IAEA
International Atomic Energy Agency
BACKGROUND GUIDE
Dear Delegates,

NHSMUN 2020 is almost here! I can’t wait to meet you all and have some of the best MUN debates ever! But first, an introduction. My name is Talha Iqbal. I am the Session I Director for the International Atomic Energy Agency. Currently, I am a sophomore at Princeton University intending to major in international policy and minor in global health and American studies. When taking breaks from the chaos of college academia, I participate in my school’s International Relations Council, write for the Daily Princetonian, and breakdance (I’m sort of a beginner still but I am improving). I first joined NHSMUN four years ago as a delegate. This year will be my third NHS-MUN conference. I loved my experience in the past and knew I had to come back; I hope you feel the same after our upcoming session!

My Co-Director, Lucy, and I have created a useful Background Guide for you all which covers key issues involving the IAEA’s mandate. Topic A, “Nuclear Techniques for Containing Vector-Borne Diseases,” looks at nuclear technology as a way to control the spread of pathogens to improve public health, promote crop growth, prevent sickness, and more. It is a unique topic which I hope will show the vast number of lesser known uses for nuclear technology. Topic B, “Legal and Regulatory Frameworks for Nuclear Energy Development,” is a more traditional issue dealing with the technical nuances that lawmakers must first address before developing nuclear technology. Potential debates involve licensing nuclear technology, promoting emergency preparedness, establishing accountability, and enhancing national safety legislation. Both topics have a lot of substantive material to offer prior to debate. I recommend that you make use of the annotated bibliography and perform additional research for your country’s position.

Because it is a MUN conference, you will be expected to promote your country’s policies and stance on the issues at hand. I understand that this may be difficult, especially if this is your first conference or you do not agree with your state’s position. But over my time with MUN, I have seen delegates perform well in such circumstances and am confident that you can too. As always, reach out to me or Lucy if you have any questions regarding the topics, need clarifications on the Background Guide, or anything else about the IAEA prior to conference. See you all in March!

Sincerely,

Talha Iqbal
talha.iqbal@imuna.org
International Atomic Energy Agency
Session I
Dear Delegates,

Welcome to NHSMUN 2020! My name is Lucy and I am your Session II Director for the International Atomic Energy Agency. I am so excited to see what this year’s conference has in store!

For a little bit about me, I am currently in my third year of studies at the University of Toronto. Since I am pursuing a double major in Neuroscience and Psychology, taking on the IAEA has been a perfect balance of my interest in political debate and application of my background in science. Beyond school, I dedicate a fair chunk of my time to playing rugby with my varsity and club teams—and of course to NHSMUN. This is my third year working with this incredible staff; I was the Assistant Director for the Organization of American States for NHSMUN 2018, then the Director for the International Court of Justice for NHSMUN 2019, and I am back again for NHSMUN 2020 with the IAEA! I sincerely hope you all will find your NHSMUN experience to be as enjoyable as I have.

The topics we have chosen to simulate for this committee are ones less commonly explored when pertaining to the governance of nuclear energy, but I am confident in your ability to take on this challenge. Topic A, “Nuclear Techniques for Containing Vector-Borne Diseases,” addresses shortcomings in public health with innovative methods to identify and eradicate vectors of disease. Topic B, “Legal and Regulatory Frameworks for Nuclear Energy Development,” tackles complications in safety and security that precede the expansion of nuclear technologies. While both topics do necessitate some scientific knowledge, it is important that you do not get too wrapped up in the technical components of these issues and rather, focus on how nuclear energy is applied in each case.

This Background Guide is meant to help you frame the issues and serve as a reference point to supplement your own research. That being said, if you have any questions about the topics or the committee in general, please do not hesitate to reach out to either me or Talha. We would love to hear from you! See you in New York!

Best,

Lucy Kim
lucy.kim@imuna.org

International Atomic Energy Agency
Session II
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A Note on the NHSMUN Difference

Esteemed Faculty and Delegates,

Welcome to NHSMUN 2020! My name is Althea Turley and I am this year’s Director-General. Thank you for choosing to attend NHSMUN, the world’s largest Model United Nations conference for secondary school students. We are thrilled to welcome you to New York City in March!

As a space for collaboration, consensus, and compromise, NHSMUN strives to help transform today’s brightest thinkers into tomorrow’s leaders. Our organization provides a uniquely tailored experience for all in attendance through innovative and accessible programming. We believe that an emphasis on *education through simulation* is paramount to the Model UN experience and this idea permeates throughout NHSMUN.

**Debate founded on strong knowledge:** With knowledgeable staff members and delegates from over 70 countries, NHSMUN can facilitate an enriching experience reliant on substantively rigorous debate. To ensure this high quality of debate, our staff members produce extremely detailed and comprehensive topic overviews (like the one below) to prepare delegates for the complexities and nuances inherent in global issues. This process takes over six months, during which the Directors who lead our committees develop their topics with the valuable input of expert contributors. Because these topics are always changing and evolving, NHSMUN also produces update papers that are intended to bridge the gap of time between when the background guides are published and when committee starts in March. As such, this guide is designed to be a launching point from which delegates should delve further into their topics.

**Extremely prepared and engaged staff:** The detailed knowledge that our directors provide in this background guide through diligent research is aimed at spurring critical thought within delegates at NHSMUN. Prior to the conference, our Directors and Assistant Directors are trained rigorously through copious hours of both virtual and in-person exercises and workshops in an effort to provide the best conference experience possible. Beyond this, our Directors and Assistant Directors read every position paper submitted to NHSMUN and provide thoughtful insight on those submitted by the feedback deadline. Our staff aims not only to tailor the committee experience to delegates’ reflections and research but also to facilitate an environment where all delegates’ thoughts can be heard.

**Emphasis on participation:** The UN relies on the voices of all of its Member States to create resolutions most likely to make a dramatic impact on the world. That is our philosophy at NHSMUN too. We believe that in order to properly delve into an issue and produce fruitful debate, it is crucial to focus the entire energy and attention of the room on the topic at hand. Our Rules of Procedure and our staff are focused on making every voice in the committee heard, regardless of each delegate’s country assignment or skill level. However, unlike many other conferences, we also emphasize delegate participation after the conference. MUN delegates are well researched and aware of the UN’s priorities and they can serve as the vanguard for action on the Sustainable Development Goals (SDGs). Therefore, we are proud to also connect students with other action-oriented organizations at the conference to encourage further work on the topics.

**Focused committee time:** NHSMUN prohibits the use of any electronic devices during committee sessions. We feel strongly that face-to-face interpersonal connections during debate are critical to producing superior committee experiences and allow for the free flow of ideas. Ensuring a no-technology policy is also a way to guarantee that every delegate has an equal opportunity to succeed in committee. We staff a very dedicated team in our office who type up and format draft resolutions and working papers so that committee time can be focused on communication and collaboration. Please note that the dais is permitted a laptop to communicate with members of Senior Staff and for other administrative needs.
Educational emphasis, even for awards: At the heart of NHSMUN lies education and compromise. As such, when NHSMUN does distribute awards, we de-emphasize their importance in comparison to the educational value of Model UN as an activity. NHSMUN seeks to reward schools whose students excel in the arts of compromise and diplomacy. More importantly, we seek to develop an environment in which delegates can employ their critical thought processes and share ideas with their counterparts from around the world. We always prioritize a dedication to teamwork and encourage our delegates to engage with others in a diplomatic and inclusive manner. In particular, our daises look for and promote constructive leadership that strives towards consensus, as delegates do in the United Nations.

Realism and accuracy: Although a perfect simulation of the UN is never possible, we believe that one of the core educational responsibilities of MUN conferences is to educate students about how the UN System works. Each NHSMUN committee is a simulation of a real deliberative body so that delegates can research what their country has actually said in the committee. Our topics are chosen from the issues currently on the agenda of that committee (except historical committees, which take topics from the appropriate time period). This creates incredible opportunities for our delegates to do first-hand research by reading the actual statements their country has made and the resolutions they have supported. We also incorporate real UN and NGO experts into each committee through our committee speakers program and arrange for meetings between students and the actual UN Permanent Mission of the country they are representing. No other conference goes so far to deeply immerse students into the UN System.

As always, I welcome any questions or concerns about the substantive program at NHSMUN 2020 and would be happy to discuss NHSMUN pedagogy with faculty or delegates.

Delegates, it is my sincerest hope that your time at NHSMUN will be thought-provoking and stimulating. NHSMUN is an incredible time to learn, grow, and embrace new opportunities. I look forward to seeing you work both as students and global citizens at the conference.

Best,

Althea Turley
Director-General
A Note on Research and Preparation

Delegate research and preparation is a critical element of attending NHSMUN and enjoying the conference’s intellectual and cosmopolitan perspective. We have provided this Background Guide to introduce the topics that will be discussed in your committee. This document is designed to give you a description of the committee’s mandate and the topics on its agenda. We do not intend to represent exhaustive research on every facet of the topics. We encourage and expect each of you to critically explore the selected topics and be able to identify and analyze their intricacies upon arrival to NHSMUN in March. Delegates must be prepared to intelligently utilize your knowledge and apply it to your country’s unique policy.

The task of preparing for the conference can be challenging, but to assist delegates, we have updated our Beginner Delegate Guide and Advanced Delegate Guide. In particular, these guides contain more detailed instructions on how to prepare a position paper and excellent sources that delegates can use for research. Use these resources to your advantage—they can help transform a sometimes-overwhelming task into what it should be: an engaging, interesting, and rewarding experience.

An essential part of representing a state in an international body is the ability to articulate a given state’s views in writing. Accordingly, NHSMUN requires each delegation (the one or two delegates representing a country in a committee) to write a position paper for both topics on the committee’s agenda. In delegations with two students, we strongly encourage each student to participate in the research for both topics, to ensure that both students are prepared to debate no matter what topic is selected first. More information about how to write and format position papers can be found in the NHSMUN Research Guide. To summarize, position papers should be structured into three sections, described below.

I: Topic Background – This section should describe the history of the topic as it would be described by the delegate’s country. Delegates do not need to give an exhaustive account of the topic background, but rather focus on the details that are most important to the delegation’s policy and proposed solutions.

II: Country Policy – This section should discuss the delegation’s policy regarding the topic. Each paper should state the policy in plain terms and include the relevant statements, statistics, and research that support the effectiveness of the policy. Comparisons with other global issues are also appropriate here.

III. Proposed Solutions – This section should detail the delegation’s proposed solutions to address the topic. Descriptions of each solution should be thorough. Each idea should clearly connect to the specific problem it aims to solve and identify potential obstacles to implementation and how they can be avoided. The solution should be a natural extension of the country’s policy.

Each topic’s position paper should be no more than 10 pages long double-spaced with standard margins and font size. We recommend 2-4 pages per topic as a suitable length. The paper must be written from the perspective of the country you are representing at NHSMUN 2020 and should articulate the policies you will espouse at the conference.

Each delegation is responsible for sending a copy of its papers to their committee Directors via myDais on or before 14 February 2020. If a delegate wishes to receive detailed feedback from the committee’s dais, a position must be submitted on or before 24 January 2020. The papers received by this earlier deadline will be reviewed by the dais of each committee and returned prior to your arrival at the conference.

Complete instructions for how to submit position papers will be sent to faculty advisers via the email submitted at registration. If delegations are unable to submit their position papers on time, they should contact us at info@imuna.org as soon as possible.

Delegations that do not submit position papers to directors will be ineligible for awards.
Committee History

In the boom of nuclear technology in the 1950s, the International Atomic Energy was born to help manage the dangers and opportunities of this technology. In December of 1953, President Eisenhower gave his Atoms for Peace Speech, in which he emphasized the goal to discover “the way by which the miraculous inventiveness of man shall not be dedicated to his death, but consecrated to his life,” harnessing the power of nuclear weapons for peaceful rather than destructive means. He proposed the creation of an international agency to encourage collaboration among nations rather than hostility and atomic secrecy. At first, the Soviet Union was reluctant, fearing that advancements of civilian nuclear technology could also lead to advancements in military technology. However, in 1955, the UN General Assembly held a conference in Geneva on the peaceful uses of atomic energy, and the Soviet Union agreed to the proposal. The IAEA's statute was adopted by 81 countries on 23 October 1956 in New York, with 23 members initially serving on the Board. As defined in Article II of the IAEA Statute, the Agency would “seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world.” The IAEA's headquarters were established in Vienna, Austria, and the Agency was established as the world’s “Atoms for Peace” organization; it was an autonomous organization within the United Nations framework that set out to safeguard the world from the dangers of nuclear energy and funnel nuclear energy technology into the advancement of global society.

Created as an entity independent from national governments, the IAEA serves as a global forum for nuclear cooperation, nuclear safety standards, and technological knowledge and guidance. Though its written mandate has remained constant, the way in which it has carried out this mandate has changed with the global political climate. To prevent the spread of nuclear weapons, the IAEA supported the development of binding treaties on the use of nuclear technology. The IAEAs has also vastly expanded the support it provides to countries to develop and properly manage their nuclear energy technologies. However, by the early 1980s, the demand for nuclear power plants declined significantly, especially after the 1986 Chernobyl accident, and the IAEAs priorities shifted towards implementing safety guidelines. Today, the IAEA focuses mostly on facilitating global nuclear energy cooperation, supporting nuclear energy programs in developing countries, establishing safeguards on nuclear energy dangers such as radiation, and promoting research on the growing applications of atomic energy technology.

The IAEAs role in managing a technology so volatile and powerful has made it unique among international organizations. It now consists of 171 member states and reports annually to the UN General Assembly and, in the case of members’ noncompliance, to the UN Security Council. Its headquarters are located in Vienna, Austria, but the Agency also collaborates with IAEA Liaison Offices in New York, United States and Geneva, Switzerland; laboratory and research centers in Seibersdorf, Austria, Monaco, and Trieste, Italy; and regional safeguards offices in Toronto, Canada and Tokyo, Japan.

IAEA inspectors regularly visit nuclear facilities, ensuring that governments are adhering to their commitments to the peaceful

3 Ibid.
4 Ibid.
9 Ibid.
10 “History.”
use of nuclear technology. The General Conference of the IAEA meets in regular annual sessions and elect the Director-General and members to the Board of Governors, review annual reports, approve the IAEA budget, and review new applications for membership. Today, the IAEA Board of Governors is composed of 35 members and carries out committee functions such as establishing safety standards and authorizing the Director-General to implement them. The administrators of the IAEA assist with the enforcement of various treaties that ensure the safe handling of nuclear technology and materials. Some of these treaties include the Convention on Nuclear Safety and the Convention on the Physical Protection of Nuclear Material. The most well-known IAEA-related treaties is the Treaty on the Non-Proliferation of Nuclear Weapons.

Member states have some reporting responsibilities to the IAEA. If IAEA safeguards are adopted, it is also the responsibility of states to responsibility apply them. The IAEA does not have the power to force any state to accept IAEA inspectors, so it relies on states to follow the Agency’s guidelines. Although inspections are often welcomed, some states have refused to accept them or sought to limit the total number of IAEA inspectors that are permitted. These constraints make it more difficult for the IAEA to deploy small corps of inspectors at its disposal and to carry out the necessary verification activities on nuclear guidelines. However, the IAEA, although reliant on states, has been successful in fulfilling its mandate: to promote safe, secure, and peaceful nuclear technologies for the world.

15 Ibid.
17 Ibid.
18 Ibid.
19 Ibid.
Simulation

This simulation at NHSMUN 2020 will allow all delegates to participate equally in a vibrant debate. Delegates must thoroughly familiarize themselves with their country’s policies so that they can accurately represent them when the committee discusses each topic. The goal of this committee will be to build a consensus to support and pass a resolution that thoroughly addresses the topics under discussion, while also respecting the differing goals and opinions of all member states. With this goal in mind, delegates should develop and support resolutions that align with their country’s policies. Each country must work towards finding compromises without abandoning their own country’s goals in favor of the resolution. The resolutions should, therefore, aim to improve the situation while allowing each country to stay on policy and accomplish what their government believes is important.

To start committee, after delegates have been introduced to the dais, they will first debate the setting of the agenda and then progress to substantive debate, which will deepen and progress throughout the following sessions. There will be two main forms of discussion in this committee: formal debate and caucusing. Formal debate consists of delegates adding themselves to the speakers list to be formally recognized before the rest of the committee for a specified length of time. When delegates appear before the committee, it is their opportunity to give an overview of their country’s position. It is imperative that all delegates remain respectful of others during this time and observe all procedural rules in order for delegates to be heard and for the speaker’s list to flow smoothly. The chair will move down the speakers list, allowing each country who has volunteered their name to speak for a set amount of time and present their concerns to the committee.

Caucusing can be done in one of two ways: moderated and unmoderated. The speakers list will be suspended for both types of caucuses. Moderated caucuses flow similarly to formal debate, but delegates’ speaking times are often shorter, and each caucus has a specific topic that delegates must discuss in their comments. A moderated caucus will allow more speakers to address the assembly without having to wait for their turn to come on the speakers list. Unmoderated caucuses suspend formal rules of debate for a designated period of time during which delegates are free to move around the room and informally discuss policy and potential solutions with one another. The majority of writing for working papers and draft resolutions will occur during these unmoderated caucuses.

The topics in this committee are challenging and will require a great deal of research. Because NHSMUN emphasizes compromise and innovative problem solving, pre-written resolutions are not allowed at this conference. While your delegation may have some informal ideas about possible solutions before committee begins, you may not bring them to the conference in resolution form; this would defeat the purpose of the committee, which is to work together and compromise. Working papers and resolutions are collaboratively created by starting with solutions, first just as a set of ideas. These solutions are formatted into a working paper, then voted upon as draft resolutions, and finally presented as resolutions in plenary if passed in committee. Throughout this process and the debates, the dais staff will be available at all times to help delegates with any concerns or questions they may have. The dais is always happy to help delegates not only with substantive questions related to the topics under discussion, but also with adjusting to the procedural aspects of Model UN.

During the conference, the chair will be moderating the committee and setting up a general direction for the flow of debate. However, it is truly up to the delegates to decide how the committee proceeds, and it is up to the delegates to make the conference and committee the best that it can be. Delegates are welcome to contact the dais at any time for help, both before and during the conference, as they are there to answer any questions. They will help to make sure the committee runs smoothly and is a success.
Topic A: Nuclear Techniques for Containing Vector-Borne Diseases

Photo Credit: Erik F Brandsborg
Introduction

Vector-borne diseases are responsible for about half of the world’s burden of infectious disease. Infections total over a billion people internationally per year and are the cause of significant illness, disability, and over a million deaths annually. Vector-borne illness refers to illnesses that are spread through vectors, some other medium, to another organism. Often, vectors refer to “arthropods”—insects—but they can be any organism that carries diseases between other organisms. Thus, the risk of spreading diseases prevails in the impoverished regions of the tropics, where the state of the environment aggravates impoverished conditions and poses problems for vector proliferation. Slums and inadequate housing constitute much of these regions with a high population density, which increases the likelihood of exposure and contact with disease vectors. Houses in these junctures do not meet standards for size or hygiene and are oftentimes constructed by the migrating families themselves—who are unqualified to make proper structural decisions for their own accommodations. As a result, entry points in unsecured doors or windows, unsealed cracks in walls or floors, and unfitted ceilings give vectors effortless access to urban populations. Lack of air conditioning and sanitation facilities in such dwellings additionally harbor warmth and human odor that attract vectors. These settlements also lack waste management systems and the plumbing infrastructure for water supply and drainage. This forces the usage of water storage vessels and open containers, gutters, or household garbage like tires or plastic bottles that collect stagnating water form optimal breeding sites for mosquitoes. These considerations make the problem of vector control about alleviating social and economic inequalities, as well as an international health concern.

The dangers of these elevated transmission risks are compounded by the increasing resistance of vectors to control methods. Vectors and the pathogens they carry are becoming progressively resilient to the finite number of drugs and insecticides currently used to combat disease, which have complicated state capacity for detecting and dealing with outbreaks. Capacity building for public health involves strengthening skills, resources, and systems in place for states to administer disease response strategies. Chemical treatments are effective, relatively inexpensive, and widely available, and have been pivotal to past successes in the control of diseases like malaria and dengue. However, diminished sensitivity to insecticides means that states must moderate their reliance on this method and look to integrate alternative strategies while they try to delay and reverse resistance.

History and Description of the Issue

The threat of vector-borne disease re-emergence and weakening of conventional vector control strategies have spurred
the IAEA's interest in developing more effective programs. They aim to incorporate nuclear techniques into contemporary vector management practices to improve extermination efforts. At the forefront of nuclear technologies is the sterile insect technique (SIT), which achieves population eradication by radiation-induced sterility. Although praised for being environmentally friendly, the SIT is costly and highly specific, requiring an immense amount of preparation, resources, and laboratory work to develop and implement. As a developing technology, the long-term success, outcomes, and effects on biodiversity are also not well-known, despite positive initial assessments. While the SIT is still a growing field of vector management, it has already managed to acquire a reputation as an auspicious solution for addressing vector-borne disease.

The IAEA and other related bodies advocate for integrated vector management (IVM) programs to contain diseases which combine various methods, including insecticides and the SIT. This background guide will discuss central aspects of infectious diseases and explore how a vector-targeted response may be the key to solving this issue.

**Characteristics of Vector Borne Diseases**

Of the many types of disease vectors, haematophagous arthropods—insects that consume blood—are some of the most common and the most dangerous to humans, and they are thus considered as the main type of vector by the European Centre for Disease Prevention and Control. Vectors contract disease when they consume the blood of an infected animal. After the disease incubates in the vector, it is able to spread the disease to hundreds more animals when it feeds on them. Transmission occurs with the injection of the arthropod's saliva, for example through a bug bite, which serves to promote feeding, but has also been found to inadvertently play a role in enhancing the passing of infection.

By understanding how pathogens work, it becomes apparent how biological agents specifically function in their interactions with pathogens and other hosts. Thanks to evolutionary forces, the strength of vector organisms is largely unaffected by (and possibly even benefit from) the pathogens that organisms carry. This characteristic grants the vectors continued survival and reproductive success, which maintains their populations and perpetuates contagion. However, humans and other animals do not share the same immunities as vectors and are easily affected by transmitted diseases. Human susceptibility to infection brings into focus another type of vector: anthropocentric, those pertaining only to cases afflicting human populations.

According to the World Health Organization (WHO), at least 17% of all communicable diseases worldwide are vector-borne, most of which pose significant risk for sickness, dis-
To read a pathogen is introduced in a climate that fosters vector proliferation, intermittent transmissions can quickly propagate and turn into an epidemic.30 Vectors are attuned to the temperature and humidity of their surroundings, so this strongly influences the geography of vector-borne disease. Delegates should possess a good understanding of the characteristics of vector borne diseases in order to properly introduce solutions in committee.

<table>
<thead>
<tr>
<th>Disease</th>
<th>Vector</th>
<th>Pathogen</th>
<th>Global burden</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malaria</td>
<td><em>Anopheles</em> mosquitoes</td>
<td><em>Plasmodium</em> parasites</td>
<td>219 million cases and 435000 deaths in 2017, predominantly in sub-Saharan Africa and India.</td>
</tr>
<tr>
<td>Dengue</td>
<td><em>Aedes aegypti</em> mosquitoes</td>
<td>Dengue virus</td>
<td>390 million cases annually, endemic to Latin America, Asia, Africa, and threatening outbreak in Europe and North America.</td>
</tr>
<tr>
<td>Chikungunya</td>
<td><em>Aedes</em> mosquitoes</td>
<td>Chikungunya virus</td>
<td>Observed mostly in Africa, Asia, India, but beginning to affect the Americas.</td>
</tr>
<tr>
<td>Yellow fever</td>
<td><em>Haemagogus, Aedes</em> mosquitoes</td>
<td>Yellow fever virus</td>
<td>200000 cases and 30000 deaths annually, endemic to Africa and South America.</td>
</tr>
<tr>
<td>Japanese encephalitis</td>
<td><em>Culex</em> mosquitoes</td>
<td>Japanese encephalitis virus</td>
<td>Over 50000 cases and 10000 deaths annually, in Southeast Asia and the Western Pacific.</td>
</tr>
<tr>
<td>Lymphatic filariasis</td>
<td><em>Aedes, Anopheles, Culex</em> mosquiotes</td>
<td>Filarial parasites</td>
<td>Over 120 million cases, predominantly in Southeast Asia and Africa, and throughout the tropics.</td>
</tr>
<tr>
<td>Human African trypanosomiasis</td>
<td>Tsetse flies</td>
<td><em>Trypanosoma</em> parasites</td>
<td>Endemic to sub-Saharan Africa.</td>
</tr>
</tbody>
</table>

One shared attribute of the above diseases is that they are found primarily in tropical and subtropical regions.27 Vectors depend on the external environment to regulate their own internal body temperature, which means they require and thrive in the stable ambient climates found along the equatorial belt.28 This attribute marks the features characteristic of vector-borne diseases: seasonal and sporadic outbreaks.29 When a pathogen is introduced in a climate that fosters vector proliferation, intermittent transmissions can quickly propagate and turn into an epidemic.30 Vectors are attuned to the temperature and humidity of their surroundings, so this strongly influences the geography of vector-borne disease. Delegates should possess a good understanding of the characteristics of vector borne diseases in order to properly introduce solutions in committee.

**Causes and Effects of Disease Transmission**

Considering the importance of climate on the distribution of vector-borne diseases, the growing impact of climate change on this issue is undeniable. Higher temperatures and increased precipitation and flooding create more optimal settings for mosquitoes to rapidly reproduce.33 Still, climate change is not the only thing driving the resurgence of vector-borne disease.

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28 Ibid.
29 Ibid.
30 Ibid.
Changes in the world population and widespread urbanization have changed how humans interact with each other, sometimes at an extremely accelerated pace.\textsuperscript{32} Without the infrastructure to support urban development, these cities are then faced with immature health and sanitation systems that fail to ensure the well-being of local inhabitants.\textsuperscript{33} Unsanitary living conditions caused by overcrowding, substandard water supplies, or waste disposal, and under-equipped public health services make them ideal places for vectors to dwell and disease to appear.\textsuperscript{34} Other urban expansion practices, like deforestation or building dams and irrigation channels, can also increase risk of communicable disease in the region.\textsuperscript{35} When natural territories are disturbed, they expose local populations to vectors and vector-borne diseases that may have previously occupied the space - particularly if these activities are not planned proficiently or executed in a controlled manner, as is usually the case.\textsuperscript{36} Breaking up habitats in this way can also have secondary consequences not yet well known, as physical alterations in the land modify points (and populations) of access for mobile vectors and are likely to transform disease distribution accordingly.\textsuperscript{37}

Globalization has also helped the spread of vector-borne diseases. As increased global trade and travel encourages more frequent contact between distant regions, vectors and pathogens now have new avenues to disperse over wide geographic areas.\textsuperscript{38} Because of this, communicable diseases endemic to certain regions have materialized in new environments that are vulnerable to this sudden exposure.\textsuperscript{39}

The impacts of vector-borne diseases can be severe. In addition to endangering millions of lives, they are the cause of considerable and lasting suffering, leaving permanent disfigurement or physical impairment in their wake.\textsuperscript{40} Besides the obvious health detriments of human infection, vector-borne diseases also have the potential to place a heavy economic burden on the people and countries they affect. Patients must also cover substantial health care costs while disease prevents them from working.\textsuperscript{41} For small farms typical of the regions where these diseases are regularly found, farmers will be troubled by sickness about five times a year.\textsuperscript{42} If they are ill at critical harvest periods, this can amount to loss of up to 60% of their crops.\textsuperscript{43}

At the state level, vector-borne disease can markedly diminish GDP to cripple economic growth and perpetuate poverty.\textsuperscript{44} Once livestock are infected, states must take action to arrest further circulation of the pathogen, which includes limitation of trade.\textsuperscript{45} One of the first health emergencies called by the WHO to significantly compromise the international market was an outbreak of the plague in India in 1994.\textsuperscript{46} The WHO also enacted the International Health Regulations in an attempt to quarantine the disease.\textsuperscript{47} This imposed a travel and trade embargo that cost India and the world economy USD three billion and USD six billion, respectively.\textsuperscript{48}

\textsuperscript{34} Ibid.
\textsuperscript{36} Sutherst, “Global Change and Human Vulnerability to Vector-Borne Diseases.”
\textsuperscript{37} Ibid.
\textsuperscript{38} Ibid.
\textsuperscript{39} Scott, “The Risks of Rapid Urbanization in Developing Countries.”
\textsuperscript{41} “Mosquitoes, Malaria and Agriculture,” BASF Global, last modified 23 September 2019, agriculture.basf.com/en/Pest-Control/Commitment-to-Public-Health/Mosquitoes-malaria-and-agriculture.html.
\textsuperscript{42} Ibid.
\textsuperscript{43} Ibid.
\textsuperscript{44} Ibid.
\textsuperscript{45} “Vector-Borne Diseases,” Institute of Medicine (US) Forum on Microbial Threats.
\textsuperscript{46} Ibid.
\textsuperscript{47} Ibid.
\textsuperscript{48} Ibid.
Commercial limitations to states, coupled with the depleting numbers of healthy livestock and expenses funneled into prevention and control measures, results in major financial losses.\(^49\) The costs associated with handling bluetongue virus infections in cattle, in profits lost from sickness, death, trade restrictions, and paying for vaccinations, can amount to roughly three billion USD.\(^50\)

**Vector management**

Because of the turbulent nature of epidemics, obstructing vector infestation has been deemed the best method for disease prevention.\(^51\) Vector management is especially important for diseases for which there are currently no viable vaccines or treatments.\(^52\) Chemical interventions have traditionally been favored because they are convenient and cost-effective, but such treatments are losing some traction because of the extent to which their application has led to vector resistance to insecticides.\(^53\) Popular chemical treatments consist of: insecticidal nets, fumigating indoor and outdoor target surfaces, water treatment, and repellents.\(^54\) Other environmental and biological control strategies are also used, including: partitions for water storage containers to restrict mosquito access to potential breeding grounds, introducing predators to feed on mosquito larvae, or genetically modifying mosquitoes so they can no longer reproduce or transfer pathogens.\(^55\)

The present approach to administering these interventions is called integrated vector management (IVM). This technique proposes the selective merging of various methods in order to maximize disease control but minimize cost and deleterious impacts on both environment and public health.\(^56\) Environmental and biological controls are considered before chemicals, which bring more severe detriments to the local ecology.\(^57\) Ultimately, though, use of insecticides are not eschewed if alternatives are not fitting.\(^58\) One measure that is becoming high in demand as a constituent part of the IVM is the SIT. Originally developed in the United States as a generic pest control mechanism, the SIT has since been engaged in experimentation with the IAEA to suppress disease transmission.\(^59\)

SIT is a safe and sustainable way to prevent mosquito reproduction, where sterility is induced by ionizing radiation before release into the wild.\(^60\) Mosquitoes of the same species as the target population are bred nonstop to accumulate enough numbers for large-scale release. Males are picked out and then their reproductive cells are exposed to X-rays or gamma radiation, which leave them effectively infertile.\(^61\)

Female mosquitoes are the only carriers of disease because only female mosquitoes feed on blood, so sterile males are mass-reared to mate with them.\(^62\) Although incapable of rendering offspring, these sterile males provide competition for the unaltered males. Since a female mosquito only mates once in her lifetime, if it mates with a sterile male, all of the eggs will remain unfertilized and will never hatch.\(^63\) This, in turn, slowly culls mosquito populations so that spread of vector-borne disease can eventually be stopped.\(^64\)

While vector management is the principal course of action to contain illness, surveillance and early diagnosis are just as important. Monitoring and collecting data regarding symptoms

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49  Ibid.
50  “Vector-Borne Diseases,” Institute of Medicine (US) Forum on Microbial Threats.
51  Ibid.
54  Ibid.
55  Ibid.
57  Ibid.
58  Ibid.
60  Ibid.
61  Ibid.
indicative of vector-borne disease and deaths disclose which groups and regions need more attention and enable states to respond sooner to suspected cases. Laboratory testing of infected persons by the nuclear-derived technique called reverse transcription polymerase chain reaction (RT-PCR) can accurately identify viruses so that appropriate protocols can be initiated. This technology previously used radioactive isotopes, but now uses fluorescent markers to screen for viruses in a given sample. It has been employed successfully in detecting incidences of diseases like Zika and Ebola in a matter of hours.

Implementation and Accessibility

The Food and Agriculture Organization (FAO)/IAEA Insect Pest Control Laboratory (IPCL) works out of Seibersdorf, Austria to assist over 75 countries with SIT programs. They house more than 125,000 male and female mosquitoes in their facilities for breeding purposes; eggs and larvae are left to develop in ordered holding trays, irradiated at the pupae stage, then held as sterile adults in specialized cages, pending deployment.

In order for the SIT to secure desired results, millions of sterile males must be flooded into the target area. Otherwise, the likelihood of them mating with the wild female population is too low for the process to be productive. Past methods of delivery were land-based, making the process unnecessarily demanding and difficult to apply over large distances. It was for this reason that the IPCL proposed the use of drones. These remote-controlled (or the desired route can be programmable) aircrafts would open doors for reaching tracts of land with no road access and could fly at heights ideal for accurate expulsion. In partnership with FAO and WeRobotics, the IAEA developed an aerial apparatus for the release of sterile mosquitoes.

Building the prototype mainly involved considerations for transport and dispatch. Around one million mosquitoes are confined to the small container inside of the drone, so they need to be kept dormant at a cool 4-10 degrees Celsius during the flight. The timing of uncooling is also essential, so that the mosquitoes will be active again and able to fly once they are freed. The exit mechanism is the most intricate component of the drone. It must be designed in such a way that mosquitoes’ delicate wings and bodies are not harmed upon release and it must be designed to execute controlled expulsion at a rate of 50,000-100,000 mosquitoes per square kilometer.

67 Ibid; “IAEA Trains Experts to Use Diagnostic Tools for Quick Zika Detection.”
69 Ibid.
72 “IAEA Conducts Successful Test of Drones in Fight Against Disease Transmitting Mosquitos.”
74 “The Latest on Drones for Disease Vector Control,” WeRobotics, 8 January 2018, 23 September 2019, blog.werobotics.org/2018/01/08/drones-for-disease-vector-control/.
75 “How to Reduce Zika Using Flying Robots.”
76 “The Latest on Drones for Disease Vector Control.”
Laboratory and field tests have brought about the more recent model, which bears 50,000 mosquitoes at a total weight under ten kilograms.77 The device tested positively in Brazil in March of 2018 against mosquitoes carrying the Zika virus.78 These developments in the administration of the SIT hold implications for the future of vector control. With the IAEA consistently exploring original ideas and adding new devices to their arsenal, this is merely a sign of big things to come.

Like with Brazil, the Technical Cooperation Programme of the IAEA offers aid to regions affected by vector-borne disease.79 They equip states with the technology to manage the disease as well as the training and expertise to properly benefit from the aid.80 The IAEA advocates for states working together to supplement each other's capacity for vector control.81

**Challenges to Efficient Management**

While the SIT has the power to be a potent vector control strategy, it is limited by its species' specificity. Sterile males can only contend for mating with females if they are of the same species.82 The SIT is well-suited for diseases like dengue, which is spread only by the *Ae. aegypti* mosquito, but would struggle to cover a different disease like malaria, which has several different vector species.83

Mass-rearing technologies for vector species is also of pressing concern, in light of the high quantities needed for effective SIT administration. Mass production of tsetse flies is under way at the IPCL, with progress being made with their semi-automated tsetse production units, but similar mechanisms have yet to be constructed for large-scale mosquito production.84 Nevertheless, the IPCL continues to make small upgrades to refine the current mosquito breeding process, such as observing temperatures conducive to larvae growth.85

Another aspect of this technology that has stagnated movement towards mass production and needs to be overcome is in isolating males from females. Sex differentiation of *Aedes* mosquitoes is done manually in SIT testing facilities, with researchers hand-picking female pupae for removal by size.86 While this may have sufficed for the relatively low numbers of SIT field projects conducted initially, it is impractical for sustaining the kinds of larger scale operations being worked towards for the future. There are two promising initiatives in the works to expedite this process. The first is a sorting instrument developed in Spain that discards the larger females and retains a good 80% of the males.87 The second, an endeavor by the FAO and the IAEA to generate a genetic sexing tool to yield only male mosquitoes for SIT.88 Machine separation of pupae has been criticized for a success rate that is still too low to service actual SIT operations.89 Because the range of male and female mosquito sizes converge in the middle, sex separation done in this way will likely not get much better. Although more difficult and time-consuming, genetic sexing is the favored strategy of the two.90 Sexing strains can induce lethality in females or generate sex-specific markers on the bodies of males.

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77 “IAEA Conducts Successful Test of Drones in Fight Against Disease Transmitting Mosquitoes.”
78 Ibid.
80 Ibid.
81 Ibid.
83 Ibid.
85 Ibid.
87 Ibid.
90 Ibid.
mosquitoes so that male/female differentiation becomes concrete, rather than contingent on perceptions of size. Once a genetic sexing strain is generated for one vector species, it can be applied to all other projects specific to that taxon, so the production value of this technique is very high.

Although sterile males are released into populated areas, whether or not any given male mosquito will encounter a wild female is inherently governed by chance. The best that the SIT projects can do to help their performance is to try to make these sterilized males as competitive as possible to maximize female attraction over indigenous males.

The action of SIT is only observable in subsequent generations of vectors. It takes effect gradually and is a long-term solution that cannot expect immediate results. It is also intended to regulate disease over a broad region, not protect against cases of singular infection of a given individual. Overtime, it will suppress the vector population so that transmission becomes less probable, but it does not mean that individuals in the region are unilaterally safe. Finally, as with any public program, states must have the resources to maintain SIT efforts. Relatively few countries possess the infrastructure, personnel, and financial ability (or sufficient external reinforcement and guidance) to pull off successful vector control attempts. This lack of capacity is an opportunity for the IAEA to support countries in need of support, training, or assistance.

Research and Development of Techniques

The FAO/IAEA Insect Pest Control Laboratory (IPCL) conducts many studies for the development of the SIT. They analyze the effects of handling and radiation on mating behavior and competition between sterilized and untouched males in model habitats and additionally look into prospects for advancing mass-rearing procedures. The current major focus for progress in breeding mosquitoes is to improve holding areas, make separation of larvae and pupae more efficient, and raise the sexual competitiveness of sterile males. For tsetse flies, the IPCL also seeks to improve holding and feeding systems, along with the process of sexing tsetse pupae.

The IPCL collaborates with member states to work on Coordinated Research Projects (CRPs), addressing problems or gaps in knowledge in nuclear applications to vector control. The CRP on Development of Standardized Mass Rearing System for male Anopheles arabiensis mosquitoes is one such project that manufactured novel technology for the production of mosquitoes. From their research, the IAEA optimized both the equipment used and quality of diet provided in mass-rearing operations, leading to superior development and survival of mosquito larvae. The tray rack system used to hold developing larvae was redesigned to better control the temperature and volume of water inside the trays, to model authentic breeding grounds and to provide easier access for

93 Alphey et al., “Sterile-Insect Methods for Control of Mosquito-Borne Diseases.”
94 Ibid.
95 Ibid.
96 Ibid.
97 “Preventing Procreation.”
98 FAO/IAEA Agricultural and Biotechnology Laboratories, “Insect Pest Control Laboratory.”
99 Ibid.
101 Ibid.
workers to give food.\textsuperscript{102} These tray racks are also assembled in a structured manner that is mindful of the facility’s limited space and operating costs for heating/cooling and filling/drainage the trays.\textsuperscript{103} The changes prescribed by this project would lower rearing and labor expenses while simultaneously expanding production capacity for the IPCL, so that they have more resources to transfer to external mosquito control programs. These findings have also been relayed to member states to incorporate into their own SIT-vector control ventures.\textsuperscript{104}

A notable CRP that concluded in January 2019, on the topic of exploring genetic, molecular, mechanical and behavioral methods of sex separation in mosquitoes, recognized the need for efficient sex separation systems and worked to remedy this.\textsuperscript{105} The researchers developed genetic sexing strains as well as alternative sex separation tools for \textit{Aedes} and \textit{Anopheles} mosquito species using target genes.\textsuperscript{106} Developing a genetic sexing strain involves linking inheritance of a selectable marker to sex, where the marker chosen decides the subsequent sex separation process.\textsuperscript{107} If the selected marker is morphological, males and females can be sorted by physical differences, whereas if the marker is a temperature-sensitive lethal (tsl) gene, females can be killed off under high temperatures that males can survive.\textsuperscript{108} Such strains make it possible to prepare
only male mosquito supplies with more certainty. In making sex separation of mosquitoes easier, sexing tools ensure that no stray females will be released and ultimately lower costs for mass-rearing.\textsuperscript{109} Because SIT is most effective when males are exclusively released, the overall impact of implementing these sexing strains will be to make SIT operations more economical. After these techniques are put through extensive trial runs and certified, they can be absorbed into current SIT practices against mosquito vectors.\textsuperscript{110} New focuses for the evolution of genetic sexing strains have also stemmed from this project. A March 2019 CRP will take on the challenge of isolating gene markers and mutations that could be generalized across various species, as well as attempt to create strains that will fix sex determination pathways to only yield male mosquitoes.\textsuperscript{111}

Another domain of ongoing research by the IAEA addresses whether irradiation can subdue vectorial capacity of tsetse flies.\textsuperscript{112} In the SIT, exposure to ionizing radiation simply sterilizes males to forcibly control vector populations, but questions remain on whether it could also influence their ability to pick up and transfer disease.\textsuperscript{113} This is the concept of raising vector refractoriness, so that treated tsetse flies might be able to resist contracting the parasite in the first place.\textsuperscript{114} Microorganisms in the gut of arthropods have been associated with increased immunity to viral and parasitic pathogens, which may interfere with the vectoral capacity of insect hosts so that they are incapable of disease transmission.\textsuperscript{115} This area of study can also be artificially reproduced in mosquitoes. Anti-pathogenic strains can be engineered, modifying genetic pathways to enhance antiviral resistance.\textsuperscript{116}

The breakthroughs that have been made in the SIT and global response to vector-borne disease as a result of the IPCL’s research projects have been far-reaching in their applications to public health. These CRPs birth the development of innovative tools and approaches to IVM, so that they can later be shared with affected countries. Coordinated Research Projects, like the ones described above, are valuable sources of information for both the IAEA and member states to integrate into established vector management strategies. Solutions particularly based around the SIT are highly requested by states that continue to endure outbreaks of vector-borne disease, as others have shown to be inadequate and unsustainable.\textsuperscript{117} The IPCL is tasked with coordinating a network with institutions and member states to apply their research in Field Projects that address these problems.\textsuperscript{118}

Current Status

Emerging Technologies

Sequential to the development of the SIT, persistent experimentation on mosquitoes led to the creation of a technique known as “release of insects with dominant lethal genes” (RIDL).\textsuperscript{119} The company that engineered this technology, Oxitec, also produced the OX513A transgenic mosquito, approved by the WHO for release in Brazil to fight dengue and Zika.\textsuperscript{120} This transgene was classified as self-limiting, which meant that mosquitoes expressing the gene now had a timer on their lifespan.\textsuperscript{121} RIDL involves the insertion of one gene

of dominant lethal type in male mosquitoes. A dominant lethal gene only needs one copy of the allele to take effect and when expressed, it will kill the mosquito that carries it. In this vector control model, expression of RIDL can be artificially repressed in the laboratory-reared larvae by providing the antibiotic tetracycline in their diet. Without this compound, wild mosquito offspring that inherit the RIDL trait are conditioned to die before they reach adulthood. Concerns regarding the repercussions of introducing genetically modified organisms to native ecosystems have been brought forward, but risk assessments of the OX513A strain showed no threat to public safety and is set for commercial use.

In contrast to SIT, RIDL makes use of delayed lethality that complements equilibration of oscillating vector population densities so that they can stabilize more quickly. This lowers the critical input ratio needed for total elimination so that fewer RIDL mosquitoes are required for the same level of control offered with the SIT. Increasing the release rate of mosquitoes simply reveals RIDL to be more effective than SIT while decreasing the release ratio reveals that only RIDL is capable of eradicating the wild population. The advantages of the RIDL technique lay primarily in cost reduction and the prescribed lethality of the modified gene. Since these mosquitoes and their progeny have already been assigned their life expectancies (typically a short two days), there is no worry over how their release could impact the environment. It is also believed that RIDL males are more competitive than classical SIT males in terms of mating success.

Laboratory testing showed RIDL mosquitoes to be on equal footing as wild males and field studies in the Cayman Islands indicated their suppression potential to be at least 80%. These statistics present the RIDL as a formidable technique in the making.

Case Study: Zika Outbreak in Brazil

The Federative Republic of Brazil is a pioneer of health in the Latin American region, known for its advanced policy and outreach programs regarding communicable disease, leading especially in genetically-based vector control. Brazil was the first to approve commercial release of OX513A mosquitoes, where preliminary SIT drone tests have returned promising results. Reining in the epidemic also entailed aid from the IAEA’s Technical Cooperation Programme to effectively

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122 Miller, “Let High-Tech Genetically Modified Insects Counter Dengue.”
125 Ibid.
126 De Andrade et al., “Use of Transgenic Aedes Aegypti in Brazil.”
127 Ibid.
128 Ibid.
129 Ibid.
130 Ibid.
131 Phuc et al., “Late-Acting Dominant Lethal Genetic Systems and Mosquito Control.”
132 Ibid.
133 Miller, “Let High-Tech Genetically Modified Insects Counter Dengue.”
135 De Andrade et al., “Use of Transgenic Aedes Aegypti in Brazil.”
administer the SIT.\textsuperscript{136} States wishing to follow suit can learn from studying the progress of the Zika situation in Brazil.

Although signs of the Zika virus manifested in northeastern Brazil as early as December 2014, the first definitive diagnosis did not occur until May 2015.\textsuperscript{137} Previous test results positive for Zika lacked certainty because of similarities to other existing viruses in Brazil: dengue and chikungunya.\textsuperscript{138} This was also the first time that the Zika virus had appeared in the Americas.\textsuperscript{139} The Zika virus was historically considered a rare disease, as it had minimal human contact and mostly kept to monkeys residing in the jungle canopies of Africa.\textsuperscript{140} Relatively small outbreaks hit several islands in Pacific Asia, most notably French Polynesia in 2013 with 30,000 infections, before moving into the Americas.\textsuperscript{141} A traveler from French Polynesia visiting Brazil was the first recorded case to have brought the virus into the region.\textsuperscript{142}

The Zika virus belongs to the same taxonomic class as dengue, yellow fever, and Japanese encephalitis.\textsuperscript{143} Being part of the Flavivirus genus means that these viruses are transmitted through the bite of insects that are endemic to tropical and subtropical zones.\textsuperscript{144} Flaviviruses are also known for their ability to produce new genetic strains that promote their spread through populations, which can lead to devastating epidemic potential and unforeseen consequences.\textsuperscript{145} The Zika virus exhibited this quality when it entered Brazil, quickly overwhelming all areas in Latin America and the Caribbean that held \textit{Aedes} mosquitoes.\textsuperscript{146} Since this region had never been exposed to the virus in the past, the Latin American population had no built-up immunity to slow the outbreak.\textsuperscript{147} The adaptability of vectors of Zika, especially the \textit{Aedes aegypti} mosquito, to rapidly urbanizing cities and their preference for human blood also helped the disease to proliferate to the extent that Brazil was sent into a state of crisis by 12 November 2015.\textsuperscript{148}

In October 2015, there was a flare-up in the number of reported cases of microcephaly that scientists later confirmed to be linked to Zika.\textsuperscript{149} Microcephaly is characterized by abnormalities in the nervous system and impaired brain growth.
that stifle physical and neural development.\textsuperscript{150} The undersized head of newborns from mothers infected during pregnancy became a hallmark feature of Zika that struck the world.\textsuperscript{151} Later research also found Zika to be a cause of Guillain-Barre syndrome, a peripheral nerve disorder that affects the muscles, with severity ranging from general weakness to paralysis.\textsuperscript{152} Even though the majority of Zika infections produce mild or no symptoms, the possibility of acquiring these two serious neurological conditions led the WHO to designate the Zika virus as a Public Health Emergency of International Concern on 1 February 2016.\textsuperscript{153}

Brazil’s response to the epidemic was one centered around vector control. Their approach involved a combination of spraying pesticides in dominant breeding grounds, the sterile insect technique, and biological control inserting \textit{Wolbachia} bacteria in \textit{Aedes} mosquitoes to thwart transmission.\textsuperscript{154} This mosquito eradication campaign succeeded in lowering Zika incidence by 95\% to terminate their national public health emergency by May 2017.\textsuperscript{155}

The IAEA’s role in this accomplishment was through a triad of education, research, and administration, and as a benefactor. The association organized a meeting in Brazil with international experts to review current data on \textit{Aedes} control and advise on IVM strategies, which stated the merits of prompt Zika virus detection and integration of SIT into control measures.\textsuperscript{156} The IAEA donated RT-PCR technologies specialized for Zika diagnosis and gamma cell irradiator needed to extend sterile male mosquitoes mass-production, as well as hosting workshops and professional training seminars for using these equipment.\textsuperscript{157} The IAEA also facilitated the consolidation of SIT programs by incorporating findings of IPCL investigations and other innovative submissions, such as the pilot projects releasing sterile insects from drones.\textsuperscript{158} Technical Cooperation Projects of this kind are well funded by powerhouses like the US, France, and Japan, to develop and transfer SIT on a global scale.\textsuperscript{159} The IAEA is a resource for providing similar support to manage other vector epidemics, and continues to study and refine techniques to pass on to afflicted member states.\textsuperscript{160}

\textbf{Sustainable Development Goals (SDGs)}

The 2030 Agenda for Sustainable Development was adopted in September 2015 following the Millennium Development Goals for 2015.\textsuperscript{161} The seventeen SDGs central to the agenda pursue global equality and prosperity, and list targets and indicators for each goal to be met.\textsuperscript{162} The IAEA covers many of these goals in their activities, working to encourage states’ competence in nuclear science applications to health and human welfare.\textsuperscript{163}

SDG 3 is ‘good health and well-being,’ which directly relates to this topic with its focus on infectious diseases.\textsuperscript{164} Efforts to increase surveillance and interventions for neglected tropical diseases like dengue or Human African trypanosomiasis have steadily decreased the number of reported cases since

\begin{itemize}
\item[\textsuperscript{150}] Ibid.
\item[\textsuperscript{152}] Ibid.
\item[\textsuperscript{153}] Ibid; “One year into the Zika Outbreak: How an Obscure Disease Became a Global Health Emergency,” \textit{WHO}.
\item[\textsuperscript{155}] Ibid.
\item[\textsuperscript{157}] Ibid.
\item[\textsuperscript{159}] Ibid.
\item[\textsuperscript{160}] Ibid.
\item[\textsuperscript{162}] Ibid.
\end{itemize}
2010. The IAEA assists states in expanding their capacity for disease management by developing and providing nuclear techniques for early detection and eradication, which also relates to SDG 9: Industry, Innovation, and Infrastructure and SDG 17: Partnership For the Goals. Through its Technical Cooperation Programmes, the IAEA invests in research for the development of innovative technologies to make it universally accessible. They facilitate the sharing of knowledge and collaboration with member states to aid the global fight against vector-borne disease.

SDG 17 is also reflected in international capacity-building efforts against disease. An economic model of global malaria expenditure showed that current Development Assistance for Health (DAH) was insufficient in keeping up with the plans outlined in the Global Technical Strategy for Malaria, 2016-30. This proposal for malaria prevention and eradication calls for an annual USD 6.6 billion of funding by the year 2020, a far cry from the estimated USD 4.3 billion disbursed in 2016. For the low-income states most encumbered by disease, their domestic financing programs need the support of external DAH to share the burden of malaria. DAH investments sourced from agencies like the US President’s Malaria Initiative, the Global Fund, and Unitaid, have been indispensable in mobilizing global partnerships for reducing malaria. The demand for additional collaboration and funding is not limited to malaria, however, but applies to all vector-borne diseases. National cooperation and solidarity within public and private health sectors is fundamental to executing a practical and sustainable control policy.

Shortcomings in vector control have also shed light on the relevance of SDG 1: No Poverty, SDG 6: Clean Water and Sanitation, SDG 10: Reduced Inequalities, SDG 11: Sustainable Cities and Communities, and SDG 13: Climate Action. SDG 11 reconciles recent trends of urban sprawl with the lagging quality and quantity of infrastructure to cater to the rapidly growing populations. Overburdened cities contribute to global poverty and unsanitary conditions, and become hotspots for vectors to overrun. By reducing inequalities between states and sharing the responsibility of achieving these SDGs, the disproportionate effects of disease on impoverished regions can be eliminated. Delegates should work to include the SDG agenda throughout their solutions.

Bloc Positions

Technology-Rich Countries

The technology-rich bloc is comprised of states that are at the head of the world’s technical advancement. They oversee many cooperative activities for disease surveillance and other projects devoted to developing technological assets. The US Centers for Disease Control and Prevention (CDC) is well-funded in order to investigate and diversify prevailing vector control strategies in the laboratory, and disseminate findings for the benefit of all. The CDC offers training to Latin American and Caribbean states in disease preparation, identification, and response as a safeguard for the integrity of the region. The US also partakes in collectives like the Global Health Security Initiative (GHSI), along with Canada,

References:

165 Ibid.
166 Jawerth and Gaspar, “How will the IAEA Will Contribute to the Sustainable Development Goals.”
167 Ibid.
168 Ibid.
170 Ibid.
171 Ibid.
172 Ibid.
176 Knudsen and Slooff, “Vector-Borne Disease Problems in Rapid Urbanization.”
177 Bliss, “Health in Latin America and the Caribbean.”
179 Bliss, “Health in Latin America and the Caribbean.”
Mexico, the United Kingdom, France, Germany, Italy, and Japan. Countries engaged in these kinds of organizations are key players in confronting problems with the health care sector, as they relentlessly search for progressive technologies to reform vector management.

The technological giants also tend to be the most resilient to epidemics. They already possess the knowledge and executive structure to continue performing, regardless of how the environment transforms. Their systems are robust and can endure a great deal of extraneous stress before they are forced to adapt. These states are in a position where they are at liberty to seek out novel instruments for vector control. Due to this resistance to outbreaks and vector-borne disease, technology-rich countries frequently monitor outbreaks and assist in other states if needed. Often, these countries are the leaders in research for new ways to combat vector-borne illness, with the CDC in the United States being the most well-known example.

**Countries with High Adaptive Capacity**

“Adaptive capacity” refers to the power to adapt to fluctuations in environment due to climate change, as opposed to trying to stop climate change before it comes to make its mark. Adaptive capacity is illustrated in the practical skills and operations that are employed when responding to disturbances that undermine the environmental, social, and economic security of a state. Examples of adaptive behaviors within the context of vector-borne disease could be a state creating and administering vaccines to immunize its citizens.

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180 Ibid.
182 Ibid
183 “Preparing the Nation to Address Vector-Borne Diseases Threats,” *CDC Division of Vector-Borne Diseases*.
185 Ibid.
after the outbreak of a new virus, vector control techniques, or implementing public policies for personal protective measures to reduce contact with vectors.

States with high adaptive capacity are able to react effectively to changing conditions that escalate transmission potential. The United States is one country to have demonstrated such adaptive capacity. Between 1980 and 1999, the documented number of mosquitoes infected with dengue was much greater in Texas than in three Mexican states combined, yet Mexico had 1,000 times the number of human cases. The main reason for this discrepancy was that housing in Texas had air conditioning and screens on windows and doors that deterred mosquito entry whereas the Mexican states did not have functional barriers in place. Research models that were mindful of climate change influences similarly predicted a decline in malaria and dengue correlating with improved health practices. Similarly, adaptive capacity is measured in ability to adapt in the future. Specifically, in a study of adaptive capacity in South America, Costa Rica and Panama were found to be of high adaptive capacity. This was due to both country’s ability to reduce reliance on staple crops and land based on factors like climate change. However, some countries like Guatemala, Honduras, and Nicaragua were also cited as being of medium capacity. These findings show that regardless of level of development or technology, adaptive capacity can also depend on geographic location, economic susceptibility to climate change, as well as weather patterns.

187 Ibid.
190 Ibid.
193 Ibid.
195 Ibid.
196 Ibid.
197 Bardosh et al., “Addressing vulnerability, building resilience.”

### Countries with Low Adaptive Capacity

States in this bloc are limited by their vulnerability to disease exposure. These countries tend to be less wealthy or have unreliable systems of governance and thus cannot acclimate with the necessary speed or force. This is apparent in the case of Venezuela, whose public health care network crumbled and enabled the spread of several vector-borne diseases. The ongoing humanitarian crisis dissolved twenty years of bolstering vector management faculties in the region, causing the prevalence of malaria to rise by 71% from 2016 to 2017.

Low adaptive capacity also means that these states do not have the resources or experience to devise their own vector control initiatives. Many countries in Sub-Saharan Africa, for instance, lack a widespread presence of entomology specialists or university programs to cultivate future expertise. Despite carrying the highest burden of disease, these states often have the least amount of data on the significant vectors and diseases in their vicinity.

Studies amongst small-scale farmers in Africa and Asia have also found that adaptive capacity is correlated with livelihood diversification, property ownership, and ability to participate in the policies and resources of the area. This shows that a lack of adaptive capacity can also stem from low accountability or influence of local communities in increasing their adaptive capacity. It also shows that adaptive capacity concerns can be felt throughout any state, no matter how developed, because often the problems can stem on a local level too.

These areas would benefit from an IVT strategy comprised...
Committee Mission

The objective of the IAEA is to promote and advance peaceful uses of atomic energy for the purposes of global prosperity and security. One aspect of international wellness that the IAEA dwells on is a pursuit of universal standards of health. They conduct scientific research to further knowledge and proficiency in nuclear technologies and apply isotopic techniques to mitigate deficiencies in public health programs. The IAEA is a resource for member states trying to implement Technical Cooperation Projects, to guide and equip them with the external funding and support they need to run a successful campaign. The IAEA does not commit to taking on financial responsibilities for projects firsthand but may allocate its own resources in some circumstances. Functions of the IAEA in relation to vector-borne disease and management coincide with these provisions. One of many areas of activity by the Technical Cooperation Programme prioritizes human health in policy and regional development. The IAEA maintains that collaboration and bidirectional exchanges with member states and relevant organizations is the best way for all to stay vigilant and access important information about vector control, especially considering the transnational nature of mobile vectors.

200 Ibid.
201 Ibid.
203 Ibid.
TOPIC B:
LEGAL AND REGULATORY FRAMEWORK FOR NUCLEAR ENERGY DEVELOPMENT
Introduction

By the year 2040, global estimates forecast that energy consumption will be 50% higher than the current consumption rate. The world’s energy needs increase every day, but flaws and liabilities related to old forms of energy production have made finding alternative sources of energy an imperative. Although many governments and the public are often skeptical about the potential of nuclear energy, it currently provides 10% of the world’s total electricity. It even is one of the primary economic industries for countries like Hungary and Slovakia. The IAEA should thus maintain a continuous and active role in regulating this technology as its use prevails.

Nuclear energy is one of the best options for providing clean, sustainable energy while meeting global market demand. As one of the lowest carbon-emitting energy sources, nuclear energy surpasses every traditional form of energy production. Today, an estimated 1.2 billion people have little to no access to electricity, severely restricting their opportunities for economic and social development. Without sufficient power, entire countries and individual citizens both suffer from reduced access to education, healthcare, and nutrition. Achieving many of the points in the IAEA’s mandate would make significant progress on the UN’s long-term sustainable development goals.

With the Treaty on the Non-Proliferation of Nuclear Weapons, the Convention on Early Notification of a Nuclear Accident, and their annual reports, the IAEA has made great strides to promote the peaceful use of nuclear technology. However, the IAEA still remains challenged when it makes an effort to add newer frameworks for nuclear energy development. While its safety standards serve as a guide for developing countries, many member states utilize their right to national sovereignty to maintain their own national standards—at times heightening international tensions, as has occurred with North Korea and Iran recently.

The majority of the agency’s resolutions remain nonbinding and, as a result, are inconsequential to a number of environmental groups and member states. Countries like Israel criticize the agency for being too lenient with volatile states. Others, like Pakistan, suggest that the IAEA is dominated by larger countries which limit economic and social development for least developed and developing countries. These issues concern the world’s limited access to nuclear energy and can be attributed to the legal framework of the IAEA’s policies on building new infrastructure. The current framework of the IAEA requires continuous updates to accommodate for changes in nuclear law, including provisions for standard and emergency procedures.

Yukiya Amano, the Director-General of the IAEA, addressed many challenges to the issue of verification and regulation at nuclear facilities worldwide in an open address in April 2019. His speech highlighted how nuclear technology today...
can be almost indistinguishable between a weapon and an energy source. Such a concern is especially significant when a member state resists pressure from the global community. According to Amano, there is a clear delineation of responsibility between member states and the IAEA, one in which the IAEA provides technical guidance to the policy decisions of Member states’ own governments. Without accountability, member states and the IAEA cannot have the mutual relationship necessary to further develop nuclear energy.

### History and Description of the Issue

The IAEA, established in 1957, was the first global institution focused on the safe uses of nuclear technology. The agency slowly developed a procured set of rules and guidelines to limit the threat of nuclear proliferation and promote the positive usage of this new technology. Similar to different bodies of the United Nations, the IAEA lacks enforcement power and participation is voluntary. While the Agency does have the power to set safety standards, conduct inspections, and define procedures, national sovereignty is a protected issue for member states.

### Nuclear Security Efforts

The IAEA has introduced a number of legal safety mechanisms to ensure that nuclear security is their primary priority as an organization. Since 2006, the Agency has continuously published its “Nuclear Security Series” which outlines objectives for the IAEA, recommendations for member states, and legal and technical guidance for implementing security measures. These technical guidelines form the basis of nuclear safety assessment across all departments of the IAEA. They also introduce the proper measures to take in case of an emergency. This framework is necessary for the development of nuclear technology, especially nuclear power plants which require additional regulations. Nuclear security for power development can be broken into five different aspects: personnel management of nuclear facilities, installation protocols for power plants, protection against radiation, radioactive waste management, and accident containment. The IAEA has protocols in place for each of these parts when the Agency oversees energy facilities being constructed and maintained.

In secure nuclear energy development, the first step is to assemble a personnel team which is responsible for running the plant and making independent decisions under IAEA regulation. In 2019, the Nuclear Energy Programme Implementing Organization (NEPIO) system was updated to improve the project hiring process. NEPIO also became responsible for coordinating efforts between member states’ respective national organizations. This management system was later followed by the Management System Network of Excellence, which takes care of communication issues by providing an online platform for member states to share data, diagnose problems, and log activities. These programs were newer initiatives by the IAEA to better screen scientists and upper management. They also restored greater power to member states’ own governments, diminishing the need for IAEA intervention beyond the introduction of the NEPIO system. Developing countries today have made use of the NEPIO system to build their own nuclear energy plants. In 2010, for example, Kenya’s Ministry of Energy developed a domestic atomic agency called the Nuclear Electricity Project Committee. The government later managed their nuclear aspirations using NEPIO which established specific facilities for nuclear energy. Other countries since then have followed in Kenya’s footsteps.

Historically, nuclear security has remained a national issue dic-
tated primarily by national policies, thus reserving the role of
the IAEA as an advisory entity. Part of that role is to outline
the process of constructing power plants. The process first
begins with siting, where officials analyze a country’s geog-
raphy for the ideal construction location. At the same time,
building designs are drawn up and approved for the commis-
sioning phase, where all of the plant’s functions are tested.
Throughout a plant’s life cycle, a variety of internal and ex-
ternal assessments are conducted by national workers and
the IAEA (if asked for by the host country’s officials). As a
backup plan, insurance pools and previously approved fund-
ing both finance the decommissioning of power plants. The
system uses a safety checkpoint approach whereby countries
are not allowed to further pursue new phases of development,
unless they successfully meet the standards for their current
stage of construction.

One of the most important standards for assessing nuclear sec-
urity in the modern world comes from the Nuclear Security
Summit (NSS), an international platform independent from
the IAEA which addresses similar concerns on nuclear se-
curity. Previous conventions and publications by the IAEA
were technical and largely based on supporting nuclear en-
ergy in developing countries. The NSS sought to bring the
conversation back to the broader international community.
Over the course of a six year period, a total of four summits

sheets/NuclearSecuritySummit.
were held to draft a series of five separate nuclear security plans to prevent nuclear terrorism and improve cooperation between nuclear states. These plans associated themselves directly with the United Nations, the IAEA, INTERPOL, and other third party organizations. Pragmatically, there was little difference in the goals of these plans from preexisting initiatives. Instead, these agreements reaffirmed, advocated, and supported current efforts being undertaken by the UN, the IAEA, INTERPOL, and others. For that reason, many argue that the summit was ineffective or unnecessary in advancing the nuclear security goals of the world. In total, fifty-three countries participated in efforts to voluntarily execute five actions plans. To be successful, the agreements made by NSS member states required the support of larger international organizations. Thus, these plans were specific to entities such as the IAEA, Interpol, and the UN as a whole. By signing onto the Nuclear Security Plan, states pledged “house gifts” which would provide resources for updating national laws, combating illegal nuclear trafficking, and training security personnel. Since the plan was established, it has been renewed every four years to accommodate required changes and keep track of the summit’s goals.

The summit addressed a number of safety concerns, but quickly gained a controversial legacy in the eyes of the media. Unlike prior conventions by the IAEA, the NSS was very political and considered to be exclusive. According to the Bulletin of the Atomic Scientists, “the states at the NSS controlled almost 98% of nuclear material in the world.” The journal also echoed concerns that discussions at the NSS were having the opposite effect at disarmament talks and that such exclusive conferences disrupted diplomatic relations. Such conferences, while a smaller size in nature, have deep consequences for the IAEA as well. When key members like the United States are a part of multiple nuclear associations, their actions in one group impact policy in another.

### Strengthening Legal Frameworks

When it first emerged, the promise of nuclear technology was very “paradoxical,” according to Mohamed ElBaradei, a law scholar who worked closely with the IAEA. While the benefits of nuclear technology became more known, concerns over its potential misuse rose directly as well. The public feared nuclear technology but wanted to welcome it at the same time. This was because the same materials and knowledge needed to build nuclear power plants could also create bombs. The IAEA addressed these concerns through drafting a solid legal foundation, which consisted of a mix between legally binding safety regulations and prescribed, or recommended, standards.

These legal frameworks primarily tackled issues of technical safety and IAEA-sanctioned operations. Article III of the IAEA’s Statute, for instance, legally holds all of the IAEA’s operations under its own statute as to prevent any workers
or affiliates from operating outside of the IAEA’s jurisdiction. To address concerns in energy plants, five primary topics were discussed: government regulation of nuclear power plants, safety in nuclear power plant siting, safety in the design of nuclear power plants, safety in nuclear power operation, and quality assurance for the safety of nuclear power plants. Each of these discussions established base-level standards for member states. These regulations were particularly significant for the IAEA, as they held binding power for the IAEA’s official functions.

The IAEA has introduced a number of standardized protocols for the proper use of nuclear energy, ranging from managing radioactive waste, to developing methods of transporting materials, to physically protecting nuclear sites. However, important parts of the IAEA’s legal framework have been recognized as limited in their applications. Only a small number of states decided to incorporate the IAEA policies into their respective national laws, whereas the majority of others felt that the new legal regulations infringed upon national sovereignty. Under Article III.A.6 of the IAEA Statute, states wishing to receive technical assistance from the IAEA must commit to a pledged agreement regarding nuclear safety standards and measures.

Other procedures only apply to a small selection of nuclear facilities, since the protection of the protocols cover only a limited number of nuclear installations. Unguarded radioactive material during the process of installation and transport is a major threat and the IAEA cannot regulate a significant number of nuclear material, despite their intention to standardize safety. While the IAEA was effective at introducing innovative new policies, they lacked the ability to manifest the policies into binding agreements as written.

In 2011, the IAEA published an updated guide to the international legal framework from which they operate, as part of their international law series. It reveals a series of binding and nonbinding measures for the IAEA to use when justifying its actions to pursue its statute’s goals. The four primary binding measures come from the influence of the IAEA, the UN, the International Maritime Organization (IMO), and Chapter VII of the UN Charter. In order to develop safe nuclear energy, the framework requires adherence to the Convention on the Physical Protection of Nuclear Material, the Convention on Early Notification of a Nuclear Accident, the International Convention for the Suppression of Acts of Nuclear Terrorism, and resolutions created under Chapter VII of the UN Charter. While each of these acts target various safety aspects of nuclear power development, they all center around the goal of standardization.

The Arms Control Association provides a significant example of the IAEA’s process of conducting itself. Both the IAEA and the UN Security Council (UNSC) work closely together when assessing “noncompliance” from member states. Within the first operative paragraph of resolution 1887, the UNSC addressed the issue in a summit about disarmament and nonproliferation and has worked more closely with the IAEA since then. The process begins with the IAEA Secretariat, who is responsible for assessing “technical and legal” noncompliance for agreements which individual states have made with the IAEA. The chain of command then follows from the Department of Safeguards to the Director-General, who may report to the UNSC in more severe cases.

To assess noncompliance, suspected states must show an intention to violate their agreement. Examples include prohibiting IAEA workers from conducting legal inspections, tampering with safeguard equipment, extensive delaying of safety protocols, denying to show proper documentation, and

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37 Ibid, 16.
38 Ibid, 16.
39 Ibid, 17.
40 El Baradei, 16.
41 El Baradei, 19.
44 Ibid.


43 Ibid.


45 Overly concealing the purpose of nuclear activity. Unfortunately, the IAEA has undergone scrutiny in the recent past from anti-nuclear groups for being reluctant to exercise the use of the word “noncompliance.” Because noncompliant behavior leads to a formal investigation, the IAEA utilizes the word conservatively. This action also protects the IAEA’s image, which is often portrayed as an overbearing legal authority, particularly by countries that are hoping to avoid investigations. However, inconsistently exercising their legal authority, the IAEA often undermines their power. For example, former Director-General Mohamed Baradei stressed the IAEA’s “zero tolerance” policy on noncompliance in an address given in November of 2002. Despite this statement, the IAEA administration failed to act against South Korea and Egypt when they refused to provide environmental samples and access to nuclear sites. Iran and North Korea have also been the subject of great controversy with their nuclear programs, requiring intervention from the international community repeatedly. All of these situations sewed doubt into public confidence within the IAEA emphasizing the need to strengthen their legal framework or be more liberal in their use of nuclear energy assessments.

Expanding Emergency Procedures

Since 1952, there have been over two dozen nuclear accidents worldwide, causing at least USD 100 million in damages or multiple fatalities. The two most infamous disasters occurred at Chernobyl in April of 1986 and Fukushima in March of 2011. Following the nuclear meltdown in Chernobyl, the UN General Assembly passed Resolution 45/190 at their general conference about improving the notification process of nuclear accidents. New precautions were introduced to improve transparency and communication between the IAEA and member states. They included a variety of strategies and guidelines meant to reduce the rate of nuclear accidents. A safety guide jointly sponsored with various national energy agencies was also published in 2015, highlighting requirements for nuclear energy plants to function and the necessary infrastructure. The shift represented a more proactive approach by the IAEA to combat the devastating effects of nuclear accidents.

However, critics have been skeptical about the effectiveness of newer techniques by the IAEA. They argue that developed countries such as the United States have continuously suffered dozens of serious nuclear accidents since the passing of new regulations, with the global community experiencing well over a hundred since 1952. These groups favor smaller scale alternative renewable energy sources, such as solar or wind power. Proponents of nuclear energy, on the other hand, argue that updating the framework allows countries to take advantage of updated nuclear technologies. An intergovernmental entity, known as the Nuclear Energy Agency (NEA), published a report in 2010 which supports this viewpoint. It showed significant decreases in the amount of worker exposure to radioactive components and the number of accidental power trips. While nuclear technology has vastly improved in the past decades, new disasters regularly undermined efforts to make them more available.

The IAEA and other nuclear agencies must assess disputes regarding the tradeoffs of nuclear power when pursuing newer...
regulations for the international community and for different countries’ infrastructures. Part of the publicly mixed response lies in the fact that serious nuclear accidents are primarily accounted for when determining risk. These vary significantly between countries and the IAEA provides a broad definition of it as well. Serious nuclear accidents are defined as “an event that has led to significant consequences to people, the environment or the facility.”

A key aspect of the IAEA’s emergency response plan was the addition of “international operational arrangements.” Some of their strategies dealt with situational circumstances prior to and after a nuclear accident. These arrangements acted as practical methods for the IAEA to ensure that its emergency protocols could be executed. They consisted of the Operations Manual on Emergency Communication, the Response and Assistance Network, and the Radiation Emergency Management Plan. These responses depended on the compliance and assistance of member states to act in case of an emergency. Countries could donate or register resources to the IAEA on a voluntary basis, like many of the IAEA’s operations.

The IAEA developed insurance programs and pools meant to reduce disaster costs in response to concerns by the public,

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57 Ibid.
following the Three Mile Island partial meltdown in the United States.\(^6\) National authorities across the world realized that they would require a strict liability agreement to protect the public from subsequent financial losses in case of a nuclear accident.\(^7\) Chernobyl cost approximately USD 235 billion and Fukushima cost USD 180 billion, with costs increasing as time passed by.\(^8\) The initial cost of containing the Fukushima disaster alone passed the nominal GDP of 132 countries.\(^9\) Lawmakers decided that operators of nuclear power plants would pay for damages, irrespective of the cause. With the introduction of private insurance companies, the burden of cost was made easier on operators too, who now relied on the nuclear insurance pools. These large organizations became necessary for nuclear insurance and security because they provided ways to unify different individual policies and assess risk. Today, the IAEA uses these pools during nuclear installations and safety assessments.\(^10\)

### Developing Power Plants

Nuclear historian Richard Rhodes argued that nuclear energy must be a part of the energy solution to global climate change.\(^11\) However, the world has been slow to develop nuclear energy and to reduce global climate change. Although the IAEA existed for more than 60 years, only 10% of the world’s total energy comes from nuclear sources including approximately 63,000 power plants across the world, most of which are located in the United States, Western Europe, or Southeast Asia.\(^12\) There are a number of factors which contribute to the slowed development of nuclear energy worldwide, including high costs to building nuclear power plants, the time required to develop effective legal frameworks, the long-term commitment required, establishing a safe, sustainable, and non-proliferation culture, small infrastructure sizes, and lack of human resources.\(^13\)

While many IAEA members view the spread of nuclear energy in a positive light, government officials or large sectors of the civilian population in some countries strongly oppose the development of nuclear technologies. This trend, commonly known as nuclear phase-out, is a part of the anti-nuclear movement which was by sparked fear of nuclear disasters and the financial burden imposed by them.\(^14\) Germany, Austria, Greece, Australia, and New Zealand are some countries who have stated that they intend to phase out nuclear energy. Many more have political parties and strong oppositions opposed to further nuclear development.\(^15\) For example, public opinion in Germany remains largely opposed to the prospect of nuclear power, resulting in the shutdown of eight plants earlier this year.\(^16\) The German legislature passed a law in 2011 that planned for the shutdown of all nuclear power plants by 2022.\(^17\) These challenges are especially difficult to overcome because the countries opposed to nuclear power are the ones capable of providing it to others, either because they possess the knowledge, finances, or infrastructure.

Despite these recent movements, the IAEA has released a number of guidebooks, checklists, and requirements outlining...
Ongoing the process of developing a nuclear power plant from start to finish. Countries in the Middle East and Europe have expressed a great deal of interest in starting their own programs. For instance, members of the Gulf Cooperation Council, France, and Iran signed a deal in 2006 to develop two large plants in Saudi Arabia which could provide 15% of the electricity in the region. Those plants would have the added benefit of providing desalination treatment to further water security in the region. The IAEA conducted a Nuclear Infrastructure Review (NIR) in January of 2019, which decided that Saudi Arabia met the requirements to build a legal framework and the physical infrastructure for its nuclear projects. This case is only one of a few examples where the IAEA conducted a successful project with member states.

**Economics of Nuclear Power**

Despite all of its benefits, nuclear energy has remained one of the most costly forms of electricity on the global market. Lewis Strauss, a former chairman of the Atomic Energy Commission, predicted that nuclear energy would overtake the world’s entire energy needs in 1954. Thirty years later, Forbes magazine held a less optimistic view, labelling the nuclear energy market “the largest managerial disaster in business history.” This obstacle to obtaining nuclear energy is largely contained within the capital costs, the initial barrier to opening a nuclear power plant. These capital costs make up an average of 74% of total energy costs, which is lower than other forms of renewable energy, but still higher than coal at 63% and natural gas at 22%. These data indicate that entering the market for nuclear energy is a riskier and less profitable option for many countries, especially developing states, which may consider building their first nuclear plant. Globally, the US and the EU have similar capital costs for construction; these are still higher than China, South Korea, and India who have further developed their own nuclear capabilities.

Typically, these expenses can be attributed to the lack of infrastructure present in many developing states. In addition to the materials needed to build the facility, construction equipment, skilled labor, and valuable metals all add to the price tag. Uranium, the main fuel source in a nuclear energy facility, accounts for roughly 28% of the operating costs. Another 14% is added for enriching and fabricating the uranium, which is essential for power plants. Because of its essentiality in nuclear power, uranium rich countries such as Australia, Kazakhstan, Russia, Canada, and Niger have great stakes in the global nuclear trade.

Even with the financial barrier of capital costs, countries can...
Still pursue nuclear energy as an economically viable option because of the low operating costs of nuclear power plants.\textsuperscript{82} A minor subset of the total generating costs comes from the price of fuel, which is normally stable on the global market.\textsuperscript{83} Additionally, the costs of decommissioning and waste disposal is factored into the final price tag.\textsuperscript{84} These two processes also account for any safety issues which may arise, in case a nuclear facility must be shut down or its material discarded. With improvements in efficiency undergoing over past years, the industry has also experienced competitive pricing, which further incentivizes governments to consume nuclear energy. This form of pricing is particularly important because the costs of developing nuclear power is typically generated by the operators of power plants.\textsuperscript{85} Traditionally, federal governments have partnered with private companies and owners to subsidize the development of nuclear energy as well, thereby reducing the cost on a single party.\textsuperscript{86} The IAEA assists with this process by providing economic advice on pricing adjustments, financial management, and cost evaluation.\textsuperscript{87} These financing tools are the most commonly used economic support systems for countries building new nuclear energy facilities.

Investment in nuclear power offers long term stability for both investors and consumers of that energy.\textsuperscript{88} This stability offers great appeal to investors when financing projects in developed countries, which already operate nuclear facilities. However, this confidence does not normally travel over to projects in countries without an already established infrastructure presenting a challenge for many developing states.\textsuperscript{89} The global nuclear energy market is dependent upon short-term price signals, which change depending on the political climate of a country, natural or manmade disasters, market psychology, project length, and many other factors.\textsuperscript{90}

**Current Status**

One of the driving forces behind many developing countries’ recent acquisition and exploration of nuclear energy is the political, economic, and educational influence of developed states. This influence arises from recent financial investment by larger countries, who have been constructing nuclear projects in smaller ones. The nuclear energy export race, as it is currently labeled, was coined to address this rapid increase in nuclear tech exports on a global scale.\textsuperscript{91} Within these past decades, the governments and firms from Russia and China in particular have significantly increased the construction of nuclear reactors overseas as an exercise of power and foreign influence.\textsuperscript{92} Concerned, the United States has responded with the intention to ramp up their own efforts abroad.\textsuperscript{93} According to Ed McGinnis, the US National Deputy Assistant Secretary for Nuclear Energy, maintaining an edge over nuclear technology is of vital importance to states like the United States.\textsuperscript{94} This attitude has further fueled larger states to utilize soft power in their diplomacy. Countries exporting nuclear technology argue that exporting nuclear technology is a way to further relations with their allies.\textsuperscript{95} They also state that transnational nuclear trading provides smaller countries an option for developing their own national programs utilizing state of the art technology.\textsuperscript{96} Developed countries offer regular discounts and loans at reduced rates for allied states as incentive for earlier investment in nuclear energy.
Challenges to Developing New Frameworks

The IAEA is responsible for guiding its member states in matters regarding nuclear energy by consolidating and proliferating the relevant information. It also plays a significant role in the establishment of universal legal frameworks that govern the use of nuclear energy. The IAEA struggles to establish more involved forms of regulation due to its perceived inefficiency. This perception stems from a variety of factors; for one, the organization has acquired a history of mismanagement in the public eye. In the early 1990s, when the world believed that Iraq was pursuing a nuclear weapons program, the IAEA was faulted by some for having insufficient safeguards. At the time, the agency only inspected nuclear sites which were declared by the member states, assuming that states would not hide any of their facilities by not declaring them. This system failed and the agency then strengthened its regulations and analytics in order to detect any false declarations by the member states. These guidelines dictate many inspections today but have yielded many other concerns about the extent of the IAEA’s oversight power.

To combat the concerns about their new inspection process, the IAEA has introduced updated regulatory frameworks to provide support for national inspection agencies to execute these inspections on their own. The “Handbook for Regulatory Inspectors of Nuclear Power Plants” provides guidance to newer inspectors. Published annually, these handbooks also outline protocols for weather-related hazards, fire accidents, and long-term correction for minor damages. New inspectors are also put through two-year training programs and are paired with veteran workers in order to best prepare them for their jobs. The benefit of this newer approach is that it slowly introduces the proper legal framework for energy development to developing countries in a manner their government is comfortable with. This approach hopes to reaffirm the IAEA’s commitment to pursuing its energy goals while allowing member states to lead their own energy projects. This rulebook has already assisted a number of nuclear and non-nuclear countries in energy. In May of 2016, the IAEA used these guidelines to conduct pre-service and in-service inspections with the Pakistan Atomic Energy Commission for two power plants in development. In October of 2018, the Spanish Radioactive Waste Management Agency (ENRESA) and a number of IAEA-affiliated organizations made recommendations to the Spanish government to update their radioactive waste system and to address delays in storage facilities; these recommendations eventually led to the decommissioning of two plants.

Another example of conflict over the IAEA’s powers lies in the aftermath of the nuclear disaster at the Fukushima-Daiichi power station in Japan. While the event occurred in March of 2011, it has continued to impact the discussion around international and national legislation to this day. Countries like Switzerland, Germany, Austria, Canada, and Singapore emphasize the importance of binding resolutions which would ensure that IAEA safety regulations supersede national laws. However, the United States, China, and India have developed a reputation of ignoring recommendations from multilateral organizations like the IAEA. This perceived imbalance has promoted the idea that their heavy influence in the IAEA sometimes allows them to set regulations more akin to their...
own national policies and interests. In 2016, U.S. Ambassador Glyn T. Davies said that “member states and the agency [the IAEA] should utilize existing instruments and programs to undertake their actions” when the Agency tried to introduce new binding measures for nuclear security.108

The IAEA’s Nuclear Security Program offers insight into many of the issues surrounding the IAEA. The program provides security measures for developing power plants such as reducing the number of “high-risk materials” (e.g., enriched uranium), preventing radiological terrorism, and providing human resources.109 While these rights and responsibilities are respected by many member states, the IAEA often encounters challenges to its authority when it wishes to verify security threats.110 In April of 2019, IAEA Director-General Yukiya Amano stated that modern day nuclear technology still possessed the ability to manufacture weapons and that the increase in nuclear material continued to pressure the IAEA’s financial budget.111 For some states, the IAEA lacks authority on the international stage. For these reasons, the agency is often relegated as an advisory entity as opposed to an organization with enforcement power.112 Developing the appropriate legal framework requires the international community to reaffirm its commitment to the IAEA as a legitimate regulator of nuclear material worldwide.

Modifying the Legal Framework

To strengthen the legal frameworks and policies regarding nuclear energy, the IAEA and the international community must first determine that a member state can respect the commitments they make to the organization.113 Keeping their promises to the IAEA is especially important, because it grants the necessary legal authority to the IAEA. In 2013, the Agency published a document highlighting the legal framework it would use to enter different states into agreement regarding its safety procedures.114 This framework would allow the IAEA to guide discussions over international inspections and power plant development. In it, the IAEA recognizes that while the Agency is not a state under international law, it is entitled to some of the privileges and powers associated with statehood, specifically in reference to treaty moderation.115 Most member states decided that agreements regarding nuclear energy would begin with a request by concerned member states. After a series of internal processes, the IAEA would then use the approval of the State and their national laws to finalize any agreement made between the IAEA and relevant states.116

Even with its own facilities and framework, the agency relies upon the respective energy agencies of its members. Member states have the ability to make changes in national policies in order to improve the framework of their energy associations and subsequently, the IAEA. Currently, the IAEA is hosted by at least 15 separate agencies from Hungary, Mexico, Indonesia, Malaysia, Brazil, India, and many more States.117 Thus, national policy and willingness to engage strongly shapes the more general guidelines on nuclear energy of the IAEA.118 Member states can prioritize more renewable sources of energy and encourage investment in their industries. States like Equatorial Guinea, Iran, and Cuba tend to prioritize national interests and seclude themselves from outside influence as a result, which reduces transparency and faith in the Agency. Even democratic countries outright refuse to adopt interna-

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107 “IAEA members approve controversial nuclear security plan,” The Hindu.
108 Ibid.
109 Boureston, 6.
110 Ibid.
112 Ibid.
115 Ibid.
116 Ibid.
118 Ibid.
tional safety standards due to heavy influence or misinformation. In discussing the general process with which the IAEA currently conducts its investigations and proceedings today, it is important to see that the agency has strived to balance itself being a legal authority which also respects national sovereignty. This is also a cause to one of the greatest challenges to nuclear energy development. When a country has an established relationship with the IAEA and routinely checks in with the international community, there is less cause to distrust their regime. However, the IAEA’s goal of spreading nuclear technology for peace cannot occur without introducing it to developing countries, most of which do not currently possess the resources and infrastructure for nuclear energy and are the same states which challenge the IAEA’s mandate.

The recent agreement between Iran, the five permanent security council members, and Germany offers a good example of why the legal framework of the IAEA needs improvement. When approved in 2015, the deal showed promise that the IAEA and its key member states could compromise with developing countries like Iran. The agreement meant to facilitate nuclear capabilities for Iran and prevent them from acquiring weapons. For many, it is considered a success. However, the politicization of the deal in Iran and the United States led to the US’s unilateral withdrawal from the agreement, restoring their economic sanctions against the country. The other participants in the deal have not followed suit. From these events, one can see that the IAEA’s legal framework and process of formulating agreements is still subjected to the will of its member states’ political divisions.

Israel and Pakistan have also provided challenges to IAEA regulations in pursuit of nationwide interests. The international community generally believes that Israel is in possession of nuclear warheads. Surrounding countries, who are often opposed to Israeli policies, stress that Israel is thus creating instability within the Middle East. However, because the state has never signed the non-proliferation treaty, they are not subject to sanctions or inspections imposed by the IAEA. Some member states support Pakistan’s assertion that the IAEA has repeatedly kept nuclear knowledge and research from spreading to developing countries, limiting social and economic growth. During times of increased tension, these underlying concerns create friction between the IAEA and key member states. This topic thus reveals that the IAEA must revisit how it balances voluntary contributions with enforceable regulation and how the agency recognizes its own power to spread nuclear energy to the international community.

Sustainable Development Goals

This issue deals with a number of the United Nations Sustainable Development Goals. Through the regulation of nuclear infrastructure, the IAEA has its hands in conflict, peace, energy, sustainability, and development. Due to this widespread applicability, it is crucial that the IAEA adhere to the sustainable development goals and work with the international community to create a more sustainable future. If gone unaddressed by the IAEA, the future of the world and its environment, people, and development could be years behind the SDGs.

To support SDG 7: Affordable and Clean Energy, the IAEA can provide clean, renewable energy to its member states by building and updating the current framework which the IAEA uses to develop nuclear power plants. In writing this legislation and constructing these plants, the IAEA would also...
accomplish SDG 9: Industry, Innovation, and Infrastructure. Possessing nuclear energy would establish an updated infrastructure for participating states and pave the way for countries to build their own projects, further industrializing developing states.130

SDG 11: Sustainable Cities and Communities, would also be addressed because nuclear energy is one of the safest and most sustainable forms of energy available to us today. Additionally, safety is one of the main priorities for the United Nations as a whole. Finally, SDG 13: Climate Action, naturally falls in the purview of this topic, as nuclear power plants produce energy with almost zero carbon emissions.131

**Bloc Analysis**

**States with Strong Nuclear Capabilities**

A small number of countries within the IAEA are considered to be “nuclear powerhouses” for their possession of nuclear weapons, power plants, research facilities, and more. Most notably, they include the United States, the Russian Federation, the United Kingdom, China, France, Pakistan, and India.132 These countries are primarily known for their possession of numerous nuclear weapons in addition to other nuclear technologies. Lesser known states include Slovakia, Ukraine, and Hungary who are famous because most of their power comes from nuclear energy sources.133 In terms of power output, Japan, South Korea, and Canada are also industry leaders, housing no fewer than twenty functioning plants each.134

On the world stage and in the IAEA, these countries lead much of the discussions about nuclear technology. They are the best equipped to provide knowledge and equipment to developing countries and other states looking to adopt nuclear power. Their commonality comes from their possession of nuclear technology and economic potential. Such states have the proper infrastructure for housing nuclear technology and strong legislative bodies to effectively enforce regulations. Most of these states are democratic and nationally stable.

A number of conditions and factors lead to these particular states dominating the nuclear industry. The U.S., Russia, the U.K. and France are pioneers in the technology because of experimentation during World War II and subsequent conflicts.135 The threat of war and availability of financial resources forced their respective armies to invest in this technology for power, research, and even weaponry.136 Pakistan and India’s acquisition of nuclear technology also emerged from the threat of war. The rest of these states, however, gained their capabilities from independent research and individual arrangements with the United States, Russia, China and others. Russia itself exports billions of dollars of energy and equipment to its closest allies and neighboring states.137 China and the U.S. have entered their own nuclear energy export race utilizing private industry alongside public policy to spread nuclear tech.138 These conditions have contributed to the current stage of nuclear politics.

**States Opposed to Nuclear Power Development**

Following the nuclear meltdowns and disasters in Chernobyl and Fukushima, international opinions over the future of nuclear energy varied greatly. In the United States alone, the Bul-
letin of the Atomic Scientists reports that a Gallup poll conducted in 2016 revealed that 44% of Americans were in favor of nuclear energy while 54% were against it. It also indicated that the public was largely uninformed about the challenges and dangers surrounding nuclear energy development. Worldwide, a number of states began introducing legislation banning or severely limiting nuclear energy usage. These states passed such rules over concerns from their constituents and reliance upon alternative sources of nuclear energy. Many of these States opted out of nuclear energy in order for the IAEA to regulate the industry instead.

There are a number of reasons that these states have chosen a nuclear-free energy policy. Many European states have chosen to pursue wind and hydropower due to its reduced cost and availability in the region. Smaller states in this bloc especially do not require nuclear energy for populations of their size. While the United States does not fall into this category, there are many political factions and environmentalists, such as Friends of the Earth International, which exists in 77 countries worldwide, opposed to nuclear energy on the grounds of health risks, national security, and high cost levels. Denmark, for example, was once a front runner in researching nuclear technology and developed plans to build power plants within the country. In 1985, however, the Danish Parliament banned the technology nationwide, opting to use energy from neighboring countries instead. Italy is another state who has followed Denmark's path, similarly opting to import its energy as well. Variations in the rural and urban population also cause nuclear energy to be inefficient for certain sectors of these countries.

In Southeast Asia, Taiwan, South Korea, and the Philippines have all expressed caution about nuclear energy and have made efforts to curb its spread. While the South Korean government did complete its most recent nuclear reactor, President Moon Jae-in stated that his new energy policy would phase out nuclear energy and that operation would not pass four decades. The Filipino government has turned to wind power, hydropower, and natural gas reserves to address power accessibility within the country. Taiwanese officials remained divided on the issue of having nuclear energy until recently. Anti-nuclear groups have gained momentum in the State instead, despite increased nuclear activity. Other states in this category include Australia, Cambodia, Greece, New Zealand, and Peru.

**States with Developing Infrastructure or Unstable Regimes**

Countries with developing infrastructure are relevant to the conversation of nuclear technology because they possess the potential to become nuclear states themselves and can work with the IAEA to further spread their nuclear abilities. Many of these states have pledged a greater amount of resources to the IAEA and have allowed the outside investment from

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139 Bisconti, *Bulletin of the Atomic Scientists*.
141 Ibid.
142 Ibid.
149 Ibid.
150 “Emerging Nuclear Energy Countries,” *World Nuclear Association*. 
private and public organizations.\textsuperscript{151} Saudi Arabia, for example, is a part of the Gulf Cooperation Council, a body of six Middle Eastern states with economic and political ties. As the main consumer and producer of energy in the Gulf region, the country's plan to develop regional desalination and power plants boasts greater economic stability for the area.\textsuperscript{152} States following Saudi Arabia's path include Belarus, Turkey, and Sri Lanka, all of whom have made deals with Russia to build their new plants.\textsuperscript{153}

Countries like Indonesia, Chile, Ghana, and Bangladesh also fall into this bloc because they have expressed interest in nuclear technology and hope to develop plans to implement the technology within the next ten years. Unfortunately, there are a number of conflicts that arise when these states want to build nuclear energy plants. For example, Chile's government has not come to a conclusive decision on the prospect for nuclear energy because their geography poses a significant challenge to any project.\textsuperscript{154} Indonesia and Ghana follow similar pathways. Other states have not adopted the regulatory framework for nuclear development introduced by the IAEA under claims that such legislation infringes upon their national interests. They have unstable regimes which decrease international confidence in their ability to manage nuclear tech. The most

\textsuperscript{153} Tom DiChristopher, “The US is losing the nuclear energy export race to China and Russia”
famous examples are North Korea and Iran, both of which are currently under investigation by the IAEA after reports of misuse and weapons development. In this bloc, all states are opening some of their first national nuclear plants or are introducing plans to develop them in the coming decade.

The nature of the economies and infrastructures of these states will likely lead to economic alliances with the ‘nuclear powerhouses’ of the international community. As mentioned before, these agreements are already well underway between the private and public sectors of States from both blocs. China, Russia, and the United States are the largest contributors of nuclear technology to developing countries. Because these agreements are typically formed independently from the IAEA, the agency has less influence in them. States in these blocs may also want to use the IAEA as a platform to ally themselves with more developed countries without fear of exploitation.

Committee Mission

The IAEA is responsible for maintaining nuclear security and peace around the world. With the support of its member states, the agency can provide counseling resources to developing countries, inspect nuclear sites for their safety standards, and develop legal frameworks for the creation of nuclear technology. In its mandate, the IAEA further hopes to fulfill some of the United Nation’s longer term sustainable development goals, which cover a wide array of international issues including the expansion of safety protocols, the general regulation of nuclear facilities, providing smaller countries with clean, modern energy, promoting the building of infrastructure, and improving the quality of life for millions of people. Without an updated legal framework, nuclear energy development may likely fall short in fulfilling these goals. While the scientific community continuously promotes safe nuclear energy, public skeptics simultaneously suppress their efforts, highlighting how the world is still unprepared for it. Presently, there are high levels of inequality in energy and knowledge between the nuclear States and the developing world. This committee should thus strengthen its regulatory framework to introduce binding and nonbinding measures for the benefit of its member states. With policy ideas across the spectrum, delegates should remember that a comprehensive solution to creating safe, nuclear energy requires compromise.

156 Aris, The Moscow Times.
Research and Preparation Questions

Your dais has prepared the following research and preparation questions as a means of providing guidance for your research process. Delegates are NOT obligated to formally answer these questions either in committee or in position papers. Rather, these questions should be carefully considered, as they embody some of the main critical thought and learning objectives surrounding your topic.

**Topic A**

1. To what extent has your country adhered to IAEA guidelines and safeguards? Has it deviated from the objectives promoted by the IAEA in the past? How IAEA member states enforced safety and peaceful nuclear guidelines at the national and international levels?

2. Does your country utilize nuclear technology? If it does support the use of this technology, how has your country balanced its advancement with the safety of the general population?

3. What main purpose has nuclear energy development in your country served? Has your country pursued it peacefully or has it pursued it in the context of international conflict and defense? How has its advancement of nuclear energy technology differed from that of other countries?

4. What are your country’s safety standards and procedures to prevent and response to a nuclear accident? How has your country prioritized the safety of communities surrounding locations of power plants and nuclear energy development? How has it participated in an international response to the risks and dangers of nuclear energy?

5. How much of a role has your country played in international collaboration on nuclear energy development? What kinds of countries has your country collaborated with? Has your country worked with developed countries to develop nuclear technology and policy?

**Topic B**

1. What research has your country been conducting on vector-borne diseases? What kind of education about the behavioral changes needed to combat vector-borne diseases? How can this education be improved?

2. How can states support reporting systems to capture the actual burden of the diseases?

3. What kind of systems does your country have to provide training in the vector-borne nuclear energy field or research?

4. How do vector-borne diseases affect your country? For example, is your country affected by these diseases because of migration, tourism, or procreation? What is being done to stop this spread from other countries on your country? How is your country trying to combat the way that this disease spread within their borders?

5. What protocols or precautions can IAEA Member State implemented within IAEA safety guidelines to stop the spread of vector-borne diseases? Should different guidelines be adopted for different geographic regions or different kinds of contagion? If so, what guidelines would you suggest?
Important Documents

Topic A


This article analyzes the effectiveness and applicability of the SIT for large-scale use on mosquitoes. Points of concern as for efficacy and sustainability include costs and biological limitations of using mosquitoes that dictate which situations the SIT is appropriate for.


This book covers the principles and technicalities that guide application of the SIT strategy to global health. It explains how the SIT works, the processes involved in its implementation, and considerations for further developing the technique. Case studies of past SIT programs and economic implications are referenced as support for the feasibility of continued use of integrative vector management in the future.


This workshop summary documents statements about the detriments of vector-borne disease outbreaks on human health, wildlife and livestock, agricultural productivity. Sections to take note of in this page regard trends and drivers of disease, and public health response efforts to deter vector transmission.


This report indicates changes to be made to urban infrastructure to more sustainably combat vector-borne disease. The proposed intervention takes a scrupulous eye to the housing sector to improve building design and practices that aid vector proliferation.


This article reviews the impacts of environmental and societal change on vector-borne diseases. The direct and indirect effects of increased global interconnectedness, through urbanization, trade, travel, and other forms of cross-contact which contribute to climate change and resource depletion, have created conditions that subject the international community to greater risk for disease transmission.


This report details the burden of disease and mode of transmission for the major vector-borne diseases affecting the global community. Prevention and control methods, as well as challenges to vector control approaches are also covered.

This article offers insight into the merits of using drones to distribute mosquitoes for the SIT. WeRobotics and the IAEA have already found success in preliminary testing in Brazil, and plan to hold more trials with added technological upgrades.

**Topic B**


This article shows the rationale behind the emerging antinuclear movement across the world. It argues against the promotion of nuclear weapons and material by citing the recent rise in tensions within recent years. The source is different from many of the pro-nuclear energy sources that are traditionally cited.


This document provides a detailed account of all of the important considerations and requirements which are involved in the production of nuclear energy projects. The source can be thought of as a guide for developing countries as they consider developing nuclear energy.


The Nuclear Security Summit is at the center of nuclear security and safety talks although it is run independent of the IAEA’s own programming. However, the states involved yield a lot of nuclear power capabilities and are essential to be included in your research. The page also shows which countries signed onto the agreement and gives an appropriate picture of the blocs formed regarding this topic.


As a former director-general for the IAEA, Mr. ElBaradei has published a lot of information about nuclear power and international law; the focus of this topic. In this older piece, he summarizes the various aspects of nuclear law which the IAEA has considered. Many of these principles are relevant today when examining nuclear energy policy.


This report provides a detailed account about the legal authority under which the IAEA operates. It includes provisions from the IAEA’s statute, the IMO, the Security Council, and the UN Charter. Additionally, it highlights both the legally binding and non-legally binding measures for the IAEA which is important for determining the extent of the IAEA’s powers.


This source is particular to the topic of nuclear insurance pools which dictate a number of decisions in the development of nuclear technology. This shorter piece highlights some key aspects of nuclear insurance pools (how they are used, what their purpose is, etc.).


Different countries have different reasons for adopting nuclear energy or refraining from it. This piece from U. Penn provides a variety of reasons and
incentives for countries to adopt nuclear energy. It is a good place to start if you are not sure about why your country takes a certain stance.


This report is an annual publication which highlights the status of nuclear power on the world stage today. There is a lot of numerical data and dozens of graphs which divide the world based on their nuclear capacity. This source is more technical and provides a good understanding of where the world lies in fulfilling the IAEA’s goals.
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“IAEA Offices and Contact Information.” IAEA. https://www.iaea.org/contact. Locations of the IAEA offices.


An overview of the treaties that the IAEA works with member states to manage.


Text of the statute establishing the IAEA.


An overview of the treaties that the IAEA helps enforce

**Topic A**

**UN Sources**


This article announces the start of a new research project by the FAO/IAEA for developing genetic sexing strains to increase the versatility of the SIT.


This article presents the development of mosquito sexing systems to be tested for large-scale use.


This article gives a basic outline of how the SIT works and is being used in its pilot stages.


This book covers the principles and technicalities that guide application of the SIT strategy to global health.


This page outlines the duties and points of investigation of the IPCL.


This feature on the SIT reviews weaknesses and areas for growth.

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Jiang, FeiFei. “Scientists Take Aim at Sixteen Seconds of Mating.” IAEA Division of Public Information. 11 August 2008. www.iaea.org/newscenter/news/no-love-deadly-mosquitoes. This article explains how manipulating male mosquitoes can influence breeding with the disease-passing females to subsequently curb population growth.

“Coordinated Research Projects.” Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture. www-naweb.iaea.org/nafa/ipc/crp/coordinated-research-ipc.html. This page describes what the CRPs are and how they work.

“Dengue and severe dengue.” 15 April 2019. WHO. www.who.int/en/news-room/fact-sheets/detail/dengue-and-severe-dengue. This fact sheet summarizes the regions where dengue is found, how it spreads and suggestions for its containment, followed by the WHO’s response.
This CRP worked to develop mechanisms to isolate mosquitoes by sex to improve productivity of the SIT.

A summary of the strategies to limit the spread of disease vectors, which is essential to combat diseases like malaria.

This article covers the use of drones as a prospective mechanism for efficient mass-deployment of sterile mosquitoes.

This article reports on the use of RT-PCR to detect and differentiate viruses.

This report indicates changes to be made to housing and urban infrastructure to more sustainably combat vector-borne disease.

This page goes into more depth the component roadblocks preventing SDG 11 from being achieved, especially infrastructural incompetence caused by rapid urbanization.

This WHO brief gives a thorough overview of the Zika outbreak in Brazil, from introduction and detection to impact and consequences.

This outlines the key IAEA documents that inform the organization’s activities.

These slides review the IPCL’s research into insect development and mating, as well as effects of sterilization, with the aim of applying this information to the SIT.

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Viegas, Luciana. “IAEA Helps Brazil Step up the Fight Against ‘Zika’ Mosquitoes.” IAEA Office of Public Information and Communication. 23 February 2016. www.iaea.org/newscenter/news/iaea-helps-brazil-step-up-the-fight-against-zika-mosquitoes. This article makes an example of Brazil’s Zika outbreak to show the ways that the IAEA can support states that are not properly equipped to handle problems of vector control.


Non-UN Sources


This thesis explains that while SIT would complement the efficacy of integrated control strategies, it was more feasible for the strategy adopted in Ghana to consist mainly of insecticide treatment.


This article analyzes the effectiveness and applicability of the SIT for large-scale use on mosquitoes.


An analysis of community-based adaptation to vector-borne diseases.


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An analysis of U.S. involvement in Latin American healthcare.


This article looks at the SIT as a safe and sustainable vector control strategy compared to popular insecticide alternatives.


An analysis of Zika in Brazil.

An explanation of flaviviruses.


This bulletin goes over concerns regarding combative efforts against the Zika virus in Brazil, and the risks and successes surrounding the targeting of vectors with sterile mosquitoes.


An explanation of parasites and vectors as they relate to public health.


An analysis of the abilities to engineer mosquito-borne diseases.


This article delves into factors that have accommodated disease emergence, such as increases in resistant vectors, public policy, and demographic changes.


This study highlights the need for global funding to help low-income countries fight vector-borne diseases like malaria.


An analysis of the use of drones to combat Zika.


An analysis of the role of the IAEA in combating Ebola.
This workshop summary documents statements about the detriments of vector-borne disease outbreaks on human health, wildlife and livestock, agricultural productivity.

This report explores the impacts of disease and suggests potential solutions.

An analysis of resilience, adaptive capacity, and vulnerability in the context of disease.

A comprehensive guide to disease ecology.

This article examines the relationship between urban poverty and the spread of vectors and disease.

This article attributes Venezuela’s increasing risk of disease transmission to inadequate public health policy.

An analysis of the Zika virus in Brazil.

This article focuses on disease in relation to the numbers and nature of pathogens and their hosts.

This piece exemplifies the Western stance on developing new and current control methods.

*A brief descriptive article about mosquitoes, their lifecycle, and their role in spreading disease.*


*A description of the role of mosquitoes in malaria and agriculture.*


*This article explains the properties that make mosquitoes so dangerous as vectors of disease.*


*A news article detailing the end of Zika in Brazil.*


*This article suggests genetic modification to delay mortality can improve SIT.*

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*An analysis of the use of drones for controlling diseases.*

An article detailing the importance of vector-borne diseases.


This article defines and discusses vectors as pathogen hosts.


An analysis of the use of drones to combat mosquito-borne disease.

**Topic B**

**UN-Sources**


Provides a comprehensive overview of IAEA collaborating centers.


Describes both the benefits and the challenges of the IAEA as an organization.


Describes the concept of nuclear verification and the issues it creates for states.


A guide on how nuclear power projects are built and maintained.

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A description of IAEA’s funding sources.

“History.” IAEA Publications, last accessed July 2, 2019. www.iaea.org/about/overview/history
A brief overview of IAEA’s history.

An article detailing Spain’s role in nuclear control, including its struggles with radioactive waste management.

A guide to IAEA’s emergency response procedures as they have developed over time.

The official IAEA handbook for inspectors in nuclear power plants.

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An article describing IAEA’s relationship with Pakistan in terms of nuclear inspections.

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A description of the International Nuclear and Radiological Event Scale.


The official guiding document of the IAEA.


A guide to the Sustainable Development Goals as they pertain to the IAEA.


A summary of Sustainable Development Goal 9.


A summary of Sustainable Development Goal 13.


A database showing the economic outlook of individual states.

Non-UN Sources


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A description of nuclear safeguards and the role of inspectors in nuclear facilities.


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A comprehensive guide to emerging nuclear energy countries and their role in the development of international nuclear power.


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Details the role of the IAEA in nuclear power control.


Details the major nuclear powers in the world.


A news article detailing the cost of cleaning up the Japanese Fukushima plant explosion.


Describes Korea’s nuclear powers in detail.


An analysis of the argument to use nuclear weapons in military situations.

A broad overview of the stock market and the many factors that affect it, including nuclear power.


A critical analysis of the Nuclear Security Summit and its effects on the nuclear security community a year later.


An explanation of the Iran deal and its benefits to the world.


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Describes nuclear energy in Denmark.


Describes nuclear energy in Germany.


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A visual guide to the locations of power plants around the world.

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A history of nuclear incidents in the past 100 years.


A critical analysis of nuclear power and its use in conjunction with nuclear power, specifically in Asia.


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Written by Talha Iqbal and Lucy Kim
Edited by Michael Beeli, Alex Burr, Annica Denktas, Walker Heintz, and Althea Turley
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