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# Qatar National Food Security Programme: Initiating a Model for Arid States

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*Qatar National Food Security Programme*

Effectively linking solar energy, seawater desalination and agricultural development to enhance food security while simultaneously augmenting water security, will allow Qatar to establish a global reference project for sustainable agriculture policy for arid states.

Food is fundamental to human survival and serves as a critical pivot for overall social, economic and political stability and progress. According to The State of Food Insecurity in the World Report 2001: *"Food Security is a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life*".

The long-term sustainability of access to food remains a challenge for most dryland countries with dependence on food imports to satisfy local market demand. In a country like Qatar, which imports over 90 percent of its food needs, food security remains one of the major challenges. With extreme water scarcity and time-bound

hydrocarbon wealth, the nation has limited choices. It either continues "business-as-usual", relying heavily on imports, or engages in an enormous undertaking to establish its food sovereignty.

The 2008 food crises came as a wake-up call for the country that had, for decades, depended on cheap food imports. In response to the world food crisis that affected the availability and prices of food products in Qatar, a National Food Security Programme (QNFSP) was established by the Office of the Heir Apparent of the State of Qatar, H.H. Sheikh Tamim Bin Hamad Al-Thani.

QNFSP aims to reduce Qatar's dependence on imports through a comprehensive master plan combining renewable energy, responsible water management, global cooperation, and food transport and processing technologies to achieve domestic food security. Headed by Executive Chairman Fahad bin Mohammed Al-Attiya, the programme will develop the national Master Plan that will guide and inform Qatar's food security policy. To that end, QNFSP actively works to build partnerships with regional and international organizations for the development of research programmes and studies focused on best practices and the optimal use of resources in the agricultural sector.

**The Master Plan**

The QNFSP "Master Plan" takes a holistic approach to devising solutions to the issue of Food Security by expanding four related sectors of the economy of Qatar, including:

- Renewable Energy;
- Desalination & Water Management;
- Agricultural Production; and
- Food Processing and Transport.

The Master Plan will leverage investments in food security infrastructure to drive public-private partnerships, private enterprise and the overall growth of new industries in these four areas. Education, research and development will support and drive continued evolution of infrastructure and industrialization of key technologies in each of the four areas.

The implementation of the QNFSP Master Plan will be guided by the vision of the Programme, "To secure sustainable, quality foods for the nation of Qatar from both local and international sources." For Qatar, food security involves increasing domestic production in a sustainable manner by preserving natural ecosystems and employing environmentally appropriate practices and technologies. International partnerships on agricultural technologies and food processing will be leveraged to insure quality and improve the overall security of international sources of additional food supplies required to fill local domestic production gaps. A geographically diversified portfolio of trade agreements will bring greater variety and reduced risk to those products that are best grown sustainably in other regions of the world.

## Qatar's water scarcity

Water is critical to agricultural production. But Qatar is a water-scarce country with limited rainfall and no surface freshwater. It is classified as being one of the world's most arid and desert regions, surrounded on three sides by the waters of the Arabian Gulf. So the provision of a sustainable water source is a key to the development of an agricultural sector in Qatar. With 95 percent of groundwater abstraction presently being used for agricultural production, Qatar's aquifers are currently being severely depleted. Today's abstraction of groundwater is four times the rate of natural recharge. Any increased agricultural development will further stress these fragile water reserves. Faced with the reality of depleted natural water reserves and the significant volume of water required for meaningful agricultural production, QNFSP's Master Plan must be built around responsible desalination.

The environmental impact of desalinating such quantities of water using traditional methods would obviously be enormous. With this challenge in mind, perhaps the most visionary aspect of the QNFSP Master Plan is a comprehensive system for responsible water management that leverages plentiful solar energy to desalinate seawater and puts in place post-flow freshwater recovery and storage systems to eliminate waste and increase stored reserves. The development of purpose-built solar energy systems dedicated to a new generation of desalination plants for agricultural development will enhance domestic food security while simultaneously augmenting overall water security, positioning Qatar to establish a global reference project for sustainable agriculture policies and practices for arid regions worldwide.

In addition to pioneering a new model globally, this national initiative delivers on Qatar's commitment to economic diversification and transformation to a "knowledge economy" The Master Plan takes on several of the critical convergence challenges for dryland applications and overall efficiency. It promises to add further momentum to Qatar's emerging solar energy sector, drive innovation in seawater desalination and responsible management of hyper-saline effluent; and advance a wide variety of dryland agriculture solutions.

In line with the dual ambition of environmental sustainability and economic diversification, QNFSP will not rely on its abundant hydrocarbon resources to power the desalination required for the Master Plan. Renewable power for desalination systems will come primarily from solar energy but other sources of renewable energy are also being explored including wind, biomass and waste heat recovery. The desalination plant, located near the coast, will be decoupled from the renewable energy plant, which will be located inland. This renewable energy supply will be fed into a 'smart grid' system–preserving critical coastal ecosystems and enabling the integration of both large and small-scale distributed renewable generation systems with existing power supplies–for a more efficient integrated solution.

## Mapping the way through research

QNFSP has commissioned a solar resource assessment project with German Aerospace Center/DLR to measure solar radiation capacity in Qatar; develop ground-validated satellite data sets and solar radiation maps for the entire country; and guide solar generation site selection. A solar park is planned for the south of Qatar where the solar radiation levels were found to be higher than the rest of the country.

The Water and Energy Department of QNFSP is involved in developing the artificial storage and recharge (ASR) of aquifers which will put in place a secure process for storing significant quantities of recovered freshwater for long periods of time. Together with Qatar General Electricity and Water Corporation (Kahramaa), they have developed the project to establish the feasibility of ASR and to develop optimal practices for ASR with food and water security objectives in mind.

Using renewable energy to desalinate water for agricultural production while also protecting Qatar's aquifers from damage and depletion delivers on the mandate of the Qatar National Vision that "the rights of future generations would be threatened if the depletion of non-renewable resources were not compensated by the creation of new sources of renewable wealth." On the demand side, QNFSP will reduce agricultural water consumption by using water-efficient best practices and technologies such as drip irrigation and hydroponics.

## SWRO technology verification

Desalinated seawater will be generated using reverse osmosis (SWRO) technology. SWRO has several advantages over alternative proven technology in economic terms as well as environmental impact, footprint and flexibility. The QNFSP Water and Energy Department has worked with Team Japan (Japanese Embassy, Mitsubishi, Toray) to deliver a project sponsored by the Japanese Ministry of the Economy that will verify a new generation SWRO technology for desalination of cooling water. In contrast to conventional SWRO plants, the investigated technology will not use chemicals to pre-treat seawater prior to desalination. This will help reduce environmental impact significantly. New membrane elements will be developed to better withstand high seawater temperatures. The group is currently facilitating the next stage of experimental verification of the technology at RLIC. The Team Japan activities were performed with the support of Qatar Petroleum and Kahramaa.

The Economics Department of QNFSP developed a framework for cost-benefit analysis and used it to assess private benefits and costs of the proposed reverse osmosis desalination technology plant and compared it to the current thermal technology plant. Net benefits for reverse osmosis were found to be higher.

## Agricultural Production

All these measures to augment Qatar's water security will ultimately enable the planned increase in agricultural production. Qatar currently has 1,216 registered farms with 23,903 hectares of assigned arable land. Only 12,274 hectares (which is roughly 51%) of this arable land is currently under actual cultivation. At present, the average size of productive farms in Qatar is 27 hectares with an average of eight hectares being used for crop production; including fruit trees, vegetables and fodder crops. Barley is the most frequently grown cereal crop.

Part of QNFSP's mandate is to investigate the potential for increasing domestic production of regionally suited crops including vegetables, fodder, legumes, oil seeds and cereal grains. The Departments of Agriculture and Economics of QNFSP have already developed a set of objective criteria that will be used to identify and estimate the production levels of the crops that could be grown in Qatar in order to fulfill the food security objectives. A constrained optimization model that considers appropriate resource constraints is being developed for this purpose. This model will be delivered through a user-friendly digital interface for ease of use by policy makers.

Another important ingredient in the economic analysis and policymaking is the relevant datasets. The QNFSP Economics Department is involved in connecting with stakeholders to gather food security related data at every stage of production and distribution. In the process, the team has already constructed a comprehensive dataset on food imports to Qatar. QNFSP intends to build on this work to create a Qatar Food Price Index by layering all relevant data (prices versus quantities) of the different sectors throughout the entire food supply chain.

## Ensuring the optimal use of resources

As part of QNFSP's comprehensive approach to food security, many of its programmes and research activities focus on the optimal use of resources in the agricultural sector. The Agriculture Department has developed "Crops Production Guidelines" for key commodities including wheat, rice, barley tomato, potato, onion, garlic, squash, eggplant, and cucumber. This resource provides guidelines on seeding rate, diseases and pests and suitable irrigation.

An additional ongoing developmental project is the Qatari Farms Development Programme. Development of Qatari farms requires modernizing irrigation systems, improving practices and expansion of greenhouses and other sheltered production facilities. Preliminary model designs and drawings suitable for local conditions have been prepared in order to layout recommended footprint scenarios for model farms, design efficient irrigation systems, and model productive greenhouses and other related infrastructure. QNFP's Nutrition Department, meanwhile, has been tasked with research, raising awareness and increasing levels of education and engagement among local stakeholders on issues such as the domestic food supply, food diversity, nutrition, lifestyle and overall sustainable food consumption patterns.

The completed concept study, "Water and Land Requirements for Maximum Crop Production in Qatar by 2024", shifts the focus to slightly more long term goals and needs. The study dealt with the calculation of the water and land requirements to attain the maximum possible food self–sufficiency in most food crops in Qatar by 2024, according to 2008 data. The water and agricultural plan, covering 10 years (2015 - 2024), may be expected to produce a total 1,686,425 tons by the year 2024. Assuming that the available food consumption in the year 2008 will be maintained over the project period, the consumption of foodstuffs in Qatar for the year 2024 could be projected to be 2,646,047 tons and the required imports for balancing the foodstuffs will be 959,622 tons. The study reveals that crop production could be greatly increased and that self-sufficiency could be attained in the vegetables group, pulses, sugar and green forages and that overall self- sufficiency in crops could be estimated at 64 percent. Such projected data is invaluable to policy makers as the backdrop for planning and implementation.

**Market Stabilization Program**

QNFSP's mission to increase domestic production to achieve food security necessitates insulating Qatar from the effects of external price volatility and export prohibitions that resulted from total or near-total import dependence. Commercial viability of agricultural production in the country is hampered by a range of challenges including water scarcity, climate, lack of expertise and resources, and the unpredictable availability of imports that are often lower priced. There is a real need for incentives-based market stabilization programmes to encourage domestic production.

Market stabilization is made up of two key components. The first being a domestic price support system, and the second being external border policies. Domestic price support systems are important in order to ensure equitable returns on domestic agriculture production and encourage long-term investment and quality enhancement. At the same time, maximizing market forces and avoiding any perverse market-distorting incentives that might result in inefficient domestic production is essential. External border measures including non-tariff and tariff measures are required to protect domestic production under specific circumstances in a manner that is consistent with Qatar's obligations under trade and related agreements.

**An alliance between dryland countries**

Food security is a global concern. The issue is especially relevant for the nearly 2.5 billion people living in dryland regions throughout the world. With projected growth in the world population and a change in dietary habits brought about by urbanization and development, ensuring food security will require a major increase in food production. Dry lands face a unique set of resource challenges and are often less resilient against climate change. Arid regions need a sustainable model with solutions

appropriate to their local conditions. Qatar is at the advanced stages of establishing a Global Dry Lands Alliance that aims to establish a platform for collaboration among dryland regions to collectively harness their science, technology and finance capabilities. When Qatar achieves food self-sufficiency, other dryland states struggling to achieve food security will no doubt benefit greatly from the lessons learned through the programme.

The Master Plan designed by QNFSP for the conditions and challenges in Qatar is multi-facetted. It seeks to increase domestic production in a sustainable manner by preserving natural ecosystems and using environmentally appropriate technologies and practices while at the same time, securing availability and the overall health and safety of food supplies in the local market through an increase in domestic production. Additionally, the increase in domestically produced foodstuffs will reduce variability of price and quality as well as overall dependence on imports. The success of this model will ensure it becomes a globally important reference project for sustainable agriculture policy for arid states.

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CIHEAM
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CIHEAM is made up of a General Secretariat (Paris) and 4 Mediterranean Agronomic Institutes (Bari, Chania, Montpellier and Zaragoza).

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**CIHEAM Observatory**

The CIHEAM Observatory is an instrument for analysis and discussion of Mediterranean agriculture, rural affairs and food.



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