Conceptual Overview

Public Health Co-benefits of Greenhouse Gas Mitigation

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In March 2014, a final version of Abu Dhabi's Climate Change Strategy was submitted to the Executive Council of Abu Dhabi for approval. While the UAE has no legal obligation to reduce or limit greenhouse (GHG) gases, the Strategy represents an important basis for the Government of Abu Dhabi to proactively adopt voluntary measures to mitigate manmade GHGs. Among other things, the Strategy identifies sector-specific initiatives to mitigate GHG emissions over the period 2014-2018.

Upon successful implementation, the initiatives in the Strategy will achieve significant GHG emission reductions over time. Most if not all of the initiatives will also achieve significant reductions of air pollutant emissions in the process. Since air pollution concentrations – particularly ground-level ozone and particulates - have been linked to serious health impacts, any reduction of their concentration in the atmosphere will yield benefits to human health, or the "co-benefits" of GHG mitigation. The concentration of air pollutants is highly influenced by climatic conditions which are projected to change in the Arabian Gulf region, as the results of the LNRCCP's regional atmospheric modeling study showed. These changes will worsen air quality.

The aim of this study was to quantify the public health co-benefits of Abu Dhabi's Climate Change Strategy. The analysis focuses on the health benefits to be experienced within the Abu Dhabi metropolitan area from implementation of the Strategy. The research builds upon the UAE's Environmental Burden of Disease study; incorporates air quality modeling; and integrates a wide range of Abu Dhabi-specific data for key sectors and activities. This information has been codified into the "Health Co-benefits Inspector", an online data portal which offers a way to access and review the various databases and reports developed in the study. The Inspector also provides a way for users to undertake their own analyses of the policies in the Strategy by changing input assumptions, updating information, and exploring more aggressive targets.

Specifically, 17 policies contained in Abu Dhabi's Climate Change Strategy were analyzed. Each policy was analyzed individually, as well as part of the entire set of policies. These policies are focused on the power/water supply, transportation, and industrial sectors. The driving research question was: "Are there significant public health co-benefits in the greater Abu Dhabi City metropolitan area associated with the emirate's Climate Change Strategy?" The study explored this question by developing an estimate of the number of avoided premature deaths and an estimate of the number of avoided excess health-care facility visits due to the comprehensive implementation the Abu Dhabi Climate Change strategy. Two scenarios were considered, a "Baseline" scenario which represented a future in which regional climate change was underway and none of the policies in the Strategy had been implemented; and a "Policy" scenario which represented climate changed future and all of the policies had been implemented.

Figure 1: Simplified conceptual framework

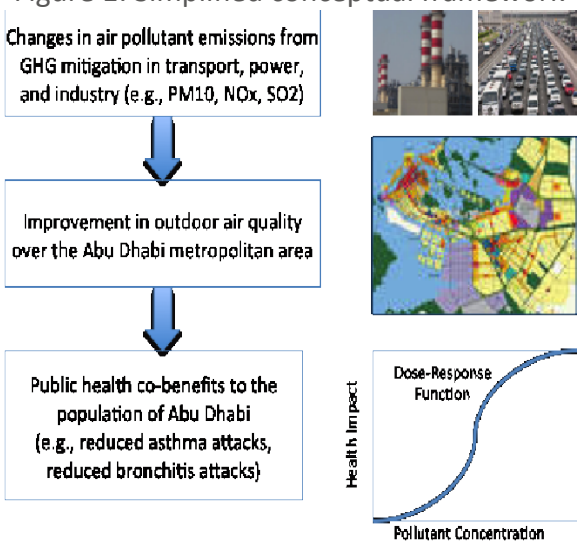

Figure 1 provides an overview of the analysis sequence. The conceptual approach involved first characterizing the air pollutant emissions with and without the implementation of GHG mitigation policies. Changes in air quality were then computed as the difference in ambient air pollutant concentrations with and without the GHG mitigation policies. Finally, these changes are translated into public health co-benefits through the application of the health model developed as part of the Abu Dhabi Environmental Burden of Disease assessment to the changes in air quality achieved by the greenhouse gas mitigation strategies.

Policy targets were established consistent with information provided in the Climate Change Strategy, where such information was available. For those policies where targets are in the process of being developed and hence unavailable, placeholder assumptions were made. These assumptions were typically on the aggressive side, as a way of illustrating the public health co-benefit potential. They should not be understood as a prediction of the eventual target, but simply a placeholder until such targets are finalized. The bullets below summarize the policies analyzed and their provisional targets.

- 1: Nuclear power generation – 4 units each with a net capacity of 1,345 MWe, coming only in 2017, 2018, 2019, and 2020.
- 2: Renewable energy power plants – Start year for the policy in 2020, with 10% of all generation comes from non GHG-emitting renewable sources by 2035.
- 3: One renewable energy water desalination pilot project - Start year for the policy is 2020

for a 100 MW solar PV station.

- 4: Renewable energy water desalination plants - Start year for the policy is 2020 for a 100 MW concentrating solar power stations (Shams 1) and a 10 MW concentrating solar power stations (Masdar).
- 5: Waste-to-energy power plants: Start year for the policy is 2020 for a 50 MW waste-to-energy plant.
- 6: Feed in tariff to sell power to the grid - Start year for the policy in 2020, with the feed-in tariff leading to an incremental 10% of all generation comes from non GHG-emitting renewable sources by 2035.
- 7: Solar roofs - Start year for the policy in 2020, resulting in 10% of all generation coming from distributed generation in solar roofs by 2035.
- 8: Supply side energy efficiency strategy for electricity and water production - Start year for the policy in 2020, resulting in 1.0%/year improvement through 2035 in the heat rate (i.e., combustion efficiency) of the following power stations: Taweelah New Extension, Taweelah A2, Shuweih S1, and Sas Al Nakhi.
- 9: Demand side management strategies for electricity and water production - Start year for the policy in 2020, resulting in 10% demand side savings in new residential construction by 2035.
- 10: Current Estidama initiative - Start year for the policy in 2020, with 10% electricity savings of new commercial buildings by 2035.
- 11: More stringent building codes for energy conservation - Start year for the policy in 2020, with 10% of new home floor space included in the Progamme by 2035.
- 12: Energy efficiency standardization and labeling programme - Start year for the policy in 2020, with 10% electricity savings in the residential sector by 2035.
- 13: Transportation demand strategies - Start year for the policy in 2020, with passenger car and passenger light vehicle kilometer growth rates half of what they were in the Baseline Scenario.
- 14: Encourage purchase of high efficiency vehicles - Start year for the policy in 2020, with all passenger vehicles a 50%-50% mix of plug-in hybrid and electric vehicles by 2035 and all other vehicle sales being 100% high efficient vehicles by 2035.
- 15: Gas flaring reduction in oil and gas industry - Start year for the policy in 2020, with flaring growth rates half of what they were in the Baseline Scenario.
- 16: Energy efficiency at industrial cogeneration facilities - Start year for the policy in 2020, resulting in 1.0%/year improvement through 2035 in the heat rate of the following facilities: Asab Agd II, Ruwais refinery, Habshan, Bu Hasa Adgas, Al Wagan, Sheikh Khalifa hospital, Mussafeah Industrial City.

- 17: Energy efficiency in aluminum production - Start year for the policy in 2020, resulting in 1.0%/year improvement through 2035 in the heat rate of the Taweelah aluminum smelter.