi's renowned 2006 planned, "Masdar City," positioned as the first sustainable city in the Middle East, strategically incorporates digital technologies into its infrastructure, optimizing energy usage and environmental impact.<sup>24</sup>

While some have questioned the scalability of such designs,<sup>25</sup> other countries in the region have been following suit in their own way, such as Egypt's "NEXGEN" project which hopes to become the first "climate positive city", meaning it would produce more energy than it consumes through novel technological uses such as self-cleaning coated solar panels.



### Case Study

ArabiaWeather, based in Amman, Jordan, is a prominent company in the field of climate technology and weather intelligence. Utilizing advanced meteorological data collection and analysis techniques, ArabiaWeather offers accurate weather forecasting and climate data. Its technology integrates a variety of data sources, including satellite imagery, atmospheric data, and ground observations, to provide comprehensive weather insights. ArabiaWeather's expertise lies in its ability to process and analyze vast amounts of meteorological data using sophisticated algorithms. This capability allows it to offer tailored weather services that cater to the specific needs of different sectors such as agriculture, aviation, and tourism. This innovative approach in the field of weather prediction and climate intelligence marks it as a key player in the region's meteorological services industry"

## The burning issues

Drawing on comprehensive discussions with a diverse range of stakeholders, three paramount issues have been pinpointed which, when addressed collectively, hold the key to propelling sustainable progress and equity in the MENA region.



### **Access to Capital (North Africa and the Levant)**

In North Africa and the Levant, the scarcity of capital has led to inadequate funding for smaller environmental projects. This funding shortfall is significant because small-scale initiatives often drive innovation. Historically, climate-related investments in the region have predominantly favored large-scale projects and major corporations. The region's banking sector, characterized by restrictive practices for small and medium-sized businesses (SMES), and an underdeveloped venture capital environment, further exacerbates the challenge of securing funds for smaller enterprises and start-ups. This lack of robust funding mechanisms has, to date, hindered the development of innovative solutions in the region. In fact, SME lending in the GCC is 3% with an estimated credit gap of US\$ 250 billion for the SME segment in the GCC region and slightly better in the Arab region excluding the GCC with a total share of 9%.<sup>26</sup> Unlocking funding for smaller entities could, therefore, be a key to unleashing a wave of much-needed innovation in the environmental sector.



### **Heavy Reliance on Oil & Gas (GCC, part of the Levant and North Africa)**

Several countries in the MENA region rely heavily on oil and gas exports for economic stability. However, as the world shifts towards decarbonizing the energy sector, these exports may face increasing challenges. This dependence also exposes these economies to the instability of energy prices. Consequently, MENA countries need to urgently develop clean energy solutions and diversify their economies to reduce reliance on oil and gas income. Simultaneously, countries that export oil will need to focus on policies to retrain workers and create new job opportunities. This can be achieved by developing local industries and manufacturing sectors, which would substitute the employment previously generated by traditional energy sectors.



### **Water Scarcity and Food Insecurity (North Africa and GCC)**

The MENA region is currently experiencing severe water scarcity due to factors like population growth, climate change, and economic development. The population has risen from just over 100 million in 1960, to more than 450 million in 2018 and is projected to surpass 720 million by 2050. By 2030, the average annual per capita water availability is expected to drop below 500 cubic meters, indicating absolute water scarcity.<sup>27</sup> In this region, economic and water resource disparities are leading to varied responses to this water scarcity, with wealthier countries investing in alternative water sources like desalination, poorer nations relying on aid, and agriculturally-rich but less water-scarce countries like Egypt focusing on alternative water solutions amidst rapid population growth. Water scarcity can disrupt water-dependent industries, such as agriculture and lead to reduced crop yield, jeopardized food security, and rising food prices. The International Water Management Institute (IWMI) has introduced a new tool, supported by Google, which utilizes artificial intelligence and satellite data for water reuse in the MENA region. This tool aims to address the challenges of water scarcity by improving water resource management and reuse. The initiative is part of IWMI's efforts to develop sustainable water management solutions in water-scarce regions, leveraging advanced technology to better understand and manage water resources.<sup>28</sup>

# Digital Transformation and Innovation

The MENA region displays a very wide range of digital maturity and literacy levels with **North Africa (such as Egypt) and the Levant regions lagging significantly behind in terms of digital infrastructure compared with GCC.** While MENA as a whole is only expected to reach 80% smartphone penetration by 2025, as of early 2023 the UAE already had a total of 19.05 million cellular mobile connections, representing a staggering 200.9% mobile penetration rate.<sup>29</sup> In Saudi Arabia, the mobile penetration rate in early 2023 reached 115.9%<sup>30</sup> in early 2023 and 93.9% in Egypt.<sup>31</sup>

Internet penetration rates show a similar pattern with the UAE and Saudi Arabia not only scoring higher rates (100%) than Egypt (72%)<sup>32</sup> but also offering significantly higher internet speed.<sup>33</sup> As for cloud adoption, the UAE is already well positioned to become a hub for cloud computing in the region with 43% of organizations having adopted cloud computing as of 2021 (versus 49% in North America and Europe).<sup>34</sup> **Saudi Arabia is also moving forward as exemplified by the launch of Google Cloud in November 2023, yet strict data privacy laws in this country may create barriers to adoption.**<sup>35</sup>

Recognizing the potential of digital technologies to enable climate action, it is estimated that today's digital technologies, if well optimized and applied widely could reduce up to 20% of total global emissions.<sup>36</sup> The positive impact results from the ability to better **connect and communicate**, enabling better **monitoring and tracking**, providing software that can **analyze, optimize, and predict**, and offering support through **augmentation and automation**. To fully harness the benefits of digital

transformation for climate resilience in MENA, governments in North Africa and the Levant should consider focusing on expanding access and building out digital infrastructure, while governments in wealthier GCC nations could benefit from driving the adoption of these technologies. This can be done through a variety of ways that focus on translating their stated goals into actionable policies through incentives and regulations while investing in adaptive measures to alleviate the realities of climate change as well as adapting to the necessary changes of a world that is less and less reliant on oil and gas.



# Climate Forward Government

Governments can effectively handle risks and challenges in environmental action by **setting goals and creating a flexible framework to achieve them**. As a first step, comprehending regional barriers and complexities is key so that policymakers can tailor their strategies to effectively address them, enabling the acceleration of digital tech-driven climate action.

## Barriers to Digital Climate Solutions

Globally, two main overarching barriers to harnessing the potential of digital technologies for climate action have been identified: insufficient innovation and insufficient engagement. **Within the MENA region, insufficient innovation can be predominantly observed in North Africa and the Levant while insufficient climate activism among the general public is a significant barrier in GCC, such as Saudi Arabia and the UAE.** The following three barriers, however, are relevant to the whole region, as highlighted through expert interviews:

### 1. Lack of Urgency

While the MENA region is becoming increasingly aware of the challenges posed by climate change, many MENA countries are in the midst of political transitions or are dealing with other issues such as armed conflicts and endemic poverty which are currently perceived as far more urgent. As a matter of fact, countries like Iraq, Syria, Lebanon, Saudi Arabia and Yemen are still experiencing armed conflicts on home soil as of 2023. In most of the region, youth unemployment is at critical levels, including in oil-rich Saudi Arabia where close to 16% of young people aged 16-24 are unemployed<sup>37</sup>, with this proportion estimated at 15.7% and 9.9% in Egypt and the UAE respectively.<sup>38</sup> In addition, North African countries also face a brain-drain phenomenon with a large number of highly skilled employees leaving for countries like the UAE where perceived quality of life is significantly better.<sup>39</sup>

### 2. Structural Reliance

The MENA region's structural reliance on the oil and gas industry presents a significant barrier to addressing climate change, particularly in terms of the adoption and effective use of digital technologies for this purpose. Recent energy diversification efforts notwithstanding, oil and gas revenues have long been the backbone of the economies in this region, particularly in the Gulf states, providing substantial national income and funding for government programs. For instance, in Saudi Arabia, the world's

largest oil exporter, oil revenues accounted for approximately 42% of the country's GDP in 2023.<sup>40</sup> Similarly, in the UAE, oil revenues constitute around 30% of the government's budget.<sup>41</sup> This economic model has led to a geopolitical stance that often prioritizes the stability and profitability of the fossil fuel sector. As a result, the heavy investment in and dependency on fossil fuels has limited the development and integration of digital technologies aimed at environmental sustainability. For instance, digital solutions like smart grids, renewable energy management systems, and data-driven climate modeling are not as readily adopted or invested in, as they often conflict with the entrenched interests of the oil and gas sector. This focus on maintaining the status quo in the fossil fuel industry stifles the innovation and investment in digital technologies that are essential for climate change mitigation and adaptation.

### 3. Lack of Data Transparency & Tracking

Across the wider economy, **companies generally still lack transparency on real-time emissions performance**, a move that would enable and improve strategic decision-making. When companies do measure their emissions, they tend to leverage third party providers to conduct annual emissions measurements because most of them do not have the capabilities to conduct internal real-time measurements as is seen frequently in European countries.



## Policy Goals

To overcome the existing barriers hindering the use of digital technologies for climate action, policymakers could strive to become facilitators in implementing and scaling up these technologies. This overarching goal could be pursued through three sub-goals enhanced with insights from expert interviews.

First, **education and awareness on the importance of climate change and its urgency**, especially as it relates to MENA is critical. AI tools like the Google Climate Engine and tracking programs such as the Environmental Impact Explorer can perhaps indicate what the future holds if climate change is not halted. Governments can utilize the data available in order to draft strategic plans to legislate their stated goals into a tangible gameplan. Second, **governments can leverage growing consumer demand by empowering businesses to exact change**. Finally, governments need to ensure that all stakeholders are considered. **A transition to a diversified economy could align with the necessary material adjustments, involving investments and the adoption of technology to upskill and reskill affected workers**. This will ensure that as dependence on fossil fuels decreases, cleaner alternatives can step in to meet the needs of the local community.

## Water & Regulation

The UAE, often characterized by its desert landscape and arid terrain, relies heavily on energy-intensive desalination processes to obtain water. Commitments such as the UAE's "Water Security Strategy 2036" have been adopted in the hopes to increase efficiency and reduce water demands (resulting in an estimated reduction of 100Mn metric tons of carbon dioxide emissions). In order to increase the efficiency of water usage and to reduce these demands, digital technologies must be adopted – such as sensors that monitor when water is used, automation that limits wasted usage and AI that helps with planning, strategizing and other efficiency optimizations. However, the absence of clearly defined regulations hampers enforcement, presenting a major barrier to achieving these objectives.

# Digital Tech Policy

In presenting the potential policy measures for achieving these goals, the Digital Sprinters Framework by Google, offers a structured approach. This framework defines four primary categories: Infrastructure, People, Market Environment and Tech Innovation. Each category addresses specific policy aspects that can facilitate sustainable and inclusive economic growth while harnessing the power of digital transformation.



## Infrastructure

- **Invest and partner with organizations and telecom companies, to ensure expanded access to the internet.** While GCC companies often perform strongly in this area, North Africa and Levant countries with limited know-how or resources could explore how they can offer expanded access and quicker internet speeds to their population through public-private partnerships.
- **Invest in resource efficiency projects to address** energy-heavy processes like seawater desalination, which plays a crucial role, especially in GCC. Innovative technologies like machine-learning can significantly improve the sustainability and energy efficiency of water desalination by optimizing operational processes and reducing energy consumption. This technology enables predictive maintenance, effective management of renewable energy sources, and ensures high water quality, leading to more efficient and eco-friendly desalination methods.



## People

- **Use social media, digital advertising and online education** to raise awareness around climate change impacts among the public and encourage public involvement in climate action.
- **Implement targeted digital training programs in MENA to help communities transition from oil and gas to sectors like renewable energy and green technology.** This involves establishing government partnerships with tech and educational institutions for online courses, virtual simulations, and digital career centers, along with policy incentives to encourage participation.



## Market environment

- **Enforce increased climate metrics measurement of private sector entities in GCC using smart grids and IoT sensors in urban areas** to enable transparency in emissions performance and to promote strategic decision-making around climate performance.
- Enhance climate technology funding in the MENA region, especially in countries like the United Arab Emirates and Saudi Arabia, by offering stronger incentives for financial institutions. This can be achieved through government loan guarantees or direct loans to entrepreneurs, capitalizing on the region's commitment to environmental sustainability and the financial strength of these nations



## Tech Innovation

- Promote the establishment of innovation hubs and incubators in key MENA countries like the UAE, Saudi Arabia, and Egypt, offering incentives for climate tech collaborations. These incentives could include funding mechanisms, tax benefits, or other rewards. These countries are ideal due to their strong focus on technological innovation, considerable financial resources, and ongoing efforts to diversify their economies away from oil dependency, making them fertile grounds for climate tech advancements
- **Support digital innovation ecosystems** in Egypt and other Northern African countries **by encouraging initiatives like Digital Africa**, which aims to advance digital technology and innovation across Africa by focusing on improving infrastructure, education, governance, entrepreneurship, health, and financial technology to foster economic and social development. Governments, private sector entities, and development agencies could collaborate to provide financial support, incubators, and tech clusters to nurture digital startups in the MENA region. This will drive entrepreneurship and innovation.<sup>42</sup>
- **Endorse and implement the African Union's Digital Transformation Strategy in North African countries such as Egypt:**<sup>43</sup> with a particular focus on the Data Policy Framework. This framework envisions harnessing the transformative potential of data for the benefit of African countries. Policymakers could strengthen national data systems, foster innovation, and facilitate cross-border data flows, ultimately contributing to the realization of the African single digital market.



## Case Study

Bee'ah, a leading environmental management company founded in 2007 in the UAE, has innovatively integrated artificial intelligence (AI) and the Internet of Things (IoT) into its waste management and recycling operations. The company employs a fleet of eco-friendly vehicles with IoT for efficient waste collection, alongside AI-powered sorting systems in its recycling facilities to improve sorting accuracy and efficiency. Smart bins equipped with sensors enable timely waste collection and contribute to cleaner urban spaces. Additionally, Bee'ah utilizes data analytics derived from these technologies to optimize waste management strategies and conducts environmental monitoring to assess the impact of their practices. This tech-forward approach not only streamlines operations but also supports the development of sustainable urban environments.

# Industry perspectives

Having identified what to do, and how to do it, the next question is where to start. Based on current emission levels and the expertise of interview partners, a special focus on implementing digital technologies leveraging climate action should be placed on the following four key industries: **Energy, Industry, Transportation and Agriculture.**

Industry	Recommendation <sup>44</sup>	Specific action	Priority
Energy	Generation of renewable energy/minerals	Support local economies that rely heavily on fossil energy by building and managing incentive programs for renewable energy adoption through digital platforms	High
		Support and prioritize the development of AI to map out the new roles and skills required by the energy transition and the progressive shifting from oil & gas <sup>45</sup>	Medium
	Smart grid and energy storage	Implement smart grids and energy storage systems to improve integration of intermittent renewable energy sources, enhance grid stability, and ensure efficient energy distribution	Medium
Industry	Digital tools for improving construction and production processes	Invest in digital tools ranging from 3D modeling and data integration to sensors or IoT devices to reduce energy consumption, reduce waste, and select sustainable construction materials such as green cement	Medium
		Encourage a shift to building regeneration by promoting data analytics tools for assessing energy efficiency, environmental impact, and cost-effectiveness of building regeneration	Medium
Transportation	Reduce environmental footprint of the aviation sector	Leverage digital twin technology to design fuel-efficient aircrafts and use advanced flight planning software powered by AI and big data to optimize routes and reduce fuel consumption	Medium
	Reduce environmental footprint of road transportation through Intelligent Transportation Systems (ITS)	Use digital technologies like IoT and AI to optimize traffic flow. ITS can reduce congestion and idle times, thereby lowering emissions. Smart traffic management systems can adjust traffic lights based on real-time traffic conditions, and AI-powered traffic prediction can help in planning better routes	
Agriculture	Sustainable farming techniques	Subsidize advanced, digital surface irrigation systems through zero interest rate loans using IoT and AI for water optimization and promote genetically resilient crops suitable for local climate challenges like drought and heat. This could be facilitated through a digital portal for efficient subsidy management and farmer guidance	Medium



## Case Study

Seabex, based in Tunisia, is a pioneering startup in the agricultural technology space. The company has developed an innovative, AI-driven sensorless precision irrigation solution. This technology is designed to empower farmers with actionable insights for water-efficient crop growth without imposing sensor data costs on them. Seabex's system is the culmination of global soil databases, expertise in crop data encompassing over 140 varieties, climate inputs, and accurate 14-day soil water predictions. This analysis allows for precise irrigation, ensuring that crops receive the optimal amount of water at the right time. By leveraging AI, Seabex aims to reduce water waste and improve agricultural productivity, making farming more sustainable and efficient. This approach not only conserves water, a critical resource in arid regions like North Africa, but also supports farmers in maximizing their crop yields through technology-driven methods.

# Conclusion

The MENA region faces a wide range of challenges such as conflicts and political instability, endemic poverty and water scarcity. The transition towards a greener future in this region is mainly complicated by its reliance on oil and gas, however recent commitments to lowering emissions and large investments into doing so highlight positive actions. **The next steps for the region involve increasing consumer awareness as well as codifying into legislation tangible ways to meet the national targets.** GCC nations can focus on reflecting how to ensure capital is invested to build resilience in a post-fossil fuel world, while countries in North Africa and the Levant may consider ways to empower their citizens to embrace smart agriculture practices and renewable energy technology. This could be achieved by expanding access to digital infrastructure and providing capital for adopting these technologies.

# References

1. For the purpose of this report, MENA is defined as the region comprising Algeria, Bahrein, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, the United Arab Emirates and Yemen. EDGAR - Emissions Database for Global Atmospheric Research. (2023). GHG emissions of all world countries. [Retrieved from](#)
2. United Arab Emirates Government. (2023). The UAE's Response to Climate Change. [Retrieved from](#)
3. The National News. (2023). UAE boosts climate fight with \$30bn investment. [Retrieved from](#)
4. UAE Ministry of Climate Change & Environment. (2023). Accelerating Action Towards a Green, Inclusive and Resilient Economy. [Retrieved from](#)
5. Climate Scorecard. (2020). Saudi Arabia Greenhouse Gas Emissions Have Increased by 225% Since 1990. [Retrieved from](#)
6. UNFCCC - United Nations Framework Convention on Climate Change. (2021). Kingdom of Saudi Arabia - Updated First Nationally Determined Contribution. [Retrieved from](#)
7. UNDP. (2023). NDC Status - Egypt. [Retrieved from](#)
8. Deloitte UAE analysis
9. European Environment Agency. (2019). How the Middle East is suffering on the front lines of climate change. [Retrieved from](#)
10. Our World in Data. (2020). CO2 and Greenhouse Gas Emissions. [Retrieved from](#)
11. Our World in Data. (2020). CO2 and Greenhouse Gas Emissions. [Retrieved from](#)
12. EIA - US Energy Information Administration. International - U.S. Energy Information Administration (EIA)
13. EIA - US Energy Information Administration. International - U.S. Energy Information Administration (EIA)
14. Action Tracker. (2023). Egypt targets. [Retrieved from](#)
15. Statista. (2021). Share of renewable energy target in the Gulf Cooperation Council region for 2030, by country. [Retrieved from](#)
16. World Nuclear Association. (2024). Nuclear Power in the United Arab Emirates. [Retrieved from](#)
17. World Green Building Council. (2022). The Hero for Net Zero in UAE. The Emirates Green Building Council. [Retrieved from](#)
18. US-UAE Business Council. (2017). U.A.E Standards & Technical Regulations. [Retrieved from](#)
19. AJSP - Arab Journal for Scientific Publishing. Measurement of Saudi Society Environmental Awareness in Relation to 2030 Saudi Vision and The Saudi Green Initiative. [Retrieved from](#)
20. Gulf Today. (2023). 74% of youth in UAE say climate change affects their lives: EAD survey. [Retrieved from](#)
21. European Investment Bank. (2022). EIB Climate Survey: 92% of Egyptian Respondents Say Climate Change is already Affecting their Everyday Life. [Retrieved from](#)
22. Al Jazeera. (2023). UAE promises to allow climate protests at COP28. [Retrieved from](#)
23. United Arab Emirates Government. (2023). Smart Sustainable Cities. [Retrieved from](#)
24. United Arab Emirates Government. (2023). Abu Dhabi Digital. [Retrieved from](#)
25. United Arab Emirates Government. (2023). Smart Sustainable Cities. [Retrieved from](#)
26. Bloomberg Businessweek. (2011). Masdar City, Castle in the Sand. [Retrieved from](#)
27. Deloitte. (2022). Bridging the SME Finance Gap in the GCC. [Retrieved from](#)
28. World Bank Group. (2023). The Economics of Water Scarcity in the Middle East and North Africa. [Retrieved from](#)
29. International Water Management Institute. (2023). IWMI announces development of a new, Google-supported tool that will harness AI and satellite data for water reuse in the Middle East and North Africa. [Retrieved from](#)
30. Datareportal. (2023). Digital 2023: The United Arab Emirates. [Retrieved from](#)
31. Datareportal. (2023). Digital 2023: Saudi Arabia. [Retrieved from](#)
32. Datareportal. (2023). Digital 2023: Egypt. [Retrieved from](#)
33. The World Bank. (2023). Individuals using the Internet (% of the population). [Retrieved from](#)
34. See Datareportal source mentioned above for the relevant three countries
35. Zawya. (2023). AWS report: Public cloud's contribution to UAE economy could reach \$181bn by 2033. [Retrieved from](#)
36. PwC - PricewaterhouseCoopers. (2023). Data Privacy Handbook for the Kingdom of Saudi Arabia. [Retrieved from](#)
37. WEF - World Economic Forum. (2022). Digital Technologies Can Reduce Global Emissions by up to 20%. Here's How. [Retrieved from](#)
38. Statista. (2023). Share of unemployed youth in Saudi Arabia from 2009 to 2022. [Retrieved from](#)
39. World Bank. (2024). Unemployment, youth total. [Retrieved from](#)
40. ECSS - Egyptian Center for Strategic Studies. (2022). Future prospects for the labor market in Egypt. [Retrieved from](#)
41. CNBC. (2024). Saudi Arabia's economy contracts again, dragged by oil cuts. [Retrieved from](#)
42. United Arab Emirates Ministry of Finance. (2023). UAE Economy Overview. [Retrieved from](#)
43. African Union. (2023). Digital Transformation Strategy for Africa
44. African Union
45. For the full industries policy recommendations please review the global study "The Road to Sustainability: Digital Technologies as a Key Enabler for Climate Action"
46. Accenture (2021). Applied intelligence to reskill the O&G workforce. [Retrieved from](#)



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