SRMUN Charlotte 2018
Global Interdependence and the Changing Role of the United Nations
April 12-14, 2018
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Esteemed Delegates,

I welcome you to SRMUN Charlotte 2018 and the International Renewable Energy Agency, also known as IRENA. I am Nicholas Edwards, and it is my distinct pleasure to serve as your Director for a committee whose mission and work is critical to the continued sustainability of the planet. This will be the first time I have the honor of serving on staff; however, Charlotte 2018 will be my fourth SRMUN experience. Over the past two years, I attended as a delegate from the University of North Alabama and I am currently a student at the University of North Carolina at Chapel Hill pursuing a degree in Political Science.

Serving as your Assistant Director (AD) for this exciting and unique committee is MacKenzie Adamson. Currently, MacKenzie attended Longwood University where she is pursuing a degree in Political Science with a concentration in Global Politics and minors in Spanish, Homeland Security, and International Studies. She plans to pursue a career in counterterrorism and counterintelligence. This is MacKenzie's first time serving on staff, and she is both proud and honored to learn, grow, and work with this year's delegates

The International Renewable Energy Agency is a relatively young agency, established in 2009, with a wealth of possibilities for future work. Being involved in this highly technical committee will provide insight into the international community's continued efforts to make a cleaner and safer planet Earth. While researching the topics, delegates will learn more about the challenges of implementing renewable energy sources in both developing and developed Member States, conduits for renewable energy, and Member States' respective policies on those conduits.

Bearing in mind the mandate and pillars of the United Nations, IRENA, and the theme of SRMUN Charlotte 2018 conference, the following topics have been chosen to discuss at this year's conference:

I: Combating Climate Change by Increasing Urban Energy Efficiency
II: Assessing the Socio-Economic Impacts of Wind and Solar Energy

The background guide serves as a base for your research; however, it should not be utilized as a delegation's entire means for the above topics. Each individual topic is prepared in depth and it is expected that delegates research beyond this guide in preparation for their position paper as well as for the conference itself. Each delegation is required to submit a position paper, no longer than two pages in length (single spaced), which should showcase your Member State's position, policies, and recommendations on each of the two topics. More information regarding formatting and examples for position papers can be found at srmun.org. ***All position papers MUST be submitted no later than March 23, 2018 by 11:59 pm EST via the SRMUN website.***

MacKenzie and I send you the warmest regards in preparation for SRMUN Charlotte 2018 and look forward to your position papers as well as the diligent work during committee. Please feel free to contact Director-General Desiree Kennedy, MacKenzie, or myself should you have any questions during your preparation for the conference.

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Committee History of the International Renewable Energy Agency

During the 1981 United Nations (UN) Conference on New and Renewable Sources of Energy, held in Nairobi, Kenya, a proposal was made to create an international agency to encourage renewable energy initiatives.[1] At the time of the initial proposal, the focus of the global community remained on conventional energy, thereby scuttling attempts to form the International Renewable Energy Agency (IRENA). Since then, global interests have changed, and IRENA was formally founded on 26 January 2009.[2] Several preparatory conferences preceded the actual formation of the agency, during which an outline of the initial work program was established. At the first meeting, 75 states signed IRENA's founding Statute, and on 4 April 2011 IRENA officially became an active agency within the United Nations, with the United Arab Emirates serving as the host Member State for IRENA Headquarters.[3] [4] [5] IRENA presently consists of 151 Member States with 27 Member States in accession.[6] States are permitted to apply for membership within IRENA as long as they agree to abide by the objectives and vision outlined in its Statute.[7]

IRENA was founded to help all Member States transition to a more sustainable and clean energy future by promoting renewable energies such as "bioenergy, geothermal, hydropower, ocean, solar, and wind energy," as well as to open communication channels between Member States to allow for advancements in technology.[8] The body relies on essential partners, including international, intergovernmental, and non-governmental organizations to further IRENA's vision and act as advocates at the local, regional, and global levels.[9]

IRENA is constituted of three bodies: the Assembly, the Council, and the Secretariat.[10] The Assembly contains one representative from each Member State and is both the main body and the decision-making body of the Agency.[11] The Assembly meets annually to approve amendments to resolutions as well as discuss reports, budgets, programs, and membership applications.[12] The Council is an elected body of 21 Member States which serve two-year terms.[13] The purpose of the Council's election is to guarantee equal participation among Member States regardless of developmental status.[14] The responsibilities of the Council are articulated in Article X of the Statute of IRENA, and include facilitating "consultations and cooperation among Members," creation of draft work programs, and preparing the draft meeting agenda.[15]

Finally, the Secretariat is composed of the Director-General and a staff that "provides administrative and technical support to the Assembly, the Council, and their subsidiary bodies."[16] The Secretariat is also in charge of implementing work programs for the Agency, preparing annual reports about the Agency to be submitted to the

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[1] "About IRENA: History," International Renewable Energy Agency. http://www.irena.org/about/aboutirena/history. (Accessed December 10, 2017).
[2] Ibid.
[3] Ibid.
[4] About IRENA: Founding Conference," International Renewable Energy Agency. http://www.irena.org/history/foundingconference. (Accessed December 10, 2017).
[5] "IRENA Headquarters Agreement Signed," International Renewable Energy Agency. http://www.irena.org/newsroom/pressreleases/2012/Jun/IRENA-Headquarters-Agreement-signed-with-the-United-Arab-Emirates. (Accessed December 10, 2017).
[6] "About IRENA: Statute, Vision and Mission," International Renewable Energy Agency. http://www.irena.org/statutevisionmission. (Accessed December 10, 2017).
[7] Ibid.
[8] Ibid.
[9] "About IRENA: Statute, Vision and Mission," International Renewable Energy Agency. http://www.irena.org/statutevisionmission. (Accessed December 10, 2017).
[10] "Institutional Structure," International Renewable Energy Agency. http://www.irena.org/institutionalstructure. (Accessed December 10, 2017).
[11] Ibid.
[12] Ibid.
[13] "Institutional Structure," International Renewable Energy Agency. http://www.irena.org/institutionalstructure. (Accessed December 10, 2017).
[14] Ibid.
[15] "About IRENA: Statute, Vision and Mission," International Renewable Energy Agency. http://www.irena.org/statutevisionmission. (Accessed December 10, 2017).
[16] "Institutional Structure," International Renewable Energy Agency. http://www.irena.org/institutionalstructure. (Accessed December 10, 2017).

Council, and "facilitating communication between the Agency and its Members."[17] The Secretariat, the Council, and the Assembly create a work program annually to outline goals and actions for the year.[18] As stated in the Statute of IRENA, projects are funded by Member States who must submit mandatory contributions determined by the Assembly and through voluntary donations.[19]

Additionally, IRENA is responsible for numerous programs which advise policies and practices regarding renewable energy, provide financial and technological aid, and act as a resource to all Member States.[20] Examples of the agency's initiatives include the Clean Energy Corridor and Renewables Readiness Assessments.[21] The Clean Energy Corridor targets indigenous communities to aid in developing renewable energy and also aims to stimulate economic growth.[22] In Africa, IRENA is using this program to develop low-carbon economic development by trading renewable power across borders.[23]

The Renewables Readiness Assessments are controlled and led by individual Member States to better offer suggestions and advice at the local levels.[24] Assessments are made by Member States using a guide created by IRENA that aids them in surveying the energy status and addressing pressing concerns regarding renewable energy.[25] Each assessment outlines five major themes: "national energy policy and strategy; institutions and markets; resources and technologies; establishment of the business model; and, the capacity needed to scale up renewables."[26]

As of the seventh meeting of the IRENA Assembly in 2017, IRENA turned its focus towards promoting strong, international cooperation in the form of resolutions, agreements, and concrete actions to increase the prevalence and availability of renewable energy sources.[27] Given the shift in focus of the international community to renewable energy, IRENA has made it part of its core mission to take this momentum and utilize it to promote new projects such as International Renewable Energy Day to increase the speed at which the global community transitions to renewable energy, as well as a renewed urban energy agenda.[28] As global climate change and the limitations on fossil fuels continue to become a more prevalent part of discussions among the international community, the work of IRENA will remain central to successful renewable energy initiatives.

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[17] "About IRENA: Statute, Vision and Mission," International Renewable Energy Agency. http://www.irena.org/statutevisionmission. (Accessed December 10, 2017).
[18] Ibid.
[19] Ibid.
[20] "About IRENA," International Renewable Energy Agency. http://www.irena.org/aboutirena. (Accessed December 10, 2017).
[21] Ibid.
[22] Ibid.
[23] "Africa Clean Energy Corridor," International Renewable Energy Agency. http://www.irena.org/cleanenergycorridors/Africa-Clean-Energy-Corridor. (Accessed December 10, 2017).
[24] Ibid.
[25] Ibid.
[26] "Renewables Readiness Assessment: Design to Action," The International Renewable Energy Agency. http://www.irena.org/menu/index.aspx?mnu=Subcat&PriMenuID=36&CatID=141&SubcatID=335. (Accessed July 19, 2017).
[27] "Report of the Seventh Session of the Assembly of the International Renewable Energy Agency," The International Renewable Energy Agency. http://www.irena.org/-/media/Files/IRENA/Agency/About-IRENA/Assembly/Seventh-Assembly/A_7_SR_1_Final-summary-report.pdf (Accessed December 22, 2017).
[28] "COP23 Renewable Energy Day: Accelerating the Global Energy Transition," The International Renewable Energy Agency. http://www.irena.org/events/2017/Nov/COP23-Renewable-Energy-Day (Accessed December 22, 2017).

I. Combating Climate Change by Increasing Urban Energy Efficiency

"Given the inextricable link connecting urbanization, urban poverty and climate change, the way in which the world's growing cities were planned and managed [will] largely determine the pace of global warming."
– Anna Kajumulo Tibaijuka, Former Executive Director of the United Nations Human Settlements Programme[29]

Introduction

One of the most pressing concerns of the international community is climate change and its implications on humanity. 97 percent of actively-publishing climatologists maintain that climate change not only exists but is also produced and exacerbated by human activity.[30] According to the USA National Aeronautics and Space Administration (NASA), the average temperature of the Earth has risen by 0.8 degrees Celsius (1.4 degrees Fahrenheit) since 1880.[31] This is due to what is typically referred to as the "greenhouse effect."[32] This effect occurs when a layer of gases, known by some as "greenhouse gases" (GHGs), prevents the heat of the sun from escaping the Earth's atmosphere.[33] These gases include nitrous oxide (N_2O), water vapor (H_2O), carbon dioxide (CO_2), and methane (CH_4). Chlorofluorocarbons, a type of industrial chemical, also contributes to the greenhouse effect but have since fallen into disuse following regulation by the United Nations Environment Programme's Montreal Protocol on Substances that Deplete the Ozone Layer.[34]

The increase in H_2O, N20, and CO_2 in the Earth's atmosphere leads to unusual weather events such as increased precipitation, decreased atmospheric clarity, and trapping heat close to the Earth's surface, thus raising the surface temperature.[35] This increase in prevalence of these gases in the atmosphere is largely the result of increased global consumption of fossil fuels and deforestation, activities that occur at a higher frequency in urban areas.[36] By promoting a shift in focus to urban efficiency, a large portion of the gases emitted can be controlled and minimized.

Implications of Climate Change

As previously mentioned, a majority of those gases emitted into the Earth's atmosphere are created in urban areas. The most concerning implication of the resulting climate change is its effect on the Earth's temperature. Climatologists have determined that small changes in planetary temperature correspond to significant environmental disruptions. For example, during the last ice age, which occurred within a time span between 110,000 to 11,500 years ago, the average temperature of Earth was only five to nine degrees Fahrenheit cooler than temperatures today.[37] The effects of modern climate change are already evidential. As NASA reports, "[g]laciers have shrunk, ice on rivers and lakes is breaking up earlier, plant and animal ranges have shifted, and trees are flowering sooner."[38]

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[29] *City Planning Will Determine Pace of Global Warming, UN-HABITAT Chief Tells Second Committee as She Links Urban Poverty with Climate Change*, United Nations, https://www.un.org/press/en/2007/gaef3190.doc.htm (accessed 27 August 2017).
[30] "Scientific consensus: Earth's climate is warming," National Aeronautics and Space Administration, https://climate.nasa.gov/scientific-consensus/ (accessed 10 September 2017).
[31] Michael Carlowicz, "Global Temperatures," National Aeronautics and Space Administration, https://earthobservatory.nasa.gov/Features/WorldOfChange/decadaltemp.php (accessed 10 September 2017).
[32] "A blanket around the Earth," National Aeronautics and Space Administration, https://climate.nasa.gov/causes/ (Accessed 10 September 2017).
[33] Ibid.
[34] "Article 2A: CFCs," *The Montreal Protocol on Substances that Deplete the Ozone Layer*, United Nations Environment Programme Ozone Secretariat, http://ozone.unep.org/en/handbook-montreal-protocol-substances-deplete-ozone-layer/9 (accessed 10 September 2017).
[35] "A blanket around the Earth," National Aeronautics and Space Administration, https://climate.nasa.gov/causes/ (accessed 10 September 2017).
[36] Ibid.
[37] "The consequences of climate change," National Aeronautics and Space Administration, https://climate.nasa.gov/effects/ (accessed 10 September 2017).
[38] "The consequences of climate change," National Aeronautics and Space Administration, https://climate.nasa.gov/effects/ (accessed 10 September 2017).

The ten hottest years in the recorded history of the Earth have all occurred since 1990.[39] By 2050, the effects of climate change are expected to dramatically alter the Earth's landscape. Expected changes include rising temperatures, increased prevalence of droughts and heatwaves, increased intensity of hurricanes, a rise in global sea levels between one and four feet, and the eradication of ice in the arctic.[40] These changes will be disastrous to both developed and developing Member States unless mitigated by an interstate coalition dedicated to reversing the effects of climate change. This effort has already begun under the world's first comprehensive climate agreement, the Paris Climate Accord, which has an expressed goal of "holding … the global average temperature to well below 2°C above pre-industrial levels."[41]

Researchers from the University of Toronto in Canada estimate that the world population will reach 9 billion by 2050. Of these 9 billion people, 75 percent are expected to live in cities.[42] Of these cities, at least 41 will bolster populations of ten million or more.[43] Today, only 54 percent of people live in cities, but as population centers become more densely populated, urban contributions to climate change are guaranteed to worsen.[44] Cities are presently estimated to be the source of up to 70 percent of all energy-related CO_2 emissions and up to two-thirds of all global energy use.[45] [46] Even these numbers are expected to rise, as IRENA noted in its 2016 report, *Renewable Energy in Cities*. The global energy consumption of today's urban areas is significantly outpacing urbanization itself.[47]

Approaches to Urban Energy Efficiency

As the international community continues to move forward in its endeavor to mitigate the effects of climate change, it is becoming increasingly clear that a specialized approach is necessary to address the challenges thereof. One of these challenges is increasing urban energy efficiency. The effort to reduce the environmental impact of the globe's many population centers is multifaceted and must be navigated with care. It is the mission of the International Renewable Energy Agency to accomplish this by providing solutions to the numerous pitfalls of creating an environmentally-friendly city. As expressed by Anna Kajumulo Tibaijuka, former Executive Director of the United Nations Human Settlements Programme, in her October 2007 remarks to the General Assembly Second Committee, further proven by a 2014 study by MIT, the rate at which climate change will affect planet Earth is inextricably intertwined with city-planning.[48] [49] It is the responsibility of the global community to comprehensively address

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[39] Benflied, F. Kald "Fighting Climate Change With Sensible City Planning," The Huffington Post, https://www.huffingtonpost.com/f-kaid-benfield/fighting-climate-change-w_b_5441393.html (accessed 16 October 2017).

[40] "The consequences of climate change," National Aeronautics and Space Administration, https://climate.nasa.gov/effects/ (accessed 10 September 2017).

[41] *Paris Agreement*, United Nations Framework Convention on Climate Change, http://unfccc.int/files/essential_background/convention/application/pdf/english_paris_agreement.pdf (accessed 29 August 2017).

[42] Shweta Singh and Chris Kennedy. "Estimating Future Energy Use and CO_2 Emissions of the World's Cities," University of Toronto, Department of Civil Engineering, http://ac.els-cdn.com/S0269749115001694/1-s2.0-S0269749115001694-main.pdf?_tid=a1e42de0-8cf5-11e7-80d1-00000aacb35f&acdnat=1504037407_d809ad5957860046816ca8c6acc16284 (accessed 27 August 2017).

[43] *World Urbanization Prospects: The 2014 Revision, Highlights*, United Nations Department of Economic and Social Affairs, https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf (accessed 27 August 2017).

[44] "Sustainable Development Goal 11," United Nations Department of Economic and Social Affairs, https://sustainabledevelopment.un.org/sdg11 (accessed 13 September 2017).

[45] *World Urbanization Prospects: The 2014 Revision, Highlights*, United Nations Department of Economic and Social Affairs, https://esa.un.org/unpd/wup/Publications/Files/WUP2014-Highlights.pdf (accessed 27 August 2017).

[46] Jasper Rigter, et al. *Renewable Energy in Cities*, International Renewable Energy Agency, http://www.irena.org/DocumentDownloads/Publications/IRENA_Renewable_Energy_in_Cities_2016.pdf (accessed 13 September 2017).

[47] Ibid.

[48] *City Planning Will Determine Pace of Global Warming, UN-HABITAT Chief Tells Second Committee as She Links Urban Poverty with Climate Change*, United Nations, https://www.un.org/press/en/2007/gaef3190.doc.htm (accessed 27 August 2017).

[49] Dizikes, Peter, "Global survey: Climate change now a mainstream part of city planning," *MIT News.* May 29, 2014 http://news.mit.edu/2014/global-survey-climate-change-now-mainstream-part-city-planning (Accessed December 22, 2017).

three main areas of concern within the field of urban energy development. The first of these areas is sustainability, defined by the Global Development Research Center (GDRC) as "how much and at what rate energy is consumed" and "the effect of existing energy use on the global environment as a whole."[50] Second, the efficiency of technology used in urban energy development must reach standards set to diminish urban impact on global greenhouse emissions.[51] Last, but of critical importance in the mission to deliver renewable energy technologies across all Member States, is equity. The GDRC defines equity as "the appropriate financial mechanism for research, development and use of finite and alternative energy forms, and their equitable distribution for all humankind."[52] IRENA, in its efforts to promote urban efficiency throughout the global, is working to ensure that Member States consider these three fundamental issues as they engage in city planning and urban development.

To address concerns specific to urban development, it is critical to note that energy efficiency is relevant to every aspect of the urban energy landscape.[53] Not only would the transition to renewable energy affect the typical areas of buildings and power, but cities must also consider how to implement these technologies across other facets of society such as industry and transport. In addition, cities must balance these concerns with the ever-present challenges of combating poverty and maintaining a healthy living environment.[54] Additionally, the complexity of the infrastructure necessary to create an environmentally-friendly city varies greatly between population centers. For example, energy use per capita per year for buildings and transport ranges from approximately 5,000 kilowatt-hours (kWh) to nearly 30,000 kWh, depending on factors such as climate, population density, and the level of development status of the city.[55]

The cost of energy utilization, as well as the construction of energy-efficient landscapes, varies across geographic landscapes. Differing costs can be attributed to access to building materials, access to energy efficiency platforms, and the requirement for the knowledge and experience to design and implement urban efficiency projects. For example, cities such as Mumbai, India, or Boston, Massachusetts, USA, are able to promote energy efficiency rather easily in comparison to cities in sub-Saharan Africa, strapped by a lack of resources, energy efficiency experience, and riddled with governmental corruption.[56]

By implementing efficient and renewable energy resources in communities with higher kWh expenditures, Member States can not only reduce the environmental impact of cities but also reduce costly energy expenses.[57] Further, when working to expand and revitalize metropolitan areas in both developed and developing Member States, particular focus can be placed on fostering energy efficiency from the beginning rather than transforming to an environmentally-friendly city after establishment.

The most cost-effective and lucrative efficiency improvement areas can be found in buildings.[58] Estimates by the United States Department of Energy indicate that 39 percent of American carbon emissions come from commercial

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[50] "Key Issues in Urban Energy Management," Global Research and Development Center, http://www.gdrc.org/uem/energy/key-issues.html (accessed 12 September 2017).

[51] Ibid.

[52] Ibid.

[53] "Key Issues in Urban Energy Management," Global Research and Development Center, http://www.gdrc.org/uem/energy/key-issues.html (accessed 12 September 2017).

[54] Jasper Rigter, et al. *Renewable Energy in Cities*, International Renewable Energy Agency, http://www.irena.org/DocumentDownloads/Publications/IRENA_Renewable_Energy_in_Cities_2016.pdf (accessed 13 September 2017). – at SRMUN we only use Ibid twice before restating the source

[55] Ibid.

[56] Aoun, Charbel, "The Smart City Cornerstone: Urban Efficiency." http://www.digital21.gov.hk/sc/relatedDoc/download/2013/079%20SchneiderElectric%20(Annex).pdf. (Accessed December 22, 2017).

[57] *Energy Analytics for Development*, Energy Sector Management Assistance Program, http://www.esmap.org/sites/default/files/esmap-files/FINAL_ESMAP_Energy_Analytics_KS027-17_Web_opt%20.pdf, (accessed 13 September 2017).

[58] Rigter, Jasper, et al. *Renewable Energy in Cities*, International Renewable Energy Agency, http://www.irena.org/DocumentDownloads/Publications/IRENA_Renewable_Energy_in_Cities_2016.pdf (accessed 13 September 2017).

and residential buildings.[59] 74 percent of the world's building energy use comes from residential buildings, and buildings in general are often paragons of wasted potential for energy efficiency.[60] The Energy Sector Management Assistance Program (ESMAP), a global assistance program administered by the World Bank, reports that up to 80 percent of possible energy savings in buildings go untapped.[61] In general, lighting efficiency offers the most in potential payoff; however, the most lucrative course of action for each Member State/region is largely dependent on the climatic properties of that area's geographic location.[62] In other words, whichever technologies work for one region may not necessarily work in another. Technologies such as systems marketed as "smart buildings" can help to eliminate the burden of efficiency maintenance by automating energy efficiency interventions.[63] The Tokyo Metropolitan Government of Japan has implemented green buildings into policy through its "Green Building Program."[64] This program encourages the use of energy efficient technologies such as mixed cement and rainwater reclamation systems to construct buildings.

Another crucial area related to combating climate change is transportation. For many cities, the solution to transportation efficiency is technological innovation and "modal shifts."[65] A "modal shift" refers to a change to the manner in which something is done. Examples of modal shifts in transportation are changes as simple as the encouragement of cycling and walking as means of transportation.[66] Technological innovation in transportation includes lighter and more fuel-efficient vehicles, as well as zero-emission electric vehicles.[67] Other Member States have taken more radical action in their transportation sectors. For example, the French Republic recently announced that it would outlaw the sale of gasoline- and diesel-operated cars by 2040, a move the French government believes will further their country's energy goals under the Paris Climate Accord.[68]

The Paris Climate Accord

The Paris Climate Accord, since its inception in 2016, has been central to the development of energy policy in Member States which are signatories to the agreement. Alongside its goal of maintaining an environmentally healthy global temperature, the Paris Climate Accord states that there is a need for global energy emissions to peak as soon as possible and for Member States to further take action to lower emission rates immediately thereafter.[69] The agreement also mandates that pursuant Member States are party to quinquennial meetings to set "more ambitious" targets and to increase transparency by reporting Member States' progress.[70] Cities' and regions' roles in combating climate change are specifically addressed in the agreement, as they are invited to encourage regional cooperation in the endeavor.

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[59] Benflied, F. Kald "Fighting Climate Change With Sensible City Planning," The Huffington Post, https://www.huffingtonpost.com/f-kaid-benfield/fighting-climate-change-w_b_5441393.html (accessed 16 October 2017).

[60] "Efficient and Sustainable Buildings," Energy Sector Management Assistance Program, http://www.esmap.org/node/71174 (accessed 13 September 2017).

[61] Ibid.

[62] Ibid.

[63] *Energy Analytics for Development*, Energy Sector Management Assistance Program, http://www.esmap.org/sites/default/files/esmap-files/FINAL_ESMAP_Energy_Analytics_KS027-17_Web_opt%20.pdf, (accessed 13 September 2017).

[64] "Outline of the Tokyo Green Building Program under the Tokyo Metropolitan Environmental Security Ordinance," Tokyo Metropolitan Government Bureau of Environment, http://www.kankyo.metro.tokyo.jp/en/attachement/green_building.pdf (accessed 29 August 2017).

[65] Jasper Rigter, et al. *Renewable Energy in Cities*, International Renewable Energy Agency, http://www.irena.org/DocumentDownloads/Publications/IRENA_Renewable_Energy_in_Cities_2016.pdf (accessed 13 September 2017).

[66] Ibid.

[67] Ibid.

[68] Angelique Chrisafis and Adam Vaughan. "France to ban sales of petrol and diesel cars by 2040," *The Guardian*, 6 July 2017. https://www.theguardian.com/business/2017/jul/06/france-ban-petrol-diesel-cars-2040-emmanuel-macron-volvo (accessed 13 September 2017).

[69] "Paris Agreement," European Commission, https://ec.europa.eu/clima/policies/international/negotiations/paris_en (accessed 19 October 2017).

[70] Ibid.

There are 171 parties to have ratified the Paris Climate Accord as of October 2017, and IRENA directly relates its own goals to the conventions outlined in the agreement, exhibited by IRENA's 2017 Perspectives for the Energy Transition report.[71] More importantly, the conventions of the accord are presently considered the standard guidelines from which the United Nations operates in regards to climate change policy.[72]

Conclusion

The threat climate change presents to humanity is, at present, more severe than at any time in the history of civilization. According to the World Economic Forum, not only are human beings more likely to be affected by climate-related events than any other global risk, but the impacts of climate-related events are considered much more severe.[73] To combat this threat, IRENA promotes international cooperation to address each facet of the problem of climate change. Increasing urban energy efficiency is one way the international community can mitigate the effects of climate change. IRENA maintains that the sustainability of the Earth depends on a protracted international effort to combat the effects climate change.

Committee Directive

This background guide introduces the concept of urban energy efficiency and how it relates to the ever-present challenge of climate change. When assessing Member States' positions on the topic, delegates should use this guide as a tool for exploring methods to improve the environmental impact of Member States' urban policies and conduct. Particular emphasis should be placed on assessing and meeting the needs of developing Member States as well as contextualizing the fight against climate change alongside the problems of poverty and public health.

By serving as an international discussion forum for the issue, IRENA is facilitating the global initiative to eliminate the harmful effects of climate change. Delegates are encouraged to remain mindful of IRENA's mission when collaborating with others to address the problems before the committee:

> *"IRENA seeks to make an impact in the world of renewable energy by maintaining a clear and independent position, providing a range of reliable and well-understood services that complement those already offered by the renewable energy community and gather existing, but scattered, activities around a central hub."*[74]

Further, delegates should preface their time in committee by considering the following questions: How can Member States further facilitate cooperation to achieve a sustainable energy future? How can developed Member States help developing Member States reach energy parity? How can the conventions and agreements found in the Paris Climate Accord be further explored and applied to Member States' policies?

Delegates should anticipate to navigate the respective energy policies of Member States to develop the "clear and independent position" necessitated in the mission of IRENA. To achieve this, careful consideration must be given to the initiatives of each Member State and reaching an amicable position by the body. The fight against climate change will remain at the forefront of environmental policy throughout the international community, and IRENA must take responsibility for not only leading the international transition to renewable energy but also for remaining one of the finest organizations for stimulating discourse in the field of climatology and international energy sectors.

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[71] "Paris Agreement - Status of Ratification," United Nations Framework Convention on Climate Change, http://unfccc.int/paris_agreement/items/9444.php (accessed 18 October 2017).

[72] "The Paris Agreement," UN Framework Convention on Climate Change. http://unfccc.int/paris_agreement/items/9485.php (Accessed December 22, 2017).

[73] Kahn, Brian. "Climate Change is the World's Biggest Risk, in 3 Charts," Climate Central, http://www.climatecentral.org/news/climate-change-worlds-biggest-risk-charts-21050 (accessed 4 November 2017).

[74] "Vision and Mission," International Renewable Energy Agency, http://www.irena.org/menu/index.aspx?mnu=cat&PriMenuID=13&CatID=9 (accessed 17 October 2017).

II. Assessing the Socio-Economic Impacts of Wind and Solar Energy

Introduction

Unlike conventional sources of energy such as fossil fuels (coal, oil, and natural gas), wind and solar energy are clean and limitless. Fossil fuels, often referred to as nonrenewable resources, form from the remains of organisms that lived 300 million years ago. In fact, many of the fossil fuels used today were formed from matter that existed prior to the dinosaurs.[75] When these organisms die, vast layers of soil and rock eventually cover them, and ancient seas and oceans bury those deposits. Over time, the organisms become organic material and later fossil fuels.[76] The type of fossil fuel formed depends on the combination of the organism and the organic materials surrounding it, temperature, and length of time.[77] Fossil fuels are not a sustainable energy source, as they take millions of years to form. On the contrary, solar and wind energy are becoming popular alternatives as they will not cause pollution nor will its source become scarce over time.

History

Wind energy has been utilized for thousands of years. In 5000 B.C., human settlements used wind to direct boats down the Nile River.[78] Invented in Greece in the first century A.D., windmills quickly gained popularity for their vast array of functions. In the Middle East, windmills were used to increase the production of food, while windmills were also used to drain marshes like the Rhine River Delta.[79] In 1887, the first wind turbine was created in Scotland to provide electricity.[80] After World War II and as a result of the oil crises that arose in the 1970s, Member States began to consider wind energy a viable alternative to fossil fuels.[81] Although wind energy has only recently begun to replace fossil fuels, it has been critical to the development of civilization for thousands of years.

Solar energy, like wind energy, is not an entirely new concept, as it has been developed and used for centuries. The first example of solar energy as a source of power came in the form of a magnifying glass in the 7th century B.C.[82] In 1905, Albert Einstein developed a theory on the photoelectric effect, which was later proved in 1916 by Robert Millikan.[83] Solar energy is constantly adapting and becoming more cost effective, and is currently one of the most well-known forms of renewable energy. The power produced by solar energy can be utilized for many different things, such as heating, cooling, lighting, and providing electricity.[84] Solar energy is generally harnessed by two different types of power plants, one of distributed generation to provide energy at the point of use (such as a personal home with solar panels) or as central-station utility scale plant, to harness and distribute solar power.[85]

The Effects of Fossil Fuels

Fossil fuels are not considered a clean source of energy. When burned, fossil fuels release nitrogen oxide, which, when trapped in the Earth's atmosphere, can lead to smog and acid rain.[86] Pollutants from fossil fuels affect the air, bodies of water, and land. Some of the main contributors of pollution due to fossil fuels include cars, trucks,

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[75] "How Fossil Fuels Were Formed," U.S. Department of Energy, February 12, 2013. https://fossil.energy.gov/education/energylessons/coal/gen_howformed.html (accessed September 3, 2017).
[76] Ibid.
[77] Ibid.
[78] "History of Wind Energy," Wind Energy Foundation, windenergyfoundation.org/about-wind-energy/history/ (accessed October 11, 2017).
[79] Ibid.
[80] Shahan, Zachary, "History of Wind Turbine," *Renewable Energy World*, 21 Nov. 2014, www.renewableenergyworld.com/ugc/articles/2014/11/history-of-wind-turbines.html (accessed October 11, 2017).
[81] "History of Wind Energy." *Wind Energy Foundation*, windenergyfoundation.org/about-wind-energy/history/.
[82] "The History of Solar." U.S. Department of Energy. https://www1.eere.energy.gov/solar/pdfs/solar_timeline.pdf: 1.
[83] Ibid.
[84] "About Solar Energy," Solar Energy Industries Association. https://www.seia.org/initiatives/about-solar-energy (Accessed December 22, 2017).
[85] Ibid.
[86] Ibid.

factories, power plants, ships, and airplanes.[87] The oil spill in the Gulf of Mexico in 2010 highlights the potentially devastating effects from human use of fossil fuels.[88] Scientists claim that it will take hundreds of years for the supply of fossil fuels to run out, but as standards of living increase worldwide, so will global usage of fossil fuels.[89] Depending on the rate at which this usage increase occurs, some estimates indicate that fossil fuels will run out by 2088.[90] Within the next decade, oil, natural gas, and coal are expected to peak before falling into a decline that is not expected to rise again.[91] In 2005, oil was produced at 74 million barrels per day.[92] The known sources of fossil fuels are depleting and new sources are not being discovered quickly enough to cover the rate of consumption. These three main fossil fuels attribute for 86 percent "of the world's primary energy."[93] Fossil fuels are increasing in price as they become scarcer and as the global market fluctuates due to tensions between states with oil and those without it. In 1950, the United States of America (USA) purchased one barrel of oil for USD 2.51. In 2016, that price has increased to USD 38.29. This statistic is partially increased due to inflation, but also due to the depletion of oil leading to an increase in cost.[94] Many scientists are lobbying for a shift to new energy sources, which are both sustainable and clean, such as wind and solar energy. Investment in clean and renewable resources, such as wind and solar energy, is cost-effective, improves overall health, and leads to a higher standard of living worldwide.[95]

These toxins produced by fossil fuels can lead to health problems for living creatures in affected areas. In many cases, developing Member States lack proper ventilation in households, leaving homes filled with pollutants.[96] These pollutants, which include carbon monoxide, particulates, and formaldehyde, have the potential to cause negative health effects. Women and children are especially vulnerable to these toxins, as they generally spend more time in the home and subsequently have the highest exposure.[97] In-home pollution correlates to high infant mortality, illiteracy, and low life expectancy.[98] Roughly 1.45 million people, as many as 4,000 a day, die prematurely each year due to pollution exposure in homes.[99] Additionally, external air pollution due to fossil fuels causes many health problems. Pollutants can lead to a higher risk of numerous cancers. Although medicine has improved within the last 30 years, an increase in mortality rates directly correlates with an increase in toxins and pollutants in the atmosphere.[100]

Furthermore, fossil fuels and the pollution they emit affect food supply, fresh water, clean air, and can contribute to infectious diseases.[101] Mercury emissions from coal factories and power plants are extremely dangerous and can cause health issues such as attention-deficit/hyperactivity disorder, impaired memory and motor skills, and neurological problems.[102] Eight percent of women in the USA have mercury levels considered unsafe, and 300,000 newborns each year may be overexposed to mercury prior to birth.[103] In the Republic of India (India), more than

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[87] "The History of Solar." U.S. Department of Energy. https://www1.eere.energy.gov/solar/pdfs/solar_timeline.pdf: 1.
[88] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011: 4.
[89] "The End of Fossil Fuels," Ecotricity, https://www.ecotricity.co.uk/our-green-energy/energy-independence/the-end-of-fossil-fuels (accessed September 4, 2017).
[90] Ibid.
[91] Chris Nelder, "The End of Fossil Fuels," July 24, 2009, https://www.forbes.com/2009/07/24/peak-oil-production-business-energy-nelder.html (accessed October 30, 2017).
[92] Ibid.
[93] Ibid.
[94] "Petroleum & Other Liquids," Independent Statistics and Analysis U.S. Energy Information Administration, September 1, 2017, https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=F000000__3&f=A (accessed September 3, 2017).
[95] Myers, Todd, "The Experts: What Renewable Energy Source Has the Most Promise?" April 17, 2013, https://www.wsj.com/articles/SB10001424127887324485004578424624254723536?mg=prod/accounts-wsj. (Accessed December 22, 2017).
[96] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011: 4.
[97] Ibid.
[98] Ibid.
[99] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011: 4.
[100] Ibid.
[101] "Climate Energy and Health," Harvard School of Public Health, http://www.chgeharvard.org/category/climate-energy-and-health (accessed September 4, 2017).
[102] "Gasping for Air: Toxic Pollutants Continue to Make Millions Sick and Shorten Lives," Natural Resources Defense Council, https://www.nrdc.org/sites/default/files/airpollutionhealthimpacts.pdf (accessed September 3, 2017): 2.
[103] Ibid.

760,000 people die each year from air pollution.[104] According to the Natural Resources Defense Council, a non-profit organization committed to preserving the environment, "nearly 37 million children live in areas with unhealthy air due to ozone smog or soot pollution."[105] Fossil fuel pollutants also correlate to increasing cases of asthma and Alzheimer's disease.[106] Researchers from Lawrence Berkley Laboratory in the USA claim, "Improvements in air quality may have prevented up to 12,700 premature deaths between 2007 and 2015."[107] Air pollution from fossil fuels leads to increased risks of several diseases including respiratory disease, heart disease, and cancer.[108] Within the USA, the World Health Organization (WHO) estimates that 200,000 deaths every year are related to air pollution.[109]

Fossil fuels are also indirectly responsible for the displacement of populations.[110] Fossil fuel emissions cause shifts in the climate and produce extreme weather patterns such as heat waves, floods, and wildfires. As a result, large populations are displaced and are forced to move to different locations, thus directly impacting the standard of living.[111] Especially since the 1980s, there has been an increase in the agricultural growing period, as the climate has warmed. Additionally, the overall precipitation has increased, as well as the number of droughts. By 2100, the sea level will rise one to four feet.[112] All of these factors affect populations and lead to natural disasters.

Furthermore, conventional resources like fossil fuels are depleting or are accessible by some but not all and can lead to conflict. Fossil fuels, like oil, cause tension between and within Member States. A policy brief by Jeff Colgan, a writer at the Belfer Center for Science and International Affairs, states that since 1973, between a quarter and a half of conflicts between states are linked to oil.[113] Scarcity in resources causes tension.[114] Aggression can result between Member States in which one is oil rich and the other is oil poor. Furthermore, terrorist organizations such as the Islamic State of Iraq and the Levant seek oil to obtain power and legitimacy.[115] By controlling oil, they are able to control part of the economy and influence Member States. Since wind and solar energy are inexhaustible resources, violent conflict between and within Member States may diminish as a result from their use.

The Benefits of Wind and Solar Energy

Wind and solar energy are cost-effective. Both are inexhaustible resources, meaning that their cost will not increase due to scarcity like fossil fuels. Wind and solar energy will exist virtually in perpetuity, which means the cost of these forms of energy will decrease over time as technologies become more prevalent in the global community.[116] In more than 30 Member States, solar and wind energy is either cheaper or the same price as fossil fuels. Michael Drexler, a spokesperson for Infrastructure and Development at the World Economic Forum claims, "solar and wind have just become very competitive, and costs continue to fall. It is not only a commercially viable option, but an outright compelling investment opportunity with long-term, stable, inflation-protected returns."[117]

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[104] "Climate Energy and Health," Harvard School of Public Health, http://www.chgeharvard.org/category/climate-energy-and-health (accessed September 4, 2017).
[105] "Gasping for Air: Toxic Pollutants Continue to Make Millions Sick and Shorten Lives," Natural Resources Defense Council, https://www.nrdc.org/sites/default/files/airpollutionhealthimpacts.pdf (accessed September 3, 2017): 1.
[106] Ibid.
[107] Hilary Lamb, "Wind and Solar Pay for Themselves in Public Health Benefits, Survey Suggests," Engineering and Technology, August 18, 2017, https://eandt.theiet.org/content/articles/2017/08/wind-and-solar-pay-for-themselves-in-public-health-benefits-study-suggests (accessed September 4, 2017).
[108] Ibid.
[109] Ibid.
[110] "The Consequences of Climate Change," NASA, https://climate.nasa.gov/effects/ (accessed October 30, 2017).
[111] Ibid.
[112] Ibid.
[113] Jeff Colgan, "Oil, Conflict, and U.S. National Interests," Harvard Kennedy School Belfer Center for Science and International Affairs, October 2013, http://www.belfercenter.org/publication/oil-conflict-and-us-national-interests (accessed September 2, 2017).
[114] Ibid.
[115] Ibid.
[116] "Advantages and Challenges of Wind Energy," Office of Energy Efficiency and Renewable Energy, https://energy.gov/eere/wind/advantages-and-challenges-wind-energy (accessed August 7, 2017).
[117] Ibid.

In 2010, the top renewable energy investments worldwide were wind energy at USD 94.7 billion and solar energy at USD 26.1 billion.[118] In 2010, the People's Republic of China (China) invested USD 48.9 billion in clean energy. China is not alone, as numerous Member States around the globe are investing in renewable energy. The USA invests in the early stages of technology development, while the European Union focuses on "stimulus for demand using regulatory policies such as feed-in-tariffs to meet targets which promote renewable electricity generation."[119] Feed–in-tariffs are used to encourage individuals within Member States to purchase renewable energy generation systems. An example of this is solar paneling on rooftops of both commercial and residential buildings. The Member State then offers the individual a set price to utilize the energy from the solar paneling for a wider area. Both the Member State and the individual benefit from the energy created. This model was originally developed in the Federal Republic of Germany (Germany). The feed-in-tariffs system is performance based instead of incentive based.[120] According to a study in *Nature Climate Change Journal*, using renewable energy could lead to significant savings each year in health care, from 5.7 to 210 million USD per year.[121]

The Intergovernmental Panel on Climate Change (IPCC) claims that roughly 1.36 to 5.1 billion USD will be invested globally by 2020, and up to 7.1billion between 2021 and 2030.[122] A study by Pricewaterhouse Coopers, Potsdam Institute, and the International Institute for Applied Systems Analysis shows Europe and North Africa could be almost 100 percent reliant on renewable electricity by 2050.[123] Investments in clean and renewable energy by the global community can ultimately lead to a more cost-effective energy system as technologies become simplified. International organizations are also contributing funds to the development of renewable and clean energy. Some private and regional banks provide loans to Member States to fund renewable energy, such as low carbon products, deployment and transfer of clean technology, wind power and transit, and the creation of multi-national energy grids.[124] The World Bank Group provided USD 13 billion in loans to renewable energy in 2010; Climate Investment Funds (under the World Bank) pledged USD 6.4 billion by 2010; regional banks (Inter-American Development Bank, African Development Bank, and Asian Development Bank) provided billions by 2012; and Global Environment Facility provided USD 8.8 billion between 1991 and 2010.[125] As a result of this funding, even despite the global economic crisis between 2008 – 2012, in 2014 the previous four years had seen a steady and continual increase in the research into renewable energy sources, the utilization of renewable energy, and policies promoting a movement towards energy efficiency.[126]

Wind and solar energy lead to a higher standard of living. Wind turbines are a healthy alternative to fossil fuels, as they do not create the pollutants and toxins that contribute to acid rain and greenhouse gases in the Earth's atmosphere. A study by the WHO indicates that better air quality has an economic benefit. Clean energy has had a positive economic benefit in the USA between USD 30 and USD 113 billion.[127] Additionally, clean energy can be utilized to improve water sanitation and access. The Permanent Interstate Committee for Drought Control in the Sahel (West Africa) created the Regional Solar Program in 1986, which constructed 995 solar pumping stations and 649 community systems, improving water access and electricity to two million people.[128]

Furthermore, global population is expected to reach 8.5 billion by 2035.[129] As the population increases, there will be a concurrent increase in the need for employment opportunities. Clean and renewable energy, such as wind and

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[118] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011: 12.
[119] Ibid.
[120] "Feed-in-Tariff: A Policy Tool Encouraging Deployment of Renewable Electricity Technologies." *U.S. Energy Information Administration*, 30 May 2013, www.eia.gov/todayinenergy/detail.php?id=11471 (accessed September 4, 2017).
[121] "Health Benefits of Renewable Energy," Harvard School of Public Health, http://www.chgeharvard.org/resource/health-benefits-renewable-energy (accessed September 4, 2017).
[122] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011: 14.
[123] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011: 15.
[124] Ibid.
[125] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011: 17.
[126] UN General Assembly A/69/323
[127] Hilary Lamb, "Wind and Solar Pay for Themselves in Public Health Benefits, Survey Suggests," Engineering and Technology, August 18, 2017, https://eandt.theiet.org/content/articles/2017/08/wind-and-solar-pay-for-themselves-in-public-health-benefits-study-suggests (accessed September 4, 2017).
[128] *Renewable Energy in the Water, Energy & Food Nexus.* United Nations International Renewable Energy Agency. January 2016: 54-55.
[129] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011: 5.

solar, creates two to three times more jobs than conventional energy produced by fossil fuels.[130] [131] In 2009 and 2010, over one million jobs were created as a result of investment in renewable energy.[132] A report from the Environment Defense Fund, a USA-based non-profit, states the profession of wind turbine technician is the fastest-growing profession in the USA.[133] The report additionally states that clean and renewable energy has created more than four million jobs in the USA alone, and 46 percent of "large firms have hired additional workers to address issues of sustainability over the past two years."[134] On the other hand, jobs in the fossil fuel sector dropped by 12 percent in 2015.[135] On a global scale, 9.8 million people were employed in clean and renewable energy in 2016.[136] Of these, 3.1 million jobs were in the field of solar energy, and the wind energy sector produced 1.2 million jobs. The Member States with the highest employment rates in the renewable energy sector are China, the Federative Republic of Brazil, the USA, India, the State of Japan (Japan), and Germany. More than half of the jobs in the solar industry were created by China, who is also the "largest installer and manufacturer of solar PV panels."[137] In 2016, 121,000 jobs were created in India by the solar industry and 140,000 jobs were created in Bangladesh.[138] China has installed 30 percent of global additions and employs 509,000 people in the field of wind energy.[139] These Member States are working towards job production and increasing the renewable energy industry as a means to better their economies. In 2015, the People's Democratic Republic of Algeria (Algeria) produced projects in solar energy that resulted in 3,500 jobs in construction and installation and 700 permanent jobs.[140] By focusing on wind and solar energy, Member States are creating jobs for their citizens.

Finally, wind turbines and solar panels can be constructed in rural areas, providing electricity to more impoverished communities. 1.4 billion people in the world live without electricity, the majority of whom live in rural areas. Within India alone, over 400 million people do not have access to reliable electricity.[141] There are four major consequences to a lack of electricity: no refrigeration (affecting food and medicine), no lighting, prevention of modernization (power tools for farming, telephones, etc.), and inhibited emergency response teams (slow communication).[142] The use of solar energy in rural areas provides electricity to a larger grid than fossil fuels. It is also more cost-effective, has a longer life expectancy, requires minimal maintenance, is environment friendly, and can be transported easily.[143] Additionally, the use of solar power requires very little training, which makes the transition to solar energy easier, particularly in rural areas.[144]

Actions Taken by the United Nations

The Johannesburg Plan of Implementation formed in 2002 outlines sustainable development goals for renewable energy including: "improving access to reliable, affordable, economically viable, socially acceptable and

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[130] Ibid.
[131] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011: 12.
[132] Ibid.
[133] Dana Varinksy, "Solar-Energy Jobs are Growing 12 Times as Fast as the US Economy," Business Insider, January 26, 2017, http://www.businessinsider.com/solar-energy-job-growth-2017-1 (accessed September 2, 2017).
[134] Ibid.
[135] Ibid.
[136] *Renewable Energy and Jobs Annual Review 2017*. United Nations International Renewable Energy Agency. 2017: 3.
[137] *Renewable Energy and Jobs Annual Review 2017*. United Nations International Renewable Energy Agency. 2017: 7.
[138] Ibid.
[139] Ibid.
[140] *Renewable Energy and Jobs Annual Review 2017*. United Nations International Renewable Energy Agency. 2017: 20
[141] *Promotion of New and Renewable Sources of Energy*. United Nations General Assembly. August 15, 2011:4.
[142] "Sustainable Energy Solutions for Rural Areas and Application for Groundwater Extraction," Global Energy Network Institute, August 2014, http://www.geni.org/globalenergy/research/sustainable-energy-solutions-for-rural-areas-and-application-for-groundwater-extraction/Sustainable-Energy-for-Rural-Areas-and-Groundwater-Extraction-D.Fong.pdf (accessed October 12, 2017): 6-7.
[143] "Sustainable Energy Solutions for Rural Areas and Application for Groundwater Extraction," Global Energy Network Institute, August 2014, http://www.geni.org/globalenergy/research/sustainable-energy-solutions-for-rural-areas-and-application-for-groundwater-extraction/Sustainable-Energy-for-Rural-Areas-and-Groundwater-Extraction-D.Fong.pdf (accessed October 12, 2017): 8-9.
[144] "Sustainable Energy Solutions for Rural Areas and Application for Groundwater Extraction," Global Energy Network Institute, August 2014, http://www.geni.org/globalenergy/research/sustainable-energy-solutions-for-rural-areas-and-application-for-groundwater-extraction/Sustainable-Energy-for-Rural-Areas-and-Groundwater-Extraction-D.Fong.pdf (accessed October 12, 2017): 10.

environmentally sound energy services." This plan was created by the World Summit on Sustainable Development to discuss uses of energy on a global scale.[145] The World Summit also outlined the importance of using renewable energy sources to eradicate poverty and improve standards of living, in addition to protecting the environment.[146] UN-Energy, an interagency organization within the UN system, was formed in 2004 to coordinate programs relating to renewable energy.[147] The Sustainable Energy for All Initiative was formed by the UN in 2011 to target issues relating to "ensuring universal energy access to modern energy services, doubling the global rate of improvement in energy efficiency, and doubling the share of renewable energy use in global energy."[148] The International Renewable Energy Agency (IRENA) and the International Energy Agency – Energy Technology Systems Analysis Program developed solar stills, solar photovoltaic (PV), and wind based reverse osmosis plants for desalination in 2012.[149] Solar PV converts direct sunlight into electricity. Reverse osmosis plants extricate salt from water. They are developed commercially and distributed on a large scale.[150]

Additionally, IRENA has developed a new mini-grid system to help Small Island Developing States embrace renewable energy practices. Mini-grids reduce energy costs and allow for the programs to be more cost efficient and useful for the Member States.[151] The UN has sought to promote renewable and clean sources of energy over fossil fuels, while also ensuring that developing Member States are able to prosper and have access to energy. In 2016, the United Nations Development Programme created "Solar Empowerment Across Countries" with the goal of providing solar power to the Republic of Cabo Verde, Kingdom of Cambodia, the Republic of Mali, the Republic of Niger, and the Republic of the Sudan for water supply.[152]

Challenges of Wind and Solar Energy

Wind and solar energy are decreasing in price; however, some worry that while they become more economically feasible, they will not be useful in areas that do not receive enough wind or sun for the technology to be efficient.[153] Arguments against wind and solar energy include unattractive terrain, disruption of bird migration, and accessibility to wind and solar energy.[154] Wind farms are often loud and deter from the attractiveness of the landscape.[155] Solar energy technologies have a high initial cost. It takes a significant amount of money to construct and produce a solar cell. Solar energy is also not as powerful as more conventional forms of energy. The cells have to recharge, resulting in the possibility that electricity and energy are not always readily available.

Furthermore, the geographical nature of the requirements of renewable energy presents challenges. Solar energy is only feasible if there is an adequate amount of light irradiance. In addition, while solar energy can power a large grid, connecting to the grid is an extremely complicated procedure.[156] Wind turbines are especially useful near

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[145] "Energy for Sustainable Development," United Nations Sustainable Development Knowledge Platform, https://sustainabledevelopment.un.org/topics/energy (accessed October 12, 2017).
[146] Ibid.
[147] Ibid.
[148] "Energy for Sustainable Development," United Nations Sustainable Development Knowledge Platform, https://sustainabledevelopment.un.org/topics/energy (accessed October 12, 2017).
[149] *Renewable Energy in the Water, Energy & Food Nexus.* United Nations International Renewable Energy Agency. January 2016: 59.
[150] Ibid.
[151] "Mini-Grid Project Guide Developed for Small Islands," Irena News Room, September 25, 2017, https://irenanewsroom.org/2017/09/25/mini-grid-project-guide-developed-for-small-islands/ (accessed October 12, 2017).
[152] "Solar Empowerment Across Countries," United Nations Development Programme, https://stories.undp.org/solar-empowerment-across-countries (accessed October 12, 2017).
[153] Earl J. Ritchie, "The Cost of Wind and Solar Intermittency," Forbes, January 24, 2017, https://www.forbes.com/sites/uhenergy/2017/01/24/the-cost-of-wind-and-solar-intermittency (accessed September 4, 2017).
[154] "Wind Power," BBC, http://www.bbc.co.uk/schools/gcsebitesize/science/ocr_gateway/energy_resources/energy_from_the_sunrev3.shtml (accessed October 12, 2017).
[155] Ibid.
[156] "Sustainable Energy Solutions for Rural Areas and Application for Groundwater Extraction," Global Energy Network Institute, August 2014, http://www.geni.org/globalenergy/research/sustainable-energy-solutions-for-rural-areas-and-

ocean-fronts and seacoasts, as these are areas that naturally produce a lot of wind.[157] Unfortunately, not every Member State has a coastal boundary, nor do they experience a significant amount of wind. Therefore, wind turbines and wind energy are not practical in every locale. Additionally, wind systems are costly to maintain, further limiting developing areas.[158]

Conclusion

Wind and solar energy are becoming more popular throughout the global community as the price of oil, coal, and natural gas increase. Local, regional, and private organizations are investing in clean and renewable sources of energy, which is leading to wind and solar technologies becoming more widely available and more affordable. While wind and solar energy are an inexhaustible resource, not every region has enough sunlight or wind to only use these forms of clean and renewable energy. However, a shift to clean and renewable sources of energy will minimize the increase in severe changes in weather patterns and diseases caused by pollutants produced by conventional forms of energy. A significant number of Member States, such as Germany, China, Kenya, Algeria, Japan, and the USA, are pushing towards a more renewable and clean energy source to preserve the environment and increase the standard of living for their people.

Committee Directive

This topic guide serves as a basic introduction to assessing the socio-economic impacts of wind and solar energy. Delegates should consider this guide as the first step in their research process and use it to help define their research. As fossil fuels are depleting more quickly than ever, it is the responsibility of the delegates of IRENA to address the current global energy crisis. Delegates are encouraged to collaborate with each other to create a solution addressing the impact of fossil fuels, the benefits of renewable sources of energy, and the challenges that come with developing wind and solar energy.

When developing your position, first, consider these questions as a guideline: What has your Member State done to address the energy crisis? Is your Member State working on developing renewable sources of energy? What programs can be developed and implemented to benefit your Member State and others regarding renewable energy? What solutions currently exist that IRENA can expand upon at the international level?

Further, be open and willing to challenge the current model for promoting international adaptation of renewable energy technologies. Is there a new and innovative approach that can be taken to decrease costs and increase efficiencies? Can your Member State serve as a global leader and example? Which renewable energy source is best for your geographic situation?

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application-for-groundwater-extraction/Sustainable-Energy-for-Rural-Areas-and-Groundwater-Extraction-D.Fong.pdf (accessed October 12, 2017): 9.

[157] "Sustainable Energy Solutions for Rural Areas and Application for Groundwater Extraction," Global Energy Network Institute, August 2014, http://www.geni.org/globalenergy/research/sustainable-energy-solutions-for-rural-areas-and-application-for-groundwater-extraction/Sustainable-Energy-for-Rural-Areas-and-Groundwater-Extraction-D.Fong.pdf (accessed October 12, 2017): 13.

[158] "Sustainable Energy Solutions for Rural Areas and Application for Groundwater Extraction," Global Energy Network Institute, August 2014, http://www.geni.org/globalenergy/research/sustainable-energy-solutions-for-rural-areas-and-application-for-groundwater-extraction/Sustainable-Energy-for-Rural-Areas-and-Groundwater-Extraction-D.Fong.pdf (accessed October 12, 2017): 14.

Technical Appendix Guide

Topic I: Combating Climate Change by Increasing Urban Energy Efficiency

Coutard, Olivier and Jonathan Rutherford. (2013) 'Urban Energy Transitions: Places, Processes and Politics of Socio-Technical Change', *Urban Studies*, http://journals.sagepub.com/doi/pdf/10.1177/0042098013500090 (accessed 6 November 2017).

Much like anything else in the realm of public policy, the urban energy transition is often politicized. This paper discusses not only the realities of that politicization but also how clean energy is implemented and where. The importance of educating the citizenry of Member States on urban development is also covered.

IRENA. (2015), 'Rethinking Energy: Renewable Energy and Climate Change', *International Renewable Energy Agency*, http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/IRENA-_REthinking_Energy_2nd_report_2015.pdf (accessed 6 November 2017).

The shift to renewable energy is intrinsic to the international effort to combat climate change. This report from IRENA details the agency's specific goals as related to the Paris Climate Accord and independent of the agreement. Information on current energy modes – both renewable and otherwise – are presented in a five-part format alongside several visual aids. The economic and environment advantages of the shift to renewables are touted.

IRENA. (2016), 'The Renewable Route to Sustainable Transport', *International Renewable Energy Agency, http://www.irena.org/-/media/Files/IRENA/Agency/Publication/2016/IRENA_REmap_Transport_working_paper_2016.pdf* (accessed 6 November 2017).

Transportation accounts for up to one-third of the world's energy consumption; and, the vast majority of transportation modes are not powered by renewable energy. However, demand for transportation continues to grow at a rate of one percent annually. This report explores ways in which such a demand can be met and how to improve the overall sustainability of the global transportation sector.

Kammen, Daniel and Deborah Sunter. (2016), 'City-integrated renewable energy for urban sustainability', *Science Magazine*, http://science.sciencemag.org/content/352/6288/922 (accessed 6 November 2017).

As the world population is expected to grow by 2.5 billion people in the next 33 years, urban areas must prepare to accommodate such an influx. Cities have a responsibility to mitigate their contributions to climate change. This article explores manners in which cities can reduce their environmental footprint – especially by reducing energy consumption and by incorporating renewable energy sources into the urban landscape.

Topic II: Assessing the Socio-Economic Impacts of Wind and Solar Energy

IRENA. (2016), "The Power to Change: Solar and Wind Cost Reduction Potential to 2025," *International Renewable Energy Agency*, http://www.irena.org/DocumentDownloads/Publications/IRENA_Power_to_Change_2016.pdf. (Accessed 7 November 2017).

This document analyzes the potential for cost reduction in solar and wind technology. It evaluates the ability to grow and expand on existing technology and ways to improve them in the future by 2025. By reducing the cost of wind and solar power technology, the technology will be more readily accessible to developing Member States.

REN21. (2016), "Renewables 2016 Global Status Report," *Renewable Energy Policy Network for the 21st Century*, http://www.ren21.net/wp-content/uploads/2016/06/GSR_2016_Full_Report.pdf. (Accessed 7 November 2017).

The Renewable Energy Policy Network has industry associations, international organizations, non-governmental organizations, national governments, and individuals from science and academia on the committee. The report outlines the importance of renewable energy. It analyzes cost effectiveness, capacity, and policies relating to renewable energy.

UN News Centre. (2017), "Cost of Renewables Fell in 2016, Lowering Global Investment in Clean Energy – UN," *United Nations*, http://www.un.org/apps/news/story.asp?NewsID=56512#.Whr_MLa-LVo. (Accessed 7 November 2017).

As of April 2017, renewable energy capacity reached a world record level leading UN experts on renewable energy to believe that cheaper and more cost-effective technology will follow. 138.5 gigawatts was added to the global power capacity in 2016 from clean energy sources. Overall, investment in renewable energy is rising.

United Nations. (2016), "Renewables Added More to Global Energy Generation Capacity Than All Other Technologies Combined, UN-backed Report Finds," *United Nations*, http://www.un.org/sustainabledevelopment/blog/2016/03/renewables-added-more-to-global-energy-generation-capacity-than-all-other-technologies-combined-un-backed-report-finds/. (Accessed 7 November 2017).

This report evaluates renewable energy usage in developed and developing Member States as well as comparing and contrasting renewable energy production with conventional fossil fuels like coal and gas. In 2015, developing Member States invested in renewable energy more often than developed Member States. The report found that renewable energy is becoming more central to the global economy.