

International Investment Law Clinic

BETTER ENVIRONMENT FOR A BETTER FUTURE

Proposal for Qatar's second Nationally Determined Contributions (NDCs)
submissions under the Paris Agreement

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Submitted by

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List of Abbreviations

CH4	Methane
CO2	Carbon Dioxide
COP	Conference of the Parties
CSP	Concentrated Solar Power
DNI	Direct Normal Irradiance
EMC	Energy Monitoring Centre
FAO	Food and Agriculture Organization
GHG	Greenhouse Gases
GWP	Global Warming Potential
HFCs	Hydrofluorocarbons
INDC	Intended Nationally Determined Contributions
KSA	Kingdom of Saudi Arabia
kWh	Kilowatt Hour
LNG	Liquefied Natural Gas
MME	Ministry of Municipality and Environment, State of Qatar
MW	Mega Watts
N2O	Nitrous oxide
NDCs	Nationally Determined Contributions
PA	Paris Agreement
PFCs	Perfluorocarbons
PV	Photovoltaic
QNFSP	Qatar National Food Security Programme
QNV	Qatar National Vision
QR	Qatari Riyals
SF6	Sulphur hexafluoride
UN	United Nations
UNCC	United Nations Climate Change
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change

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Executive Summary

This paper conducts a critical analysis of Qatar's Nationally Determined Contributions (NDCs) under the Paris Agreement (PA) as submitted to the United Nations Framework Convention on Climate Change (UNFCCC) secretariat on November 19, 2015. Under its first NDCs, Qatar submitted a set of voluntary national actions and plans for economic diversification with mitigation co-benefits. This paper provides a brief background on the concepts of economic diversification and mitigation co-benefits, highlighting the roots of mitigation co-benefits as proposed by a unified Qatar, Bahrain, the United Arab Emirates (UAE), and the Kingdom of Saudi Arabia (KSA) during the 18th session of the Conference of the Parties (COP 18) held in Doha in 2012. Ironically, the blockade currently imposed by Bahrain, the UAE, and KSA, closing Qatar's sea, land and air borders have raised new challenges for Qatar that require a re-examination of Qatar's NDCs.

The paper proposes that Qatar's NDCs could be improved by examining Qatar's national policies with specific regard to the impact of the blockade on Qatar's NDC commitments and the new challenges faced by the country. Qatar's NDC also ought to consider adding provisions dealing with food production and food waste, green building construction, and reducing carbon emissions per capita. Additionally, Qatar should consider adding specific adaptation commitments and economic incentives covering energy use, green energy investment, and electricity generation.

The paper ends with a proposal for Qatar's second submission of its NDCs to the UNFCCC.

1. Introduction

The UNFCCC, adopted in May 1992,¹ is an international environmental treaty of the United Nations focused on limiting the impact of the resulting climate change across the globe. Within the framework of the UNFCCC, states have met annually since 1995 at the Conference of the Parties (COP). The COP is the supreme decision-making body of the UNFCCC and includes all states that are parties to the UNFCCC.

By way of the third session of the COP in December 1997, the Kyoto Protocol² was adopted by the parties to the UNFCCC setting out the first commitment period and corresponding targets, ending in 2012. The targets for the second commitment period starting in 2013 were agreed upon at the 18th session of the COP that took place in Doha, Qatar, from November 26 to December 7, 2012.³ The COP 18 was held in Doha to adopt an amendment to the Kyoto Protocol, to update and set new commitments for the Parties, to revise the list of greenhouse gases (GHGs) that parties have to report on, and to bring

¹ UN General Assembly, *United Nations Framework Convention on Climate Change: resolution/adopted by the General Assembly* (20 January 1994), A/RES/48/189, available at <https://www.refworld.org/docid/3b00f2770.html> (last visited 18 August 2019).

² *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, UN Doc FCCC/CP/1997/7/Add.1 (10 December 1997), 37 ILM 22 (1998), available at <https://unfccc.int/process/the-kyoto-protocol/compliance-under-the-kyoto-protocol/background> (last visited 18 August 2019); *UNFCCC & Kyoto Protocol*, Asia Pacific Adaptation Network (APAN), available at <http://www.asiapacificadapt.net/about-us/unfccc> (last visited 15 August 2019).

³ *Report of the Conference of the Parties on its eighteenth session, held in Doha from 26 November to 8 December 2012*, FCCC/CP/2012/8/Add.1, available at <https://unfccc.int/resource/docs/2012/cop18/eng/08a01.pdf#page=3> (last visited 18 August 2019); United Nations Development Plan (UNDP), *Summary of the UNFCCC Climate Change Conference in Doha, Qatar, 26 November – 7 December 2012*, available in PDF at https://www.undpcc.org/docs/UNFCCC%20negotiations/UNDP%20Summaries/2012_12%20December%20Doha/UNDP%20COP18%20summary.pdf (last visited 15 August 2019).

together policymakers and scientists to discuss how parties can meet their targets through national measures.⁴

By far the most important COP was the one that took place in Paris, France in 2015 as it led to the landmark PA. The PA is the first agreement bringing together all 196 parties into a common cause of taking a positive action towards climate change.⁵ It aims for countries to deal with the impact of climate change, to make finance flows consistent with a pathway towards lower GHG emissions, and to create climate resilient development. It aims to achieve this by requesting countries to create, communicate and prepare climate action plans that are also known as NDCs. NDCs submitted by parties have to be reported to the UNFCCC secretariat.

Even though the PA is not a legally binding agreement, it motivates parties to make pledges to mitigate the effects of global warming.⁶ The NDC is a chance for countries to show how willing they are to contribute to reducing the effects of global warming, whether it is by mitigation or adaptation.

The State of Qatar has ratified the PA⁷ and submitted its NDCs.⁸ Qatar's first NDCs addressed important aspects in reducing emissions and limiting the risks of climate change. However, Qatar's

⁴ Pablo Suarez, Carina Bachofen, Maarten Van Aalst, Saleemul Huq, Mairi Dupar & Sahara Juichiro, *Development & Climate Days at COP 18 meeting report*, Climate and Development, 5:2, at 182-185 (2013), available at <https://www.tandfonline.com/doi/abs/10.1080/17565529.2013.801825> (last visited 18 August 2019).

⁵ Paris Agreement (13 December 2015), in *UNFCCC, COP Report No. 21*, Addendum, at 21, UN Doc FCCC/CP/2015/10/Add.1 (29 January 2016), available at <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement> (last visited 18 August 2019).

⁶ Timmons Roberts & Angelica Arellano, *Is the Paris climate deal legally binding or not?*, Climate Home News (2 November 2017), available at <https://www.climatechangenews.com/2017/11/02/paris-climate-deal-legally-binding-not/> (last visited 18 August 2019); Jon Truby, *Using Bitcoin technology to combat climate change*, Nature Asia (19 September 2018), available at <https://www.natureasia.com/en/nmiddleeast/article/10.1038/nmiddleeast.2018.111> (last visited 15 August 2019).

⁷ *Status of Ratification of Paris Agreement*, available at https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=_en (last visited 18 August 2019).

⁸ United Nations Climate Change (UNCC), *Qatar Submit their Climate Action Plan Ahead of 2015 Paris Agreement*, available at <https://unfccc.int/news/qatar-submits-its-climate-action-plan-ahead-of-2015-paris-> →

NDCs should be re-examined due to new national circumstances that have arisen in the country just within the past two years, such as the imposition of a political, physical, and economic blockade against Qatar by its neighbors, and Qatar's enactment of a new investment law, possibly to mitigate the effects of the blockade on foreign direct investment. Qatar's second NDCs should also address environmental issues that the blockade has exacerbated.

This project will examine the effects of the PA on Qatar's trade and investment policies and vice versa, i.e., the effect of trade and investment policies on the PA. The paper will proceed as follows:

- **Part two** of this paper provides a brief background on the concepts of economic diversification and mitigation co-benefits under the PA.
- **Part three** proposes that Qatar's NDCs could be improved by examining and updating the country's national circumstance, most importantly the impact of the blockade on Qatar's NDC commitments and the new challenges posed to Qatar.
- In light of the blockade and recent legislative changes, **part four** of the paper offers recommendations for Qatar's second NDCs including provisions on food production, food waste, reducing carbon emissions per capita, adding specific adaptation commitments, including environmental objectives in legislation and adaptation commitment for green building, and increasing investments in green energy.

2. Background on Economic Diversification and Mitigation Co-Benefits

Climate change and the effects of global warming is a challenge that faces all humanity. Even though there are many methods to deal with its effects, there are two widely regarded approaches:

1. **Mitigation:** Limiting GHG emissions and stabilizing levels of heat-trapping GHG in the atmosphere. Mitigation involves limiting the sources of the GHG and increasing carbon sinks, such

agreement (last visited 15 August 2019); INDC portal maintained by the UNFCCC Secretariat, available at <http://www4.unfccc.int/submissions/indc/Submission%20Pages/submissions.aspx> (last visited 18 August 2019).

as natural oceans and forests and artificial deposits that help with absorbing, capturing and reducing carbon dioxide (CO₂) in the Earth's atmosphere. In short, mitigation are all actions that reduce GHG emissions or increases carbon sinks for GHGs.

2. **Adaptation:** Adaptation is the prevention or reduction of the impacts from anthropogenic climate change. Article 7.1 of the PA recognizes the use of adaptation when it included “enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change.”⁹ In other words, adaptation means countries adapting to the existing and predicted climate, and finding methods to adjust to climate change. Adaptation can happen through economic diversification and positive economic growth through the use of green energy. Under Article 4.7 of the PA, mitigation co-benefits can result “from Parties’ adaptation actions and/or economic diversification can contribute to mitigation outcomes...”¹⁰ A stable and reliant way for countries to adapt is to build in low-emission and climate friendly plans while diversifying their economy. Economic diversification is also a strategy to foster positive economic and sustainable development and allows countries to move away from vulnerable sources of income, jobs and products that are more climate resilient.¹¹

It is notable to mention that while the Kyoto Protocol treated mitigation and adaptation actions differently, the PA treats both actions almost at the same level.

⁹ Paris Agreement, *supra* note 5, art. 7.1.

¹⁰ Paris Agreement, *supra* note 5, art. 4.7.

¹¹ United Nations Climate Change, *Economic Diversification*, available at <https://unfccc.int/topics/resilience/resources/economic-diversification> (last visited 18 August 2019).

3. Qatar's NDCs could be improved by updating the national circumstance

3.1. NDCs submitted by the State of Qatar

The Ministry of Municipality and Environment (MME) submitted its NDCs ahead of the PA on November 19, 2015.¹² Qatar's climate action plans build upon the Qatar National Vision 2030, which focuses on the four pillars of Human, Social, Economic and Environmental development.¹³ Qatar's first NDCs set out the country's unique geographical topography and ecological circumstances.

Qatar's first NDCs also state the following aims and objectives in respect of economic diversification with mitigation co-benefits:

- i. Qatar is seeking to diversify from the main source of income from hydrocarbons and will export Liquefied Natural Gas (LNG) as a clean energy;
- ii. Qatar is investing in the development of technology to utilize clean energy and renewable sources of power;
- iii. Qatar is investing in making the country environmentally aware.

The State of Qatar has also set out the following adaptation actions with mitigation co-benefits as a part of its NDCs:

- i. Water management, including water conservation and desalination;
- ii. Improving Qatar's public transport infrastructure and regulating emissions of private vehicles across Qatar;
- iii. Waste management across the board in Qatar;

¹² *Supra* note 8.

¹³ General Secretariat for Development and Planning, *Qatar National Vision 2030* (July 2008), available at <https://www.gco.gov.qa/wp-content/uploads/2016/09/GCO-QNV-English.pdf> (last visited 28 August 2019).

iv. Running awareness campaigns to educate the public.

In its submission, the MME indicated the establishment of a department dedicated to the fulfillment of the above-mentioned voluntary pledges.

State parties to the PA have to report on their NDCs every five years to the UNFCCC secretariat, giving the MME 16 months to formulate and submit its revised NDCs to the UNFCCC secretariat.

3.2. The blockade – Change of Circumstances for Qatar

In June 2017, four Arab countries (KSA, the UAE, Bahrain and Egypt) imposed an air, sea and land blockade on Qatar. This blockade has affected Qatar in various sectors. For example, the abrupt political change affected the investment treaties signed with the four blockading countries.¹⁴ To deal with the ongoing blockade, Qatar had to think of novel ways to diversify its foreign inflows and sources of investment.¹⁵ The blockade imposed on Qatar materially affects Qatar's NDCs and the achievement of the NDCs within the stipulated time.¹⁶

Qatar's genuine interest in addressing challenges facing the environment is undeniable. From hosting the COP 18 in 2012, which was the birthplace of the concept of mitigation co-benefits of adaptation,¹⁷ to joining the PA and including the environment as one of the four pillars of its National

¹⁴ Jonathan Bonnitcha, *Political Change vs. Legal Stability: Problems Arising from the Application of Investment Treaties in Transitions from Authoritarian Rule*, International Institute for Sustainable Development (IISD) – Investment Treaty News (17 February 2015), available at <https://www.iisd.org/itn/2015/02/17/political-change-vs-legal-stability-problems-arising-from-the-application-of-investment-treaties-in-transitions-from-authoritarian-rule/> (last visited 19 August 2019).

¹⁵ Holly Ellyatt, *Qatar blockade 'has been a catalyst for change for the entire nation,' says the investment chief*, CNBC (11 October 2018), available at <https://www.cnbc.com/2018/10/11/qatar-blockade-has-been-a-catalyst-for-change-says-investment-chief.html> (last visited 19 August 2019).

¹⁶ Ali Al-Kuwari, *Blockade enhanced Qatar's lead as regions most diversified economy*, Gulf Times (23 January 2019), available at <https://www.gulf-times.com/story/620104/Blockade-enhanced-Qatar-s-lead-as-regions-most-div> (last visited 19 August 2019).

¹⁷ Axel Michaelowa, Sonja Butzengeiger, Marjorie Menard & Beatrice Verez, *Mitigation co-benefits of adaptation actions and economic diversification*, Perspectives (10 April 2018), available in PDF at https://www.perspectives.cc/fileadmin/Publications/Mitigation_co-benefits_of_adaptation_actions_and_economic_diversification.pdf (last visited 15 August 2019); Pablo Suarez, Carina Bachofen, Maarten Van Aalst, Saleemul Huq, Mairi Dupar & Sahara Juichiro, *supra* note 4.

Vision 2030, Qatar has taken a lead in committing to creating a climate resilient economy and country. However, there are new difficulties that Qatar will have to take into account while revising and reporting on its second NDCs given the economic blockade faced by Qatar. Qatar will also have to examine the challenges posed by a shipping route and canal proposed by KSA along its border with Qatar, which would effectively do away with any land borders and turn Qatar into an island.¹⁸

An example of a sector that has been affected by the blockade is aviation. Qatar Airways, Qatar's state-owned flag carrier, is facing business and environment challenges due to the blockade. Qatar Airways is now forced to fly longer routes since it is unable to use the airspace of the blockading countries, which in turn leads to an increase in CO2 emissions. The longer routes that Qatar Airways now flies are an example of how the blockade has affected Qatar from both an economic and an environmental perspective.

Prior to the blockade, Qatar's fuel consumption made up 97% of the total CO2 emissions,¹⁹ which Qatar Airways was working on reducing by optimizing the fuel efficiency of flight routes.²⁰ Given the blockade, Qatar Airways is tasked with an almost impossible goal of reducing its carbon footprint since it has to fly longer routes leading to increased GHG emissions.

The aviation sector is, of course, only one example of many other circumstances in which the blockade has made it difficult for Qatar to meet its NDCs. Due to the blockade, financial and environmental costs have dramatically increased in the food, manufacturing, shipping, and

¹⁸ Dominic Dudley, *Saudi Arabia Eyes Up Canal Border Idea, Turning Qatar From A Peninsula Into An Island*, Forbes (6 April 2018), available at <https://www.forbes.com/sites/dominicdudley/2018/04/06/saudi-canal-qatar-island/#6e336936249e> (last visited 19 August 2019).

¹⁹ Victoria Scott, *Qatar Airways aims to limit environmental impact as it grows*, Doha News (3 November 2016), available at <https://dohanews.co/qatar-airways-aims-limit-environmental-impact-grows/> (last visited 19 August 2019).

²⁰ Qatar Airways, *Environmental awareness*, available at <https://www.qatarairways.com/en-qa/about-qatar-airways/environmental-awareness.html> (last visited 19 August 2019).

construction sectors, to mention just a few. In light of the blockade, it is necessary for Qatar to re-examine how it can make good on the voluntary pledges made to the UNFCCC secretariat.

4. Recommendations for Qatar's Second NDCs under the PA

4.1. Recommendation 1 – Food production should be addressed in Qatar's second NDCs

Food production is an essential subject that Qatar's 2015 NDCs missed. Food production, therefore, in relation to the agriculture, fish, livestock, forestry and dairy annually produced by the country should be added to Qatar's second NDCs.

Food production has been an issue for Qatar due to its hot subtropical desert climate that features water shortage, lack of arable land, and high temperatures generally considered very challenging for agriculture or animal husbandry.²¹ Only less than 6% of Qatar's land is agricultural and 1.1% is arable, which makes it difficult for Qatar to become self-sufficient when it comes to food production.²² Qatar has to import almost 90% of its food due to the harsh climate that complicates the sustainability of locally produced food.²³

Nevertheless, Qatar has successfully increased its food production by 400% in two years reaching QR10 billion in its fresh food trade volume.²⁴ It must be mentioned here that Qatar has been

²¹ *Environment and Agriculture*, Hookumi Qatar e-Government, available at <https://portal.www.gov.qa/wps/portal/topics/Environment+and+Agriculture> (last visited 15 August 2019).

²² *Qatar Land Use*, Index Mundi, available at https://www.indexmundi.com/qatar/land_use.html (last visited 15 August 2019); Aryn Baker, *Desert Dreams: Can the Middle Eastern Country of Qatar Learn to Feed Itself?*, Time (19 November 2012), available at <http://science.time.com/2012/11/19/desert-dreams-can-the-middle-eastern-country-of-qatar-learn-to-feed-itself/> (last visited 15 August 2019).

²³ UN Sustainable Development Goals, *Qatar Voluntary National Review 2017, Sustainable Development Goals 2030, High Level Political Forum*, available in PDF at https://sustainabledevelopment.un.org/content/documents/16517Qatar_VNR_2017_En.pdf (last visited 15 August 2019).

²⁴ *Food Production in Qatar grows by 400% since 2017*, The Peninsula Qatar (13 March 2019), available at <https://thepeninsulaqatar.com/article/13/03/2019/Food-production-in-Qatar-grows-by-400-since-2017> (last visited 19 August 2019).

able to increase its food production in spite of the blockade effected by the countries mentioned above. The blockade had a huge impact on Qatar's food security since the country imported 90% of its food content, and nearly all of the food supply passed through the KSA land border prior to the blockade.²⁵ For example, Qatar imported \$196.53 million worth of food products from KSA in 2016.²⁶ Qatar overcame difficulties posed by the blockade and managed to increase the local food production by 400% within a very short span of time.²⁷

The MME has played a vital role in increasing food production and is aiming for further growth by 2022: in the livestock sector by 30% and the fisheries sector by 65%.²⁸

Qatar's food security plan should be mentioned because the growth of Qatar's population has also increased consumption and demand for food.²⁹ Qatar does have a National Food Security Program (QNFSP), which was established in 2013 by an Emiri Decree in response to the 2008 global food crisis.³⁰ The QNFSP was responsible for developing a national plan for Qatar's food security, taking

²⁵ Semsia Al-Ali Mustafa, *Growing food pyramids in the sand: how sustainable are Qatar's self-sufficiency and foreign agro-investment policies?*, Journal of Agriculture and Environment for International Development - JAEID, 111 (2): 409-424, p. 412 (2017); Tahra ElObeid & Abdelmoniem Hassan, "The Nutrition Transition and Obesity in Qatar" in *Food Security and Food Sovereignty in the Middle East*, Summary Report No. 6, Center for International and Regional Studies, Georgetown University School of Foreign Service in Qatar (2012), at 26, available in PDF at <https://pdfs.semanticscholar.org/e6cc/8d805a3823c38f1d25c393434d1d255d551d.pdf> (last visited 19 August 2019).

²⁶ *Qatar Imports from Saudi Arabia*, Trading Economics, available at <https://tradingeconomics.com/qatar/imports/saudi-arabia> (last visited 15 March 2019).

²⁷ The Peninsula Qatar, *supra* note 24.

²⁸ *Id.*

²⁹ Semsia Al-Ali Mustafa, *supra* note 25; Supreme Council of Health, *Qatar Dietary Guidelines Evidence Base* (2014), Doha: Supreme Council of Health.

³⁰ Mohammad Al-Saidi & Sally Saliba, *Water, Energy and Food Supply Security in the Gulf Cooperation Council (GCC) Countries—A Risk Perspective*, Water, 11, 455 (2019); Safa A. Al-Ameri, Presentation, Qatar National Food Security Programme, Office of the Heir Apparent, *Food Security, Statistics, and Climate Information – What Crops to Grow?* (5 December 2012), available at <https://www.psa.gov.qa/en/media/events/Documents/Qatar-QNFSP-COP18-QSA-SafaAlameri.pdf> (last visited 15 August 2019).

into consideration Qatar's climate, water supply, and renewable energy, among other factors.³¹ After delivering on its mandate, the QNFSP was reorganized into the Implementation Committee, and tasked to create public-private collaborations in its implementation, including the diversification of international trade and investment, and improving local food production.³²

Developing local food and feed resources has become a high priority for the Qatari government and investing in the agriculture industry is one of the most important ways to increase food production.³³ Due to the harsh climate of the area, traditional agriculture is an issue but researchers have found many alternative ways such as soilless farming or to help make the land more arable.³⁴ Halophytes and saline crops are a possible option that Qatar could focus on as they do not require fresh water and can help with improving salt tolerance of the conventional crops.³⁵ Soil is another obstacle but can be enhanced by recycling organic food waste and using it to fertilize the land, and make it more composted.³⁶

Qatar could also explore the option of moving to indoor farming. Specifically, vertical farming, an innovative farming method, could be adopted by Qatar as it neither requires a substantial amount of fresh water sources nor an arable land.³⁷ Vertical farming, as opposed to traditional farming, does

³¹ Semsia Al-Ali Mustafa, *supra* note 25.

³² *Id.*

³³ UN Sustainable Development Goals, *supra* note 23.

³⁴ Abdullah Nik-Othman, *Vertical-Horizontal Regulated Soilless Farming via Advanced Hydroponics for Domestic Food Production in Doha, Qatar*, Research Ideas and Outcomes, 2: e8134 (2016); Huda Abul Kalam Samsul et al., *Improving Vegetable Crop Production in Qatar: Strategies to determine optimum planting time minimise production risk and maximise water and nutrient use efficiency*, Qatar Foundation Annual Research Conference Proceedings (2018: EEPP126).

³⁵ J. Jed Brown, Probir Das & Mohammad Al-Saidi, *Sustainable Agriculture in the Arabian/Persian Gulf Region Utilizing Marginal Water Resources: Making the Best of a Bad Situation*, Sustainability, 10, 1364 (2018).

³⁶ Huda Abul Kalam Samsul, *supra* note 34.

³⁷ Abdullah Nik-Othman, *supra* note 34.

not need arable land as food is grown on shelves by stacking and is an environmental friendly option especially when combined with the use of renewable energy.³⁸

The need for Qatar to increase its local food production and to invest further and highly in the agriculture industry would lead to increased CO₂ emissions. It is recommended that Qatar devises and implements the most environmentally friendly option, by making use of renewable energy, for example, given the rapid increase of global temperatures across the world. In doing so, Qatar can be a model to other countries by being food secure in spite of all the challenges and will also be able to lend its technology to poorer countries that face the same issues.

4.2. Recommendation 2 – Food waste should be included in Qatar’s second NDCs

Food waste should be given a higher priority in Qatar’s second NDCs under the PA. The Food and Agriculture Organization of the United Nations (FAO), in a recent study, has found that the financial loss that results from global food waste is estimated to cost around \$940 billion.³⁹ This loss is in addition to an 8% of the global emissions of greenhouse gases every year.⁴⁰ Thus, food waste has a significant imprint on the environment as it affects climate, land, water and biodiversity in an undesirable way.⁴¹

³⁸ Kheir Al-Kodmany, *The Vertical Farm: A Review of Developments and Implications for the Vertical City*, Buildings, 8, 24 (2018), doi:10.3390/buildings8020024; Len Calderone, *What is Vertical Farming?*, AgriTech Tomorrow (10 October 2017), available at <https://www.agritechtomorrow.com/article/2017/10/what-is-vertical-farming/10273/> (last visited 19 August 2019).

³⁹ Food Agriculture Organization (FAO), *Food wastage footprint: Impacts on natural resources*, Summary Report (2013), available in PDF at <http://www.fao.org/3/i3347e/i3347e.pdf> (last visited 15 August 2019); Food and Agriculture Organization, *Proposal for an International Day of Awareness of Food Loss and Waste*, 160th Session, CL 160/4, available at <http://www.fao.org/3/my358en/my358en.pdf> (last visited 19 August 2019).

⁴⁰ Craig Hanson, *Guidance on Interpreting Sustainable Development Goal Target*, World Research Institute (12 March 2017), available at <https://champs123blog.files.wordpress.com/2017/10/champions-12-3-guidance-on-interpreting-sdg-target-12-3.pdf> (last visited 19 August 2019).

⁴¹ Barbara Seed, *Sustainability in the Qatar national dietary guidelines, among the first to incorporate sustainability principles*, Sustainability and Public Health Nutrition, 18(13), 2303-2310 (2015).

The problem of food waste is especially important in Qatar since according to the FAO (2014) the average resident in Qatar produces more than three times the amount of waste compared to residents of other countries.⁴² In addition, the study found that only a small amount of the food waste is used to fertilize the soil even though Qatar's infertile soil is one of the huge difficulties that Qatar is facing when it comes to food production.⁴³

Qatar's MME has taken initiative following Qatar's National Vision 2030, which includes environment development and economic growth as fundamental goals where one cannot be sacrificed at the expense of the other.⁴⁴ The MME has launched "Tadweer", a program that aims to recycle food waste and tree leaves into organic composts that will help fertilize soil. "Tadweer" works by crushing the waste, drying the waste, removing harmful bacteria and finally drying the waste again to remove all the liquid produced.⁴⁵ "Tadweer" has set two recycling machines in Al-Khor Park.⁴⁶

"Amwaj", a food catering business, has also followed the steps of the MME and adopted "BiobiN", an Australian concept, which allows the business the right to produce, use and commercialize and recycle their food waste.⁴⁷ Food can always be repurposed, either, for human consumption or to be used as compost.

A simple yet great start for illuminating the food waste problem would be to educate people and raise awareness about how much it affects the environment. This will help widen the public

⁴² Adema Sybrandus, *Food Waste Woes in Qatar*, EcoMENA (9 March 2016), available at <http://www.ecomena.org/food-waste-in-qatar/> (last visited 19 August 2019).

⁴³ *Id.*

⁴⁴ Ministry of Municipality and Environment (Qatar), *MME launches initiative to turn organic waste into fertiliser* (17 April 2018), available at <http://www.mme.gov.qa/cui/view.dox?id=702&contentID=5485&siteID=2> (last visited 15 August 2019).

⁴⁵ *Id.*

⁴⁶ *Id.*

⁴⁷ Catherine W. Gichuki, *Qatar adopts 'BiobiN' to produce organic compost* (2017), available at <http://www.qatar-tribune.com/news-details/id/95238> (last visited 15 August 2019).

consciousness. Moreover, an educational and social awareness campaign would also be very useful, especially in schools. Another way would be increasing the number of the (Tadweer) recycling machines and encouraging more food businesses and restaurants to recycle their organic wastes instead of throwing them away as this will help the environment and will reduce their costs.

Qatar, which is an art hub in the Middle East region, could also use art and bring in artists to outline the problem of food waste and spread awareness. Lowering food waste is a great way for Qatar to reduce its carbon footprint and the MME can provide incentives to businesses for finding successful ways to reduce food waste.

4.3. Recommendation 3 – Qatar’s second NDCs should address the reduction of carbon emission per capita

According to the Intergovernmental Panel on Climate Change (IPCC), Qatar ranks first among the highest emitter of CO₂ per capita.⁴⁸ Such a label on Qatar has been argued as unfair due to Qatar’s low population and as an energy producer.⁴⁹ The per capita emission is measured using total absolute emission that is derived from total absolute emission and total population.⁵⁰ Qatar is a developing country with high ambitions and has been quickly growing. Qatar’s rapid growth and development also means that carbon emissions are increasing annually at a higher rate. The air pollution in Qatar is concerning as it is higher than the international standard.⁵¹ Economic growth results in an increase in

⁴⁸ Mona Al-Asmakh & Nadya Al-Awainati, *Counting the Carbon: Assessing Qatar’s Carbon Dioxide Emissions*, Qatar Foundation Annual Research Conference Proceedings, Volume 2018, Issue 1 (March 2018), EEPD592.

⁴⁹ *Id.*

⁵⁰ *Id.*

⁵¹ L Charfeddine & Z Mrabet, *The impact of economic development and social-political factors on ecological footprint: A panel data analysis for 15 MENA countries*, *Renewable and Sustainable Energy Reviews* 76 (September 2017), 138-154.

carbon emissions, which have led to giving developing countries more leeway to reduce their carbon footprint.⁵²

Additionally, studies show that the temperature affects carbon emissions. Black carbon is emitted more during the summer time than in winter or when temperatures are lower. Qatar is hot and sunny throughout most of the year, which by itself leads to high emissions of black carbon independent of human action. Owing to the high temperatures in the country, air cooling and conditioning is rampant and heavily relied on, which also increases CO₂ emissions. Increased temperatures require air conditioning leading to higher emissions resulting in even higher temperatures creating a vicious cycle.⁵³ Realizing the unintended threat of air conditioning, research is being undertaken to create and use machines that capture CO₂ from the air instead of emitting it.⁵⁴ Such methods will go a very long way in reducing Qatar's total output of emissions given that every single outlet in the entire is air-conditioned.

Certainly, how the CO₂ emission is measured is also important. A country's carbon emission is measured in tons of CO₂ equivalent.⁵⁵ Such a measurement allows for comparison between different GHGs on a like-for-like basis relative to a unit of CO₂.⁵⁶ The output is calculated by multiplying the footprint of each of the six GHGs (Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulphur hexafluoride (SF₆)) by its 100

⁵² L Charfeddine & Z Mrabet, *supra* note 51.

⁵³ Chris Bryant, *Air Conditioning is the World's Next Big Threat*, Bloomberg (28 June 2019), available at <https://www.bloomberg.com/opinion/articles/2019-06-28/air-conditioning-is-the-world-s-next-big-threat> (last visited 28 August 2019).

⁵⁴ Richard Conniff, *Could Air-Conditioning Fix Climate Change?*, Scientific American (30 April 2019), available at <https://www.scientificamerican.com/article/could-air-conditioning-fix-climate-change/> (last visited 28 August 2019).

⁵⁵ *Id.*

⁵⁶ *Carbon footprinting guide*, Carbon Trust, available at <https://www.carbontrust.com/resources/guides/carbon-footprinting-and-reporting/carbon-footprinting/> (last visited 28 August 2019).

year global warming potential (GWP).⁵⁷ Al-Asmakh and Al-Awainati argue that consumption and population are two major and significant factors that should be taken into account when measuring CO2 emissions per capita. They argue for measurement that is not only production based but also consumption based, making it fairer for developing countries like Qatar.⁵⁸

Despite the valid arguments about the unfairness in the measurement of CO2 emission per capita, and taking into account Qatar's circumstances like low population, energy sector reliance, and the need for rapid development, Qatar could do more to make its case favorable. Qatar's water consumption is among the highest in the world, and there has been a 12% increase in demand for power, consistent with population growth.⁵⁹ Subsidizing water and electricity also does not encourage the lowering of per capita emission. Instead, Qatar should subsidize green energy use per capita, and incentivize the transition of per capita consumption from fossil fuel to green energy.

There is much at stake to be labeled the top per capita emitter, especially affecting economic diversification efforts. As Al-Asmakh and Al-Awainati recognized, the label on Qatar as the top CO2 emitter per capita makes it difficult to attract green investment because of the perception that the investment is ultimately not green.⁶⁰

Working towards reducing carbon emissions will be a big step for Qatar to maintain the environment and reduce the effects of carbon emissions. Qatar should include the reduction of carbon emissions as one of its goals to the NDCs. This will also show that Qatar is acknowledging its high carbon emission per capita but also its willingness to reduce it by employing alternatives methods, such as solar energy and green energy.

⁵⁷ Carbon Trust, *supra* note 56.

⁵⁸ Mona Al-Asmakh & Nadya Al-Awainati, *supra* note 48.

⁵⁹ Adema Sybrandus, *supra* note 42.

⁶⁰ Mona Al-Asmakh & Nadya Al-Awainati, *supra* note 48.

4.4. Recommendation 4 – Qatar’s second NDCs under the PA could be improved by adding specific adaptation commitments and economic incentives

Even though Qatar’s climate is considered a drawback in the food production section, it is a huge bonus for cultivating solar energy as this geographical area has access to sunshine over nine hours a day with low cloud coverage. In addition, the deserts offer large vacant space, which is suitable and can be used for both photovoltaic (PV) systems and concentrated solar power (CSP).⁶¹

Qatar’s global horizontal irradiance is 2,140 kWh per m² per which fits the standards for the PV system and has direct normal irradiance (DNI) value of 2,008 kWh per m² per year, which is perfect for concentrated solar power.⁶²

Qatar has aimed to reach the target of 2% renewable energy contributions by the year 2022.⁶³ Certainly, switching to solar energy would benefit Qatar, both environmentally by reducing GHG emissions, and financially by creating job opportunities for the Qatari population.⁶⁴ Qatar can use this solar energy to help with food production as well an alternative option to traditional sources of energy.

The concentrated solar power can also assist with water security as it can be used in the seawater desalination process.⁶⁵ Universities in Qatar have taken such steps. For example, Qatar Foundation is responsible for 85% of the country’s photovoltaic solar energy as it launched one of the region’s first Energy Monitoring Centre (EMC) to manage the solar power generation in the education city.⁶⁶ The Solar Smart-Grid Project has successfully added a total of 1.68MW of PV systems across the campus.⁶⁷

⁶¹ Salman Zafar, *Solar Energy in Qatar*, EcoMENA (13 May 2018), available at <https://www.ecomena.org/solar-energy-in-qatar/> (last visited 28 August 2019).

⁶² *Id.*

⁶³ *Id.*

⁶⁴ *Id.*

⁶⁵ Salman Zafar, *supra* note 61.

⁶⁶ *Qatar Foundation generates solar energy to support Qatar National Vision*, Ifpinfo (27 June 2014), available at <https://dohanews.co/qf-solar-initiative> (last visited 29 August 2019).

⁶⁷ *Id.*

Nevertheless, using solar energy is not the only option for reducing energy usage. Qatar has already planned to gradually get rid of incandescent bulbs and to replace them with an environmentally friendly option.⁶⁸ Qatar has also announced a strategy that will encourage the use of solar energy by requiring the people to use the PV systems in order to displace 2% of electricity demand and solar thermal systems to reduce energy consumption for water heating.⁶⁹

Qatar has taken a great approach by adding regulations that list responsibilities, regulations, violations, and fines for wasting water and electricity.⁷⁰

Qatar is one of the few states that offer their citizens free electricity in their houses. The government could alter this service by offering free service only to citizens that agree to switch to the alternative option of renewable energy by applying solar panels on top of their roofs and requiring fees from those who refuse to do the switch.

4.5. Recommendation 5 – Include environmental objectives in newly enacted investment legislation

In January 2019, Qatar passed a new law that regulates the investment of non-Qatari capital in economic activities.⁷¹ The new law allows 100% foreign ownership of firms in all sectors, which is very different from the previous law that required a local partner to hold a minimum of 51% stake in the business. The law is a substantial change in foreign ownership and investment, and is the first in the Gulf region, where all the countries continue to require a majority share of all businesses to be held

⁶⁸ Alan Meier, Mohamed Darwish & Sinan Sabeeh, *Complexities of saving energy in Qatar*, European Council for an Energy Efficient Economy Summer Study Proceedings, available at https://www.ecee.org/library/conference_proceedings/ecee_Summer_Studies/2013/1-foundations-of-future-energy-policy/complexities-of-saving-energy-in-qatar/2013/1-055-13_Meier.pdf/ (last visited 28 August 2019).

⁶⁹ *Id.*

⁷⁰ Mari Luomi, *Qatar's Natural Sustainability: Plans, Perceptions, and Pitfalls*, CIRS: Georgetown University School of Foreign Service in Qatar (2012), available at <https://pdfs.semanticscholar.org/92ef/654a93ec2da526ae666102ea485023dc09d7.pdf/> (last visited 28 August 2019).

⁷¹ Qatar Law No. 1 of 2019.

by a citizen. The new investment law aims to promote economic development by attracting foreign investments, and encourages economic diversification as envisaged by Qatar National Vision 2030.

Qatar could incorporate mandatory provisions on these new companies to use green energy, which will help the country achieve its goals of sustainable economic development and environmental protection. Qatar could also provide incentives to companies for reducing their dependence on traditional sources of energy.⁷²

Under the new investment law, the Ministry of Commerce and Industry is tasked with processing requests for 100% non-Qatari ownership and the Council of Ministers could place ownership restrictions in certain industries like banking and insurance. The new law could be used as an incentive for those using green building construction, or those businesses engaged in green energy, giving such businesses a fast-track process. The new law already provides certain incentives to non-Qatari investors such as land allocation, income tax exemption, and custom duties exemption on machineries. Furthermore, the Council of Ministers may grant new or additional investment project incentives and benefits not already provided in the law. The Council of Ministers, for example, could grant additional or new incentives for green energy businesses. There is a genuine opportunity in Qatar to attract foreign direct investment and foreign businesses to invest in environmentally focused businesses.

If Qatar had been able to make such provisions under the new investment laws, this would be a good addition to the country's second NDCs under the PA. Qatar would also be the first country in the region to include sustainability and environmental protections in its investment and business laws.

⁷² Eugenio Bettella & Guido Maria Solari, *Qatar – new investment law, new opportunities for investors*, Rödl & Partner (1 February 2019), available at <https://www.roedl.com/insights/qatar-new-investment-law-new-opportunities-investors> (last visited 28 August 2019).

4.6. Recommendation 6 – Qatar’s second NDCs should add specific adaptation commitments and economic incentives related to green buildings

Qatar is a fast expanding country that is expending its resources on infrastructure and many new buildings. The new investment law discussed above offers opportunities for investors from all over the world to invest in Qatar. Qatar should target companies that not only employ green energy but also construct in place of the conventional buildings found across the country. Net zero carbon buildings should be the standard in Qatar as they protect the environment and are a practical option. Green buildings do not only protect the environment but are also safer for human health by using natural resources.⁷³

Many countries, in their NDCs, have listed “constructing green buildings” as one of their strategies to help the environment and reduce carbon emissions.⁷⁴ Some of these countries, however, have pointed to the higher financial costs associated with green buildings. Some of the issues that these countries have raised are that green buildings might cost substantially more than conventional buildings. Whether a green building costs more than a conventional building continues to be a debate.⁷⁵ It is, therefore, essential for governments to incentivize green building constructions with tax or other financial incentives.

Standardizing green building construction is the best strategy for reducing carbon emissions in the long term. It could also help the economy when combined with foreign direct investment incentives, inviting foreign investors to invest in Qatar.

⁷³ *Green Building Description*, legrand, available at <https://www.legrand.com/en/our-solutions/green-building/green-building-description> (last visited 28 August 2019).

⁷⁴ INDC, *supra* note 8.

⁷⁵ Meredydd Evans, *Building Energy Efficiency and the Nationally Determined Contributions*, NDC Partnership, available at <http://ndcpartnership.org/building-energy-efficiency-and-nationally-determined-contributions> (last visited 28 August 2019).

Qatar could also educate construction companies about the importance of green building construction. An example are the new buildings in Lusail City that were constructed using green building technology. These green building construction methods could be adopted nationally as standardized construction method buildings.

Qatar could incorporate green building construction in its zoning, building, and tax regimes. For example, certain areas in Qatar or a percentage of construction per square meter could be designated for green building construction. These green zones could be subject to building codes that must meet a certain standard of environmental efficiency, including, for example the use of a designated amount of green energy. Qatar could also incentivize businesses or individuals that take advantage of green building construction.

Addressing the environmental crisis requires a transformational effort from the government and that this is not a task for tomorrow's leaders, but one that requires urgent interventions today. Qatar took the first steps of adopting the green building strategy by building all of Lusail City with green buildings. This approach should be used as a standard for all new buildings and infrastructure across Qatar.

With all the infrastructure projects coming up in Qatar over the next few years, in preparation for the 2022 FIFA World Cup to be hosted in Qatar and other prestigious projects, it would be a good time for Qatar to think of constructing green buildings. It can be challenging for the country to expand its economic plan by prioritizing green architecture, but, with effective planning, resources and implementation, it will be possible.

4.7. Recommendation 7 – Increase investments in green energy

In addition to adapting investment and business laws to allow for green buildings and investment, Qatar should also look at attracting or investing in companies that manufacture or develop renewable

sources of energy. Qatar's green energy policy should include investing in green energy start-ups in Qatar. Qatar has already shown an interest in providing capital flow for Qataris who are interested in green technology, such as the Qatar Development Bank's initiative to provide interest free loans for agricultural greenhouse construction. Investment in the renewable energy sector will further diversify Qatar's economy and will give the country a chance to nurture local expertise and cultivate resources.

As mentioned above, the UNFCCC is a voluntary undertaking by states parties and does not mandate any specific obligation on parties. Parties are free to devise their own plans to reduce the effects of climate change.⁷⁶

Qatar is a country with resources to develop its own technology, which can also be used to assist other developing countries and least-developed countries. A technology push by a few initial leader countries will be proven sufficient to make renewable energy competitive against fossil fuels by the end of this decade.⁷⁷

Qatar's second NDCs under the PA could be improved by adding such specific adaptation commitments and economic incentives related to green energy investment. The NDCs focus on reducing the GHG emissions of parties to the PA with developed countries taking the responsibility of setting goals and reaffirming to help reduce the average global temperature by two degrees. Developing countries, such as Qatar do not have to set GHG emission goals, but it is still important

⁷⁶ Rana Elkahwagy, Vandana Gyanchandani & Dario Piselli, *UNFCCC Nationally Determined Contributions: Climate Change and Trade*, TradeLab (2016), available at <https://www.tradelab.org/single-post/2018/03/02/UNFCCC-Nationally-Determined-Contributions-Climate-Change-and-Trade> (last visited 28 August 2019).

⁷⁷ Oliver Waissbein, Yannick Glemarec, Hande Bayraktar & Tobias S. Schmidt, *Derisking Renewable Energy Investment A Framework to Support Policymakers in Selecting Public Instruments to Promote Renewable Energy Investment in Developing Countries*, United Nations Development Programme, available at <https://www.osti.gov/servlets/purl/22090458> (last visited 28 August 2019).

for Qatar to lower its carbon emissions due to its effects on the country's population, the environment and also to uphold the Qatar National Vision 2030.

5. Conclusion

In the words of UN Secretary-General António Guterres, climate change is an “existential threat to humanity.”⁷⁸ Qatar's second NDCs should be improved by adding the recommendations discussed above.

Other areas that the government should examine are the role of education and how the population should be made aware of its role and footprint in the country's and the world's climate change issues. Children in schools should be taught at an early age on how to preserve and conserve the environment around them since the children of today are the leaders and protectors of tomorrow. It would also be useful to the MME to explore how the newest laws of the country, including business and investment-related laws, should incorporate climate and environment safe requirements.

The State of Qatar can truly be a pioneer in developing clean technology and leading the MENA region to offset the catastrophic effects of climate change given its resources and bent towards scientific research.

⁷⁸ *Climate change: An 'existential threat' to humanity, UN chief warns global summit*, UN News (15 May 2018), available at <https://news.un.org/en/story/2018/05/1009782> (last visited 15 August 2019).

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