

MTFC Project Proposal 2024-25

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Team ID #	19716

Part 1: Project Definition (*Team's Topic*)

These prompts can be found on page 3 of the MTFC Project Proposal Prompts 2024-25. Additional information on Project Definition can be found in **Step 1: Project Definition** in the Actuarial Process Guide.

Team Responses:

#1: Identify the topic

Our topic is the risk associated with carbon emissions due to the current war in Gaza. Since war broke out just over a year ago, this conflict has only grown in terms of bloodshed and weaponry used. This large increase in the usage of vehicles, planes, and bombs, along with the associated production thereof, led us to wonder how the environment fares from this conflict. Environmental issues resulting from carbon emissions are well documented as affecting the whole world, through global warming, air pollution, and sea level rise.

#2: Identify potential risks

Carbon released by the war in Gaza may incur financial costs to the infrastructure sector and the government due to exacerbated climate change-related effects like sea level rise. There are costs to taxpayers that fund infrastructure repairs that may result from climate change caused by the war's carbon emissions. The carbon released by the war in Gaza will largely contribute to global warming, which would result in infrastructure needing to be built to combat global warming such as ACs. As the war may fuel climate change, consumers would have to pay for things like air conditioning as well, increasing costs towards everyday people. Carbon emissions caused by the war in Gaza could cause air pollution which would lead to negative health risks globally and infrastructure to try and fix the polluted air.

#3: Identify a behavior change risk mitigation strategy

A ceasefire would reduce the carbon emissions from the war almost immediately, since the need and use for weapons would cease. This is a behavior change strategy because changing from wartime to peacetime would stifle weapons manufacturing-related emissions and vehicle or bomb-related emissions.

#4: Identify a modifying outcomes risk mitigation strategy

Developing additional infrastructure that can prevent the effects of climate change such as sea walls, and city wide cooling measures that can keep people safe from climate change. This is a modifying outcomes strategy because it involves reducing the severity of climate-related effects of the carbon emissions from the war.

#5: Identify an insurance risk mitigation strategy

Environmental liability insurance could insure countries to help pay for the damages related to climate change and its adverse effects. This is an insurance strategy because it insures against the harmful and costly effects of climate change.

#6: Identify driving research questions for your topic

How many of these pieces of technology are being used currently in the war, and what are the emissions associated with their use? What is the cost of these carbon emissions, how much would it cost to offset these emissions?

Part 2: Data Identification & Assessment (*Team's Topic*)

These prompts can be found on page 4 of the MTFC Project Proposal Prompts 2024-25. Additional information on Data Identification and Assessment can be found in **Step 2: Data Identification & Assessment** in the Actuarial Process Guide.

Team Responses:

#7: Identifying the type of data you hope to find

In a perfect world, we'd like to find information on the carbon emissions caused by the manufacturing and use of different jeeps, planes, bombs, as well as the number of them made and used in the current war. This would allow us to sum up the data and compare it to emissions made from other wars, sectors in economies, and total global emissions.

#8: Identify potential data sources for your topic

Overall Summary of shipments from the US to Israel (for estimates of surplus weapons manufactured)

<https://www.propublica.org/article/israel-gaza-america-biden-administration-weapons-bombs-state-department#:~:text=Since%20October%202023%2C%20the%20U.S.,depend%20largely%20on%20U.S.%20support.>

This website seems trustworthy as it is an independent nonprofit organization with Pulitzer prize-winning journalism. The data source has a relatively small scope, but provides information both on the frequency and severity of emissions. We could visualize this by plotting carbon emissions from manufacturing by type (planes, bombs, guns, etc).

Shipments from the world to Israel (for estimates of surplus weapons manufactured)

<https://oec.world/en/profile/bilateral-product/weapons/reporter/isr>

This website also seems trustworthy, as an open-source research project started at MIT. The data source has a global scope, and provides information on severity of emissions and the categories we should look more into. We could visualize this by plotting money donated by each country and using it to scale information found on US military aid to determine aid given on a global scale.

Hamas's weapons

<https://www.thecipherbrief.com/a-look-inside-hamass-weapons-arsenal>

This website appears trustworthy as it cites videos and pictures from both sides, though hard data is difficult to get. We could visualize this data by plotting carbon emissions from manufacturing by type (planes, bombs, RPGs, guns, etc).

Part 3: Mathematical Modeling (*Team's Topic*)

These prompts can be found on page 5 of the MTFC Project Proposal Prompts 2024-25. Additional information on Mathematical Modeling can be found in **Step 3: Mathematical Modeling** in the Actuarial Process Guide.

Team Responses:

#9: Modeling research on your topic

https://www.qmul.ac.uk/sbm/media/sbm/documents/Gaza_Carbon_Emissions.pdf

<https://www.scientificamerican.com/article/warfares-climate-emissions-are-huge-but-uncounted/>

https://ceobs.org/wp-content/uploads/2022/11/SGR-CEOBS_Estimating_Global_Military_GHG_Emissions.pdf

One study shows that wars in general account for as much as 5.5% of global carbon emissions. Another study finds that the war in Gaza specifically has been directly responsible for somewhere between 420,265 and 652,552 tons CO₂. The Paris climate agreement doesn't require countries to report military-related emissions, which makes data collection more difficult.

#10: Goals of a mathematical model in the project phase

Our model should account for emissions related to weapons manufacturing. Our Model should also account for emissions related to the use of weapons. We aim to have a model that looks at weapons from Israel (and their sources, like the US), Hamas (and their sources, like Iran), and Hezbollah (and their sources). We additionally will investigate and model emissions from military facilities and vehicles. Our model should also account for the future emissions required to rebuild destroyed buildings, infrastructure, etc.

#11: Assumption development

We assume mass-produced equipment (guns, clothes, most planes, tanks) are produced in multiples of 100. We also assume that production-related emissions for this equipment are constant. We assume all military vehicles also have uniform emissions. Missiles are categorized by their model and manufacturer, and we assume emissions are the same for all missiles of the same model and manufacturer. We also assume buildings and infrastructure replaced need to be rebuilt with a building density similar to the pre-war density.

Part 4: Risk Analysis (*Team's Topic*)

These prompts can be found on page 6 of the MTFC Project Proposal Prompts 2024-25. Additional information on conducting a Risk Analysis can be found in **Step 4: Risk Analysis** in the Actuarial Process Guide.

Team Responses:

#12: Goals for mitigation strategy

If the war in Gaza continues as it is going currently, the potential CO₂ emissions are devastating, and there would be massive infrastructural damage to the region that would require future emissions to repair. The goal of a risk mitigation strategy would be to immediately reduce Carbon emissions from the war and to minimize other sources of emissions such as weapons manufacturing and infrastructure rebuilding.

Part 5: Recommendations (*Team's Topic*)

These prompts can be found on page 7 of the MTFC Project Proposal Prompts 2024-25. Additional information on making Recommendations can be found in **Step 5: Recommendations** in the Actuarial Process Guide.

Team Responses:

#13: Recommendation differences between mitigation strategies

To choose our mitigation strategy, we will look at various key metrics. The first metric we will look at is carbon emissions, which is what we aim to minimize as soon as possible (meaning we will look at time-frames as well). We will also look at costs since we want our solution to be as simple to implement as possible. Finally, from an ethical standpoint, we aim to minimize projected deaths from the ongoing war in our recommendation.

#14: Audience for recommendations

Our target audience is the United Nations and the governments of countries involved in the war. We specifically target the UN's environment programme. We target these audiences because they have the greatest ability to act on our recommendations, and our project is in the best interest of the UN environment programme.

#15: Goals for situation improvement

Our best-case scenario outcome would be an end to the carbon emissions from the war through a ceasefire. Halting the production of weapons and ending damage to civilian infrastructure that would require repairs would lead to less emissions in the future. Israel and Palestine agreeing to a ceasefire would be the best course of action for both the world and them.