MASDAR CITY

AGRI-TECH JOURNAL:
A HOLISTIC APPROACH TO AGRI-TECH AT MASDAR CITY

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1. WELCOME MESSAGES

1.1 MESSAGE FROM THE CEO OF MASDAR CITY

As CEO of Masdar City, I am proud to present this comprehensive journal exploring the transformative potential of Agri-Tech in addressing global challenges such as food and water security, resource efficiency, and environmental sustainability. Masdar City, as a leading global hub for innovation, research, and development, stands at the forefront of these efforts. This journal highlights not only the broader significance of Agri-Tech but also the pivotal role of Masdar City as a driver of sustainable agricultural solutions, water conservation and a more resilient urban development model.

Through our collaborative efforts, we aim to inspire and enable businesses, researchers, and innovators to shape the future of food systems, ensuring a sustainable and resilient tomorrow for all. Join us on this journey as we redefine the boundaries of what is possible in Agri-Tech.

Ahmed Baghoum
CEO, Masdar City

1.2 MESSAGE FROM THE EXECUTIVE DIRECTOR OF SUSTAINABLE DEVELOPMENT OF MASDAR CITY

Masdar City has long been recognized as a living laboratory for sustainability and innovation, a place where forward-thinking solutions are brought to life to address the most pressing global challenges. As the UAE's flagship sustainable urban development, we have been at the forefront of creating and implementing technologies that aim to reshape how we live, work, and engage with our environment.

This journal delves into the dynamic world of Agri-Tech, highlighting the significant strides made within Masdar City as a hub for pioneering solutions in agriculture. Our city has become a nexus for cutting-edge technologies and groundbreaking collaborations, particularly within Masdar City's Agri-Tech cluster, which is dedicated to advancing sustainable farming and food security. Through this cluster, we are fostering a thriving ecosystem that nurtures innovation, bringing together global leaders, entrepreneurs, and researchers focused on developing sustainable solutions for food security, water scarcity, and environmental stewardship.

Masdar City offers a supportive environment where ideas can flourish, from vertical farming to water-efficient irrigation and alternative proteins. We have attracted some of the world's brightest minds in Agri-Tech, empowering them to create impactful solutions that contribute to a more sustainable and resilient agricultural system.

Through this publication, we celebrate the milestones we have achieved together, highlighting success stories, technological advancements, and the collaborations that make our Agri-Tech cluster a beacon of innovation in the agricultural sector. As we continue to push the boundaries of what is possible, we extend an invitation to global stakeholders to join us in revolutionizing agriculture for a sustainable future.

We believe that through collaboration and innovation, we can build the next generation of agricultural systems that not only feed the world but also protect the planet for future generations. Together, we can make a lasting impact on the way we produce, consume and conserve.

Mohamed Al Breiki
Executive Director of Sustainable Development, Masdar City

2. AGRI-TECH: A GLOBAL PERSPECTIVE

2.1 THE ROLE OF AGRI-TECH IN SUSTAINABLE DEVELOPMENT

Agri-Tech, short for agricultural technology, is revolutionizing traditional farming practices by integrating advanced tools like artificial intelligence (AI), Internet of Things (IoT), vertical farming, and hydroponics. This sector plays a crucial role in achieving the United Nations Sustainable Development Goals (SDGs), particularly in eradicating hunger (SDG 2), clean water and sanitation (SDG 6), and sustainable cities and communities (SDG 11).

According to the Food and Agriculture Organization (FAO), IoT-driven irrigation systems have reduced water consumption by up to 30%, while vertical farming has maximized output in urban environments. When combined with indoor farming processes, over 90% water savings have been achieved compared to traditional farming methods. By leveraging data-driven insights, Agri-Tech solutions address pressing issues such as utilization of urban land, minimizing transportation and associated carbon emissions, water and resource efficiency, improved crop yields, reduced reliance on pesticides, and climate adaptation, all while minimizing impacts to existing arable farming land. For example, predictive analytics enable farmers and operators to optimize crop yields, while IoT devices monitor soil health and water usage in real time.

2.2 GLOBAL CHALLENGES: FOOD SECURITY AND WATER SCARCITY

Global agriculture faces critical challenges, with food demand projected to rise by 50% by 2050 according to the Food and Agriculture Organization (FAO). At the same time, water scarcity remains a pressing concern, with agriculture consuming 70% of the world's freshwater resources. Meeting this demand sustainably requires groundbreaking solutions.

FOOD SECURITY:

As populations grow, ensuring equitable access to nutritious food is paramount. Innovative farming technologies like vertical farming and hydroponics provide localized and sustainable production systems that reduce dependence on imports and mitigate supply chain disruptions. The UAE Federal Ministry of Food Security aims for the United Arab Emirates to be No. 1 in the global index by 2051, currently ranked as No. 9, according to the Ministry of Food Security. Masdar City supports these efforts through ongoing innovation, liaison with industry leaders, and support of Agri-Tech start-ups.

WATER SCARCITY:

With freshwater resources depleting, techniques such as precision irrigation and water reduction applications become essential. Precision irrigation delivers water directly to plant roots, optimizing usage by tailoring water supply to plants' immediate needs, and ensuring soil conditions are monitored to retain moisture, leading to higher yielding produce.

By adopting Agri-Tech innovations, the UAE agricultural sector can address these interlinked challenges, ensuring a resilient and sustainable food system for future generations. This is critical in minimizing the demands placed on potable water and desalination within arid regions.

2.3 INNOVATIONS DRIVING THE FUTURE OF AGRICULTURE

Key innovations shaping the future of Agri-Tech include:

VERTICAL FARMING:

This technology maximizes agricultural output by using vertical spaces to grow crops, often in dense and controlled environments. By stacking layers of crops in basements and car parks, vertical farming significantly reduces land use while ensuring year-round production. It also reduces dependency on traditional farming methods and provides urban areas with fresh produce, maximizing nutritional value due to immediate harvesting times and minimizing transportation emissions.

AI IN AGRICULTURE:

Artificial Intelligence enables predictive models that help farmers manage weather variability, nutrient delivery, pest control, and soil health. By integrating AI tools with agricultural processes, farmers can monitor stock in real time, optimize planting schedules, enhance resource efficiency, reduce production losses, and allows for harvesting at the optimum time.

HYDROPONICS:

These soil-free farming techniques revolutionize water use by requiring up to 90% less water than traditional farming. Hydroponics uses nutrient-rich water to grow plants. This method supports sustainable, high yield farming in arid and urban environments.

3. AGRI-TECH IN THE UAE

3.1 UAE'S NATIONAL FOOD SECURITY STRATEGY

The UAE's National Food Security Strategy 2051 prioritizes sustainable food production through Agri-Tech advancements. Key objectives include:

Increasing local food production by 30%.

Promoting the use of alternative protein sources.

Enhancing water-efficient methods, such as hydroponics, indoor, and vertical farming.

3.2 AGRI-TECH AS A PILLAR OF ECONOMIC DIVERSIFICATION

Agri-Tech aligns with the UAE's vision of economic diversification by fostering innovation and reducing reliance on food imports. Initiatives such as the Abu Dhabi Investment Office's (ADIO) AgTech Incentive Program have attracted global companies, driving investments and job creation.

3.3 KEY GOVERNMENTAL INITIATIVES AND PARTNERSHIPS

AGTECH INCENTIVE PROGRAM:

The Abu Dhabi government has launched the AgTech Incentive Program, committing AED 1 billion (approximately $272 million) to foster innovation in agricultural technology and support emerging start-ups in this field. The program aims to accelerate the adoption of cutting-edge solutions, such as AI-driven farming, precision agriculture, and vertical farming. It provides support, mentorship, and access to state-of-the-art facilities to entrepreneurs and SMEs, driving the country's ambition to enhance food security and reduce reliance on imports. This initiative aligns with the UAE's National Food Security Strategy 2051, which prioritizes sustainable and efficient food production systems.

INTERNATIONAL COLLABORATIONS:

The United Arab Emirates (UAE) has established strategic partnerships with countries renowned for their expertise in sustainable agriculture, notably the Netherlands, a global leader in Agri-Tech and innovation. These collaborations facilitate the exchange of best practices, technology transfer, and joint research projects in areas such as greenhouse technology, water management, and high-yield crop cultivation.

A prime example of this partnership is the "Plant the Emirates" initiative, launched in October 2024 as part of the UAE's Year of Sustainability. This ambitious program aims to promote sustainable agricultural practices, expand the number of productive and organic farms by 25%, and advance the nation's agricultural sector by raising productivity by 20%. The initiative also seeks to support national food security and contribute to the UAE's Net Zero 2050 Strategic Initiative by reducing waste from agricultural production by 50%. The Netherlands, with its advanced agricultural technologies and expertise, is well-positioned to collaborate on these objectives, particularly in areas like water management and climate-smart agriculture solutions.

Additionally, the Netherlands has been actively involved in events such as Gulfood Green, held in Dubai, where Dutch horticultural companies and representatives collaborate with UAE stakeholders to build a sustainable food system. The Netherlands applies an integrated approach to water, energy, and sustainable horticultural solutions to address local challenges, aiming to support the UAE in its journey toward self-sufficiency in fresh food production.

Furthermore, the UAE and the Netherlands have focused on water and food security projects ahead of the COP28 climate summit in Dubai. Diplomats from both countries have emphasized the importance of collaboration in addressing challenges related to water, energy, and food, with a particular focus on water security. This partnership aims to develop innovative solutions that can benefit not only the two countries but also other nations facing similar challenges.

By leveraging international expertise, the UAE aims to address its unique agricultural challenges, including arid climate conditions and limited water resources, while fostering a global network of Agri-Tech solutions.

4. AGRI-TECH IN ABU DHABI

4.1 ABU DHABI'S VISION FOR SUSTAINABLE AGRICULTURE

Abu Dhabi's Vision 2030 emphasizes the crucial role of Agri-Tech in strengthening food security and driving economic resilience. A key initiative supporting this vision is the Agrifood Growth and Water Abundance (AGWA) program, launched in partnership with the Abu Dhabi Investment Office (ADIO) and the Abu Dhabi Department of Economic Development (ADDED). The program addresses the interconnected challenges of sustainable food production and water scarcity by fostering collaborative research, technology exchange, and innovative pilot projects. These efforts focus on driving scalable solutions that enhance food security, optimize resource management, and contribute to global climate resilience.

As a key infrastructure partner in the AGWA cluster, Masdar City collaborates with ADIO, alongside Abu Dhabi Ports Company PJSC, Abu Dhabi Airports Company PJSC, and Abu Dhabi Distribution Company (ADDC), leveraging its expertise in sustainability and technology. Masdar City provides essential infrastructure to support companies within the cluster, fostering innovation in Agri-Tech and advancing global food security. Through its thriving ecosystem, the city offers an enabling environment for start-ups, SMEs, and global leaders, attracting companies focused on developing solutions for climate-smart agriculture and resource-efficient food production.

Masdar City's role in this initiative is part of a broader collaboration to position Abu Dhabi as a global hub for innovative food and water solutions. This includes pioneering advancements in alternative proteins, algae-based nutrition, and water purification technologies such as reverse osmosis. By working alongside key infrastructure partners, Masdar City plays a vital role in creating a sustainable and resilient food supply chain, ensuring access to cutting-edge research, non-traditional business models, and novel food production.

The program taps into a multi-trillion-dirham industry with immense potential for economic growth and job creation. By leveraging Abu Dhabi's leadership in advanced food and water production, it is set to contribute significantly to the Emirate's GDP, create numerous employment opportunities, and attract substantial investment. Masdar City's involvement reinforces its commitment to sustainability, technological progress, and economic diversification, helping to build a resilient future for generations to come.

4.2 ADVANCED TECHNOLOGIES IN LOCAL AGRI-TECH

DESALINATED WATER FOR AGRICULTURE

Innovative uses of desalinated water are enhancing agricultural practices across the region. Advanced water treatment technologies make it possible to utilize seawater for farming, ensuring a reliable and sustainable source of irrigation in areas where freshwater is scarce. By integrating these systems with precision agriculture techniques, local farms can minimize water wastage and maximize crop yields.

In Abu Dhabi, desalinated water plays a crucial role in agricultural advancements. The Emirate operates nine desalination plants producing 4.13 million cubic meters of water per day, with desalinated water making up 30% of total water resources. Within the agricultural sector, 18% of water usage comes from desalinated seawater, demonstrating its growing importance in sustainable farming.

The agricultural sector in Abu Dhabi is still 81.4% dependent on groundwater, 18% on costly desalinated seawater, and 0.6% on recycled water. This calls for expanding the use of recycled water to reduce the depletion of groundwater and the consumption of desalinated seawater.

According to Statista, that is a German online platform that specializes in data gathering and visualization, the agricultural consumption share of desalinated water in the Emirate of Abu Dhabi was 21.7% in 2019. The leading region of agricultural desalinated water consumption in the Emirate of Abu Dhabi was the Al Ain region with 50.2% in 2019.

A notable example is the Seawater Greenhouse on Al-Aryam Island, which utilizes solar energy to desalinate seawater for irrigation. This facility covers 864 square meters and produces 1 cubic meter of freshwater daily, meeting the irrigation needs of its crops. The greenhouse employs a specialized cooling system to optimize water production while maintaining a controlled environment for plant growth.

Masdar City is also contributing to water savings and innovation advancement through its support for Alesca Agri-Tech, a company based in Masdar City Free Zone that specializes in vertical farming solutions and achieving 90% water savings. Alesca's in-house development and patented technology systems utilize controlled environments to grow crops with minimal water usage, including desalinated sources, promoting more sustainable agricultural practices. This cutting-edge technology supports water efficiency and contributes to Abu Dhabi's overall push toward sustainable food production.

Additionally, Abu Dhabi is investing in vertical farming, an innovative approach that efficiently utilizes water, including desalinated sources. A $130 million joint venture between U.S.-based start-up Plenty and the UAE's Mawarid aims to develop five indoor farms in the next five years. The first of these farms, set to begin operations by 2026, will focus on growing over 4.5 million pounds of premium strawberries annually for local consumption and export.

With these advanced desalination and precision farming techniques, Abu Dhabi is strengthening food security while promoting sustainable agricultural practices in arid environments.

INTEGRATION WITH SMART TECHNOLOGIES

The integration of Internet of Things (IoT) and Artificial Intelligence (AI) in Agri-Tech is further enhancing efficiency and productivity. Smart sensors monitor soil moisture, temperature, and nutrient levels in real time, enabling precision irrigation and reducing resource wastage. AI-driven analytics help predict crop performance and optimize farming strategies, ensuring maximum efficiency.

SUPPORTIVE ECOSYSTEM:

These advanced technologies are supported by initiatives like Agrifood Growth and Water Abundance (AGWA) and strategic investments from organizations such as the Abu Dhabi Investment Office (ADIO) and the Abu Dhabi Department of Economic Development (ADDED). Collaborative environments like Masdar City offer a robust platform for research, innovation, and scaling up these technologies.

Together, these advancements demonstrate Abu Dhabi's commitment to leveraging technology for sustainable agriculture, aligning with its Vision 2030 goals and positioning the UAE as a global leader in Agri-Tech innovation.

5. AGRI-TECH IN MASDAR CITY

5.1 MASDAR CITY AS A HUB FOR INNOVATION

With over 1,300 businesses operating within its ecosystem and over 15 of them being a part of the Agri-Tech sector, Masdar City is a globally recognized hub for innovation in sustainable practices. These businesses span a range of industries, including renewable energy, advanced technologies, and sustainable urban development, fostering a unique multidisciplinary environment conducive to groundbreaking Agri-Tech advancements.

5.2 THE CATALYST ACCELERATOR: SUPPORTING AGRI-TECH INNOVATION

The Catalyst Accelerator at Masdar City is a program designed to support the growth and development of start-ups, particularly in the Agri-Tech sector. It provides tailored resources to help entrepreneurs bring innovative solutions to market, including those addressing challenges related to food security and water abundance.

Key features of The Catalyst Accelerator include:

MENTORSHIP

Start-ups receive expert guidance from industry professionals and mentors who have experience in scaling businesses and developing innovative Agri-Tech solutions.

FUNDING OPPORTUNITIES

Participants gain access to funding through connections with potential investors, enabling them to secure the capital necessary for growth.

NETWORKING

The program offers access to a global network of investors, partners, and peers, facilitating collaboration and market expansion. This includes platforms like World Future Energy Summit (WFES), industry talks, podcasts and the like. Masdar City also operates our 'Smart Farm' education centre where school groups can learn about the latest innovations and the importance of sustainable agriculture.

RESEARCH AND DEVELOPMENT FACILITIES

The Accelerator is based within Masdar City, where participants have access to high-tech laboratories and innovation spaces, providing a conducive environment for research, development, and prototyping.

The city's infrastructure is designed to support innovation, offering access to state-of-the-art research facilities, collaborative workspaces, and a robust digital ecosystem. Entrepreneurs and multinational corporations alike benefit from the city's strategic location in Abu Dhabi, positioning it as an essential player in the Middle East's Agri-Tech landscape.

5.3 THE AGRI-TECH CLUSTER: ADVANCING SUSTAINABLE AGRICULTURE

Masdar City's Agri-Tech cluster is a cornerstone of its mission to drive sustainable agricultural practices. This cluster leverages cutting-edge technologies and partnerships to address critical challenges in food security, water scarcity, and climate resilience.

Key focus areas include the development of vertical farming technologies to optimize space and resource use, algae-based protein production as a sustainable alternative to traditional protein sources, and AI-driven agricultural analytics to improve crop yields and reduce waste. These innovations are complemented by ongoing collaborations with academic institutions, start-ups, and global Agri-Tech leaders, ensuring that the cluster remains at the forefront of industry advancements.

The Agri-Tech cluster also serves as a platform for testing and scaling new technologies, offering start-ups and researchers a dynamic environment to refine their solutions and bring them to market.

5.4 PILOT INITIATIVES TO SAVE WATER

Masdar City is at the forefront of water-saving studies and pilot projects. Two relevant examples include the recent trial and monitoring with Desert Control / Soyl. By using Liquid Nano Clay (LNC) applied to landscape areas within Masdar Park, an impressive 50% water saving has been achieved. This pilot was documented through a six-month trial and careful monitoring of water use. LNC is unique in that it is liquid applied and does not require tilling of the ground which can contribute to releasing carbon into the atmosphere.

A more technical solution Masdar City is pioneering with DENODL, is the use of Hydroballs which monitor soil moisture levels and allow fine-tuning of water use. Masdar City and DENODL have established a digital dashboard to a section of the park. The goal is to monitor real-time soil moisture and other critical parameters, enabling precise adjustments to irrigation flows for plants and optimising a reduction in water consumption over 3-6 months.

Another existing initiative is the pilot initiative for Agri-voltaics at Masdar City's Connect Park. This innovative land-use solution allows agriculture and solar PV to complement each other for dual usage. The solar PV not only provides renewable energy to the city but shades the crops from direct sunlight so that plants grow better. Likewise, the vegetation and evapotranspiration reduce local temperatures by 2-3°C. This reduction in temperatures makes the solar PV fractionally more efficient in terms of performance.

6. COMPANIES DRIVING AGRI-TECH IN MASDAR CITY

6.1 PROFILES OF LEADING COMPANIES

Masdar City is home to a thriving Agri-Tech ecosystem, with over 15 innovative companies pioneering sustainable solutions in food security, water conservation, and circular economy practices. These companies leverage cutting-edge technologies such as vertical farming, insect-based bioconversion, and precision agriculture to address the region's unique environmental challenges. Listed below are some of the key Agri-Tech innovators operating within Masdar City, each contributing to a more resilient and sustainable future for food production.

alesca life

In February 2024, Masdar City partnered with Alesca Agri-Tech to launch its first indoor vertical farm, housed in repurposed shipping containers near the city's Eco-Plaza. This facility features two full-size commercial farming containers that collectively produce over 650 kilograms of leafy greens monthly, utilizing 90–95% less water than traditional farming methods. The farm employs automated equipment and artificial intelligence software to cultivate various high-quality leafy greens, lettuces, and herbs without harmful chemicals. This initiative underscores Masdar City's dedication to supporting start-ups that develop innovative climate change solutions and addresses food security challenges in arid regions like the UAE. They have set up a successful subscription model for lettuce and leafy greens available to local employees and residents.

DE L'ARTA™
OUTDOOR LIVING LABORATORY

An Emirati start-up founded in 2018 and incubated under The Catalyst accelerator, De L'Arta focuses on sustainable skincare products derived from native arid plants. The company operates an "Outdoor Living Laboratory" in Masdar City to cultivate and research indigenous flora for bioactive compound extraction.

The HydroArtPod is an innovative indoor gardening solution designed to bring sustainable, automated hydroponic farming into homes. Developed by HydroArtPod, an Abu Dhabi-based start-up founded in 2020 by Aline Pate, the device allows users to grow up to 30 different plants simultaneously, including herbs, leafy greens, and small vegetables, using a fully automated system that adjusts light, water, and nutrient cycles to optimize plant growth. The sleek, wall-mounted design not only saves space but also serves as a piece of living art, enhancing home décor. The HydroArtPod is equipped with LED grow lights, a 10-liter water tank, and sensors that monitor water and nutrient levels, alerting users via a smartphone app when attention is needed. This user-friendly approach makes it easier for individuals to engage in sustainable living by growing their own fresh, chemical-free produce at home.

Circa Biotech

Circa Biotech, established in 2020 in Abu Dhabi, UAE, is pioneering sustainable solutions by converting organic food waste into valuable resources through innovative biotechnology. Utilizing black soldier fly larvae, the company processes organic waste to produce high-quality insect protein for animal feed, organic fertilizers, and feedstock for sustainable aviation fuel (SAF). This approach not only addresses the global challenge of food waste but also contributes to environmental sustainability by promoting a circular economy. Circa Biotech's operations are based in Masdar City, Abu Dhabi, where they focus on integrating waste management, renewable energy, and sustainable agriculture into their business model.

6.2 INNOVATIONS IN VERTICAL FARMING AND HYDROPONICS

Masdar City is at the forefront of Agri-Tech innovation, with companies in its ecosystem driving transformative advancements in vertical farming and hydroponics. These cutting-edge technologies are reshaping urban agriculture and addressing critical challenges in food security, sustainability, and scalability.

RESOURCE EFFICIENCY:

Vertical farming and hydroponics represent a paradigm shift in resource management, especially in regions like the UAE where water conservation is vital. Vertical farms can reduce water usage by up to 95% compared to traditional agriculture, thanks to closed-loop irrigation systems that recycle and minimize wastage. By maximizing land-use through multi-layered growing systems, these technologies make it possible to produce more food on less land, a crucial advantage in urban areas with limited space.

SUSTAINABILITY:

Hydroponic systems eliminate the need for soil, enabling cultivation in environments where arable land is scarce. These systems also reduce or entirely eliminate the use of chemical pesticides and fertilizers, contributing to cleaner, safer, and more environment-friendly food production. Vertical farming, often powered by renewable energy sources, complements these efforts by reducing the carbon footprint associated with transporting produce over long distances.

SCALABILITY:

One of the most significant advantages of vertical farming and hydroponics is their scalability. Compact designs and modular systems allow for large-scale production in urban environments, even within buildings or underutilized spaces. This approach brings fresh produce closer to consumers, reducing supply chain complexity and enhancing food security. Companies within Masdar City are leveraging this scalability to meet the growing demand for locally sourced, high-quality produce in the UAE and beyond.

Masdar City's Agri-Tech ecosystem fosters innovation by providing access to state-of-the-art facilities, funding opportunities, and collaboration with global leaders in sustainable technology. Initiatives like Agrifood Growth and Water Abundance (AGWA) and support from the Abu Dhabi Investment Office (ADIO) and Abu Dhabi Department of Economic Development (ADDED) further empower companies to push the boundaries of what's possible in urban agriculture.

By championing advancements in vertical farming and hydroponics through companies like Alesca and HydroArt Pod, Masdar City not only contributes to urban food security but also aligns with Abu Dhabi's Vision 2030 goals of sustainability, innovation, and economic resilience. These technologies underscore the city's role as a global hub for sustainable development and Agri-Tech excellence.

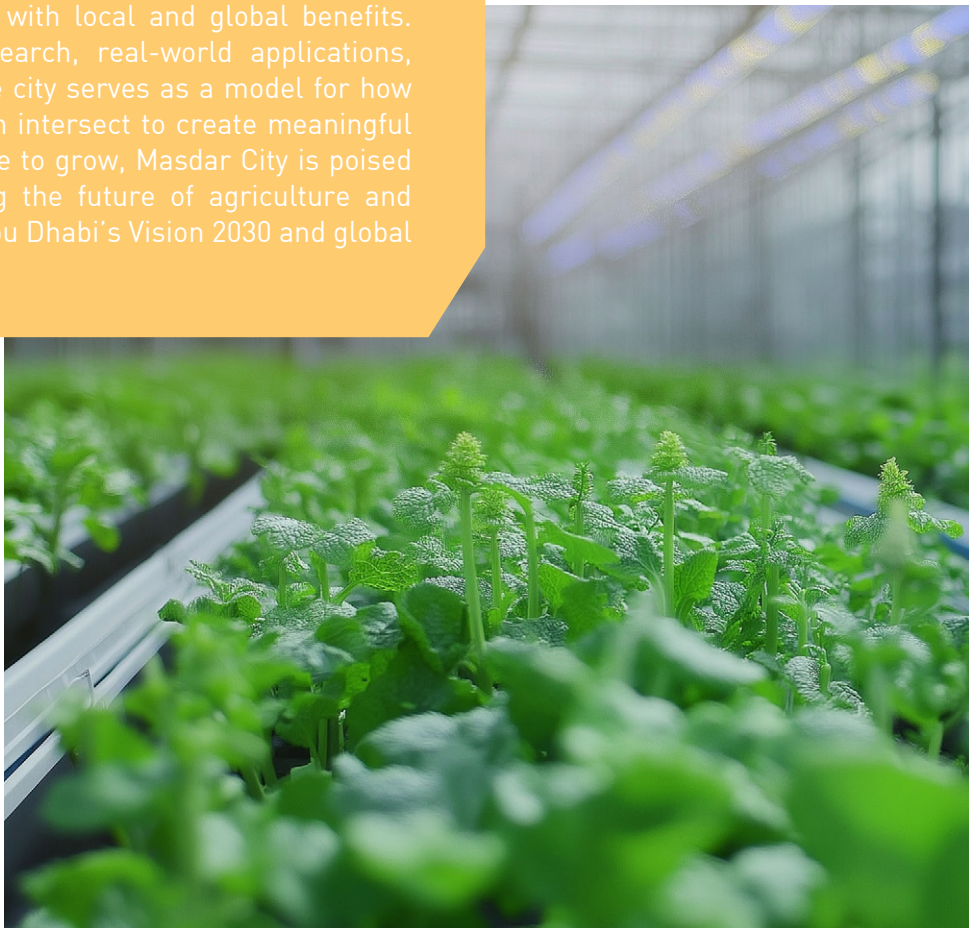
6.3 SUCCESS STORIES AND GLOBAL IMPACT

LOCAL COMMUNITY IMPACT:

Agri-Tech companies in Masdar City are committed to enriching the local community. Through educational programs and partnerships, these firms are raising awareness about the importance of sustainable agriculture and inspiring the next generation of innovators. Programs tailored for schools and universities introduce students to the principles of Agri-Tech, from hydroponics and vertical farming to renewable energy integration. Partnerships with local organizations and government entities have facilitated the establishment of urban gardens and community farming projects. These initiatives not only promote food security within the UAE but also empower residents to adopt sustainable living practices in their everyday lives.

A MODEL FOR GLOBAL AGRI-TECH:

Masdar City's success stories illustrate how a collaborative ecosystem can drive innovation with local and global benefits. By combining cutting-edge research, real-world applications, and community engagement, the city serves as a model for how technology and sustainability can intersect to create meaningful change. As these efforts continue to grow, Masdar City is poised to expand its influence, shaping the future of agriculture and reaffirming its commitment to Abu Dhabi's Vision 2030 and global sustainability goals.



7. OPPORTUNITIES FOR INVESTORS AND INNOVATORS

Masdar City Free Zone hosts organizations from around the world, ranging from start-ups testing new climate-change solutions to multi-nationals leading their industries. All tenants benefit from comprehensive support at the One-Stop Shop, which helps them set up quickly and gain access to local and international networks, investors, and partnership opportunities. This streamlined approach ensures that businesses can focus on innovation and growth without the usual administrative burdens. Key advantages of joining the Masdar City Free Zone ecosystem include becoming part of the dynamic and growing Agri-Tech sector, where companies are driving forward sustainable solutions in food security, water conservation, and smart farming technologies.

7.1 WHY INVEST IN AGRI-TECH IN MASDAR CITY FREE ZONE

- 100% foreign ownership and tax exemptions.
- Proximity to key markets in the Middle East, Africa, and Asia.
- Access to cutting-edge R&D facilities and an innovation-driven ecosystem.
- Being part of a thriving ecosystem for enhanced collaboration and regulatory approvals.
- Engagement with key government entities, including the Emirates Drug Establishments, UAE Space Agency, AD Customs, AD Conformity Council, ENEC, and the Department of Energy, for enhanced support and partnerships.

7.2 BUSINESS SUPPORT AND RESOURCES IN THE FREE ZONE

Masdar City's free zone is designed to streamline operations for businesses of all sizes, offering unparalleled support services. The one-stop-shop approach provides comprehensive assistance for licensing, visa processing, and company registration, reducing administrative burdens and expediting the setup process.

Modern office spaces and co-working facilities are tailored to the needs of Agri-Tech enterprises, fostering collaboration and innovation. Businesses in the free zone benefit from access to state-of-the-art research and development facilities, ensuring they can leverage advanced technologies to remain competitive.

Masdar City also offers an extensive network of global partnerships and industry connections, enabling businesses to scale and thrive in an international market. Combined with tax exemptions and robust intellectual property protections, the free zone creates an ecosystem that attracts top-tier innovators and investors in Agri-Tech.

8. INFRASTRUCTURE AND SUSTAINABILITY

8.1 RESEARCH AND EDUCATIONAL FACILITIES

- **Mohamed bin Zayed University of Artificial Intelligence (MBZUAI):**
  MBZUAI is at the forefront of advancing AI-driven solutions for Agri-Tech applications. Ranked 10th globally in artificial intelligence, the university's focus on computer vision, machine learning, natural language processing, robotics, and computational biology enables the development of innovative solutions for the agricultural sector.

- **Advanced Technology Research Council:**
  The Advanced Technology Research Council (ATRC) supports cutting-edge research initiatives aimed at enhancing agricultural efficiency and sustainability. ATRC provides resources and funding to facilitate the development of sustainable agricultural practices, fostering advancements in Agri-Tech.

- **International Renewable Energy Agency (IRENA) Headquarters:**
  Located in Masdar City, IRENA's headquarters is a symbol of the UAE's commitment to renewable energy. IRENA plays a key role in shaping international energy policy and promoting sustainable energy technologies. The IRENA Innovation and Technology Center further drives advancements in renewable energy, particularly in clean energy storage and solar power technology.

- **Alesca Agri-Tech Research Facility:**
  Alesca Agri-Tech is revolutionizing urban farming with its hydroponic systems that use up to 90% less water than traditional farming methods. The research facility contributes significantly to addressing food security through local, controlled environment agriculture.

- **Circa Biotech:**
  Circa Biotech, a UAE-based agribusiness start-up, exemplifies innovation at the intersection of sustainable agriculture, food security, and Agri-Tech. By harnessing the power of black soldier fly larvae (BSFL), the company transforms organic food waste into high-quality insect protein, offering a sustainable alternative to traditional animal feed sources. This aligns with the program's mission to address food security challenges through sustainable protein production, reducing dependence on environmentally harmful feed like fishmeal and soy. Circa Biotech's circular economy approach, upcycling food waste into valuable resources like protein, organic fertilizers, and oils, complements the initiative's commitment to waste reduction and sustainable food systems. The company's cutting-edge insect farming techniques, along with their exploration into biofuels, further enrich the Agri-Tech landscape, aligning with the focus on fostering smart, tech-driven solutions. By localizing food production within the UAE, Circa Biotech also enhances regional food security and economic growth while reducing reliance on imports a key objective in strengthening the Agri-Tech and biotech sectors in the region.

8.2 GREEN BUILDINGS AND SUSTAINABLE TECHNOLOGIES

Masdar City is a global benchmark for sustainable urban development, showcasing innovative architecture and technologies designed to minimize environmental impact. Every aspect of the city's design reflects a commitment to sustainability, from energy efficiency to resource conservation, positioning it as a leader in green urban planning.

ENERGY-EFFICIENT DESIGN

Masdar City's buildings are designed with sustainability at their core. Architectural features such as shading techniques, angled facades, and reflective materials reduce direct sunlight exposure, significantly lowering the need for air conditioning in the region's hot climate. Traditional Arabian design elements, such as wind towers, are reimagined with modern technologies to provide natural cooling and ventilation, further enhancing energy efficiency.

Photovoltaic panels are a cornerstone of the city's renewable energy strategy, generating a significant portion of Masdar City's electricity needs. By integrating rooftop solar panels and strategically placed solar arrays, the city leverages Abu Dhabi's abundant sunlight to power its operations sustainably.

WATER EFFICIENCY AND RECYCLING

In a region where water is a precious resource, Masdar City employs advanced water recycling systems to minimize waste. Greywater is treated and reused for irrigation and landscaping, while high-efficiency fixtures reduce water consumption in buildings. These initiatives ensure that the city's water usage is both efficient and sustainable, supporting Abu Dhabi's broader water conservation goals.

SUSTAINABLE CONSTRUCTION PRACTICES

Key initiatives in Masdar City's development include the use of locally sourced and low-carbon materials. By prioritizing materials that have a reduced environmental footprint, the city minimizes the emissions associated with transportation and manufacturing. Prefabricated construction methods further enhance sustainability by reducing waste and improving energy efficiency during the building process.

ADVANCED WASTE MANAGEMENT

Masdar City has implemented cutting-edge waste management practices to support its zero-waste goals. Organic waste is composted and repurposed for use in urban gardens, promoting circularity within the city's ecosystem. Recycling programs are integrated into residential and commercial operations, ensuring that waste is sorted and reused wherever possible. The city's commitment to minimizing landfill contributions underscores its holistic approach to sustainability.

Masdar City also operates on-site composting to its two main district parks. These facilities combine green waste and leaf cuttings with food waste from local cafés to produce compost that is re-applied to the parks. This sustainable approach is in line with circular economy principles and waste minimization.

A LIVING LABORATORY FOR GREEN INNOVATION

Masdar City is more than just a sustainable urban development; it serves as a living laboratory for green innovation. Researchers, entrepreneurs, and companies collaborate within the city to test and refine cutting-edge technologies that can be scaled globally. From smart grids and energy storage solutions to low-carbon transportation systems, Masdar City's innovations are shaping the future of sustainable living.

By combining traditional wisdom with advanced technologies, Masdar City exemplifies how urban environments can thrive in harmony with the planet. Its achievements align with Abu Dhabi's Vision 2030 goals and inspire cities worldwide to embrace sustainable development.

8.3 INTEGRATION OF “AI” AND “IOT” IN AGRI-TECH

Masdar City is setting new standards in Agri-Tech innovation by integrating Artificial Intelligence (AI) and the Internet of Things (IoT) into its farming systems. Companies integrating AI and IoT within the Masdar City ecosystem are:

HYDROARTPOD

An innovative indoor gardening solution that integrates both artificial intelligence (AI) and Internet of Things (IoT) technologies to facilitate home cultivation of fresh produce. The system features smart grow channels that distribute nutrient-rich water evenly, optimizing air and water levels to ensure optimal plant root health. Additionally, it includes smart functions that notify users when attention is required through a connected app. The device is app-controlled, allowing users to monitor and manage the growth environment remotely. This automation reduces the need for manual intervention and minimizes reliance on chemicals, packaging, and transportation, thereby promoting sustainability. The HydroArtPod can be wall-mounted, serving both as a functional garden and a piece of living art within the home.

ALESCA TECHNOLOGIES

In partnership with Masdar City, Alesca Agritech has established the city’s first indoor vertical farm. This facility utilizes automated equipment and AI software to cultivate various high-quality leafy greens, lettuces, and herbs. Housed in repurposed shipping containers near Masdar City’s Eco-Plaza, the farm produces over 650 kilograms of produce monthly, using 90-95% less water than traditional farming methods. The controlled environment and automated monitoring systems maximize food production and minimize waste.

These advanced technologies are revolutionizing agriculture, creating smarter, more efficient, and environmentally sustainable farming solutions that address global challenges in food security and resource conservation.

A GLOBAL MODEL FOR AGRI-TECH INNOVATION

The successful integration of AI and IoT in Masdar City’s Agri-Tech ecosystem underscores its role as a global leader in sustainable agriculture. Companies and researchers within the city are not only implementing these technologies but also developing scalable solutions that can be exported to regions facing similar challenges.

By leveraging the power of AI and IoT, Masdar City continues to push the boundaries of what’s possible in agriculture, advancing its mission to create a more sustainable and food-secure future. These technologies further solidify its reputation as a hub for innovation and a beacon of sustainable development worldwide.

9. LOOKING AHEAD: THE FUTURE OF AGRI-TECH IN MASDAR CITY

9.1 EXPANDING THE AGWA CLUSTER

The AGWA cluster is central to Masdar City's vision of leading global advancements in sustainable food production and water resource management. This dynamic initiative brings together innovators, researchers, and entrepreneurs to address pressing challenges in agriculture, food security, and environmental sustainability. With ambitious growth plans, the program is poised to become a global hub for cutting-edge Agri-Tech solutions.

EXPANDING RESEARCH IN ALTERNATIVE PROTEINS

A key focus of the initiative is the development of alternative proteins, which play a crucial role in reducing the environmental impact of traditional meat production. Research efforts explore sustainable protein sources, including lab-grown meat, plant-based alternatives, and insect-based products. These innovations require fewer resources, generate lower greenhouse gas emissions, and provide scalable solutions for feeding a growing global population.

Lab-grown meat has the potential to transform the food industry by offering ethically and environment-friendly alternatives to traditional livestock farming. Similarly, insect-based proteins are emerging as a nutrient-rich, high-efficiency food source for both animal feed and human consumption. Masdar City's support of these advancements has positioned it as a key player in the evolution of sustainable food systems.

SUPPORTING START-UPS

Recognizing the pivotal role of start-ups in driving innovation, the AGWA initiative is launching a support program to accelerate the development and commercialization of next-generation Agri-Tech solutions. This initiative will provide financial support, mentorship, and access to a global network of investors and industry experts.

The program aims to empower entrepreneurs in areas such as automated farming systems, biotech advancements, and sustainable packaging solutions. By fostering a vibrant start-up ecosystem, the program ensures a continuous pipeline of transformative ideas to address food security and environmental sustainability challenges.

AMBITIOUS GROWTH TARGETS FOR 2030

Aligned with Abu Dhabi's Vision 2030, the AGWA initiative has set ambitious goals to solidify its status as a global hub for Agri-Tech in Masdar City. By 2030, the program aims to host over 200 Agri-Tech businesses, creating more than 1,500 jobs across research, technology development, and operational roles. These efforts will not only strengthen Masdar City's role in advancing sustainable agriculture but also contribute significantly to the UAE's broader economic and sustainability objectives.

PIONEERING THE FUTURE OF AGRI-TECH

Masdar City is committed to leading the transition toward sustainable agriculture which supports AGWA. By combining innovation, collaboration, and investment, the cluster is setting new benchmarks for sustainable food systems and water management. Its efforts will have a lasting impact, inspiring similar initiatives globally and positioning Masdar City as a beacon of Agri-Tech excellence.

9.2 VISION 2030: A SUSTAINABLE AGRICULTURE FRAMEWORK

Aligned with Abu Dhabi's Vision 2030, Masdar City is implementing circular economy principles in agriculture to enhance sustainability and resource efficiency. This approach integrates waste-to-energy projects and water reuse initiatives, aiming to minimize resource consumption and environmental impact.

WATER REUSE INITIATIVES

In addition to waste-to-energy projects, Masdar City is implementing water reuse strategies to support sustainable agriculture. The city employs advanced water recycling systems that treat and reuse wastewater for agricultural purposes, reducing the demand for freshwater resources. This practice is particularly crucial in arid regions like the UAE, where water scarcity is a significant concern.

By integrating these circular economy principles, Masdar City not only addresses food security challenges but also contributes to environmental sustainability, aligning with the broader goals of Abu Dhabi's Vision 2030.

WATER RECYCLING AND REUSE

Masdar City employs advanced water recycling systems to treat and reuse wastewater for agricultural purposes, thereby reducing the demand for freshwater resources. All wastewater in Masdar City is recycled through a bioreactor and used for landscaping and agriculture.

CIRCULAR ECONOMY PRINCIPLES

Masdar City integrates circular economy principles by using organic waste and the nutrients it contains as inputs into the feed production process, thus enhancing food security.

FOOD SECURITY AND ENVIRONMENTAL SUSTAINABILITY

Masdar City partners with the UAE Office for Food Security to develop joint initiatives that enhance the country's capacity and competitiveness in critical sectors related to future food security.

SUSTAINABLE AGRICULTURE INITIATIVES

Masdar City showcases sustainable smart home farming solutions to increase food and water security, supporting start-up companies and entrepreneurs to develop an innovation ecosystem focused on improving food and water security for the region.

9.3 OPPORTUNITIES FOR COLLABORATION AND GROWTH

Masdar City provides a dynamic and collaborative environment that fosters innovation and supports the development of sustainable agriculture solutions. By facilitating interactions between researchers, investors, and businesses, the city enables the co-development of technologies and strategies aimed at addressing the critical challenges facing the agricultural sector, particularly in relation to water scarcity, food security, and resource efficiency.

Furthermore, collaborations with international universities and research institutions focus on advancing knowledge and skills within the Agri-Tech sector. These collaborations provide a platform for sharing cutting-edge research, developing new approaches to sustainable agriculture, and training the next generation of professionals in the field.

Through these initiatives, Masdar City not only enhances its role as a hub for Agri-Tech innovation but also accelerates progress toward achieving global sustainability goals. The city's integrated ecosystem of research, investment, and business collaboration helps drive advancements that have the potential to revolutionize agriculture worldwide, positioning Masdar City at the forefront of sustainable agricultural development.

10. APPENDICES

10.1 CONTACT INFORMATION

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10.2 KEY PARTNERS AND STAKEHOLDERS

مكتب أبوظبي للاستثمار
ABU DHABI INVESTMENT OFFICE

دائرة التنمية الاقتصادية
DEPARTMENT OF ECONOMIC DEVELOPMENT

جامعة خليفة
Khalifa University

ADVANCED TECHNOLOGY RESEARCH COUNCIL

10.3 GLOSSARY OF AGRI-TECH TERMS

AGRI-TECH (AGRICULTURAL TECHNOLOGY)

The application of advanced technologies such as artificial intelligence (AI), Internet of Things (IoT), robotics, and biotechnology to enhance agricultural productivity, efficiency, and sustainability.

HYDROPONICS

A method of growing plants without soil, using mineral nutrient solutions dissolved in water. This system reduces water usage by up to 90% compared to traditional farming and is ideal for controlled environments.

AQUAPONICS

An integrated system combining aquaculture (raising fish) with hydroponics. The fish waste provides organic nutrients for plant growth, and the plants filter the water for the fish.

VERTICAL FARMING

The practice of growing crops in vertically stacked layers or controlled environments, which optimizes space usage and allows for year-round production with minimal land and water resources.

PRECISION AGRICULTURE

The use of technology such as GPS, sensors, and data analytics to monitor and manage variability in crops. This approach enhances efficiency by applying water, fertilizers, and pesticides only where needed.

BIOTECHNOLOGY

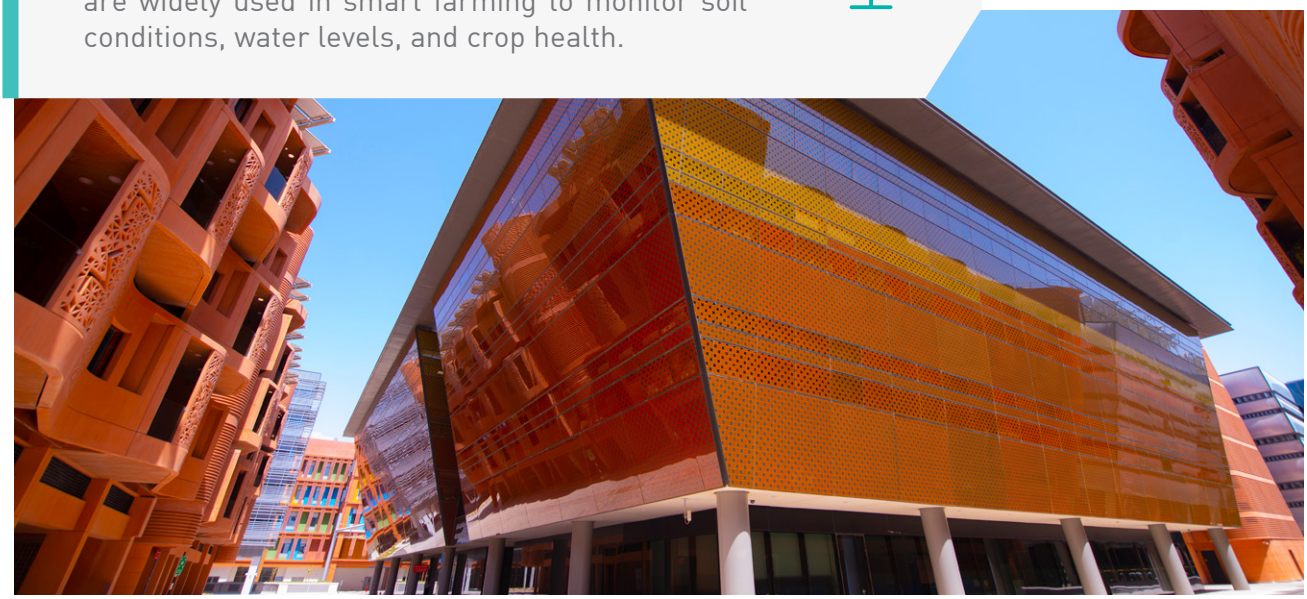
The use of living organisms or biological processes to develop agricultural solutions, such as genetically modified crops resistant to pests, diseases, or extreme weather conditions.

ARTIFICIAL INTELLIGENCE (AI)

The simulation of human intelligence in machines, enabling technologies to analyze data and make decisions. In agriculture, AI is used for predictive modeling, pest management, and optimizing resource use.

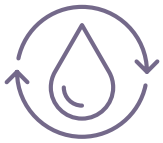
INTERNET OF THINGS (IOT)

A network of interconnected devices equipped with sensors that collect and exchange data. IoT systems are widely used in smart farming to monitor soil conditions, water levels, and crop health.



DESALINATION TECHNOLOGY

The process of removing salt and impurities from seawater to produce freshwater for agricultural use, which is particularly valuable in arid regions.



SUSTAINABLE AGRICULTURE

Farming practices designed to meet current food needs without compromising the ability of future generations to meet theirs. This involves reducing resource consumption, protecting biodiversity, and minimizing environmental impacts.

ALTERNATIVE PROTEINS

Protein sources that are alternatives to traditional animal-based proteins, including algae, plant-based meats, and lab-grown or cultured meat.

CIRCULAR AGRICULTURE

A farming model focused on recycling resources, such as using organic waste as fertilizer or converting crop residues into bioenergy, to create a self-sustaining agricultural system.

CLIMATE-RESILIENT CROPS

Crops genetically engineered or bred to withstand extreme weather conditions, such as droughts, floods, and heatwaves, ensuring stable yields despite climate challenges.

FOOD SECURITY

The availability and access to sufficient, safe, and nutritious food for all people at all times. Agri-Tech innovations play a critical role in improving global food security.

ALGAE-BASED PROTEIN

Protein derived from algae, a highly sustainable and nutrient-rich source. Algae farming uses minimal land and water, making it an eco-friendly protein alternative.

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