

THE GLOBAL ENERGY CRISIS: CHALLENGES AND OPPORTUNITIES



AUGUST 2023

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In view of the current global energy crisis heavily affected by Russia's Invasion of Ukraine, oil strategy challenges, and climate change, what is the outlook for economic and security concerns? An interdisciplinary panel of U.S. and foreign experts discussed past lessons, evolving risks, and recommendations for conflict-resolution opportunities on national and international levels.

For video information please consult www.III.org and www.potomacinstitute.org.

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I. PREFACE

PROFESSOR YONAH ALEXANDER AND PROFESSOR DON WALLACE, JR.

EDITORS

A popular English proverb provides an insightful lesson of history, “He that would know what shall be, must consider what hath been. Things present are judged by things past.” Indeed, a realistic assessment of permanent factors of domestic and international life entails consideration of factors such as the struggle of power within and among nations.

It is not surprising, therefore, that throughout recorded history national, regional, and global energy security interests and concerns required a critical focus that is expanding with every passing year. Thus, interdisciplinary published and unpublished literature reveals infinite lists of relevant terms, concepts, trends, consequences, costs, and impacts on societies past, modern, and even, to the minds of some, predictable glimpses of thousands of years hence.

This extensive lexicon brings to mind topics such as artificial intelligence, business, coal, crime, cyber, diplomacy, disasters, economy, environment, gas, leadership, media, military, nuclear, peace, propaganda, science, solar, strategy, terrorism, and war.

By June 2023, these energy-related topics have grown substantially both at home and abroad. For example, in North America frequent storms in the state of Texas, have caused the Electric Reliability Council of Texas to ask residents to cut power consumption and turn up their thermostats amid rising temperatures. This has been a growing concern in Texas, as its power grid is largely cut off from the rest of the U.S.ⁱ

Colombia’s Ecopetrol is sustaining sales to Asia at about 45% of its crude oil production even with the competition from Russian oil forcing it to offer deeper discounts.ⁱⁱ

In Africa, cheap contraband petrol from Nigeria abruptly doubled in price. This caused black market fuel vendors’ and commercial drivers’ businesses to collapse in Cameroon, Benin, and Togo.ⁱⁱⁱ

In Europe, Germany’s energy prices have surged. Some companies are considering leaving the country altogether. Russia’s invasion of Ukraine continues to affect the rising increase of energy prices across Europe.^{iv}

China’s fulfillment of its green energy targets for 2030 looks to be five years ahead of schedule, but coal plants are increasingly being produced as a backup for new wind and solar farms. China’s increasing capacity to generate power from wind and solar could have a significant affect on limiting impacts of rising temperatures.^v

Saudi Arabia’s Aramco and France’s TotalEnergies have been awarded Engineering, Procurement and Construction contracts for the \$11 billion Amiral complex in Saudi Arabia. The award of the EPC contracts marks the start of construction work on the joint petrochemical expansion.^{vi}

Australia’s government made a \$66.35 million investment into the Waratah Super battery. The project is aimed at helping ease demands on the grid as the Eraring coal power plant is set to be decommissioned in 2025.^{vii}

The Organization of the Petroleum Exporting Countries (OPEC) announced that global oil demand will rise to 110 million barrels a day in about 20 years, increasing the world’s oil demand by 23%.^{viii}

An International Atomic Energy Agency (IAEA) mission stated that Croatia remains committed to addressing the challenges of managing its radioactive waste shortly after the Integrated Review Service for Radioactive Waste and Spent Fuel Management Decommissioning and Remediation (ARTEMIS) review team concluded a nine-day mission to Croatia.^{ix}

With the upcoming UN climate talks in November 2023, representatives have argued for a plan to fight climate change by welcoming oil and gas companies to participate more fully in the talks, with energy use derived from fossil fuels accounting for more than two-thirds of global emissions.^x

These random media reports and many thousands of previous instances have been continuously considered by contemporary scholars, professionals, and policy-makers.

Academically, nearly seven decades ago, an emerging field of challenges to modern energy security was developed at the University of Chicago. Following the suggestion and encouragement of Professors Hans Morgenthau and Quincy Wright, a young graduate student from Israel prepared a dissertation on, "The International Status of the Upper Jordan River."

Following their recommendation, Yonah Alexander prepared his study during 1952-1955, with additional guidance from academics and diplomats at the United Nations and elsewhere.

This work delved into water security and energy concerns in the Middle East and other regions as well as fields of geography, history, politics, engineering, geology, and international law.

Subsequently, academic work for a PhD in Public Law and Government at Columbia University continued on terrorism and the role of international organizations to combat global security threats under the guidance of Professors Philip Jessup and Leland Goodrich.

Following on this, some years later Dr. Edward Teller served as Chairman of the International Board of the Inter-University Center for Terrorism Studies (IUCTS), an academic structure that included colleagues such as Madeleine Albright, Ray Cline, and Stuart Eizenstat. An early study in this field was published on Political Terrorism and Energy: Threats and Responses co-edited by Charles K. Ebinger and Yonah Alexander in cooperation with the Center for Strategic and International Studies (CSIS) at Georgetown University and released in 1982.

The focus of our work were critical issues related to certain components of national and international basic industrial infrastructures, including oil, gas, hydroelectric, coal, nuclear power operations, comprising production, distribution, upgrading, and storage facilities, to mention a few.

These topics were raised within the IUCTS framework of the growing nature of conventional and non-conventional threats of global terrorism.

This early academic effort has expanded considerably over the years via published books, academic journals, university courses, and educational forums. This vast knowledge base is collected at Stanford University's Hoover Institute Terrorism Collection as well as available in private and public libraries around the world.

More recently, an Ambassador's Forum was held on, "Global COVID-19 and Energy: Threats and Responses" and hosted on June 25, 2020. Speakers included General (Ret.) Wesley Clark (Retired U.S. Army General, former NATO Supreme Allied Commander); Distinguished University Professor Rita Colwell, University of Maryland, College Park and Johns Hopkins University Bloomberg School of Public Health; Ambassador (Ret.) Andras Simonyi (The Atlantic Council); Ambassador (Ret.) Gerald Feierstein (Senior Vice President of the Middle East Institute); Professor Shireen Hunter (Georgetown University); Ambassador (Ret.) Charles Ray (Former U.S. Ambassador to Cambodia and Zimbabwe); Ambassador Pjer Simunovic, The Embassy of Croatia; and Dr. Anthony Fainberg (Former U.S. Government Official).

Another updated virtual event titled, "The Global Energy Crisis: Challenges and Opportunities" was held on September 15, 2022. Distinguished contributors to the virtual Forum were Dr. Dov S. Zakheim (Former Under Secretary of Defense (Comptroller) and Chief Financial Officer for the Department of Defense); Brigadier General (Ret.) David G. Reist, USMC (Senior Fellow at the Potomac Institute for Policy Studies; and former Assistant Deputy Commandant, Installations and Logistics Department, US Marine Corps); Jane Nakano (Senior Fellow in the Energy Security and Climate Change Program, Center for Strategic and International Studies (CSIS); Ambassador (Ret.) Charles Ray (Former U.S. Ambassador to Cambodia and Zimbabwe); Ambassador Zango Abdu (Country Manager, USIP Nigeria; Former Deputy Chief of Mission, Nigeria Embassy, Washington DC); Ambassador Pjer Simunovic (Embassy of the Republic of Croatia); and Professor Robert F. Turner, SJD (Former Distinguished Fellow, Center for National Security Law University of Virginia; Assistant Secretary of State for Legislative Affairs; Consular to the President's Intelligence Oversight Board in the White House).

In view of the critical strategic implications of energy concerns, the current report released in August 2023 consists of both academic efforts held in 2020 and 2022. For video information please consult www.II.org and www.potomac institute.org.

ACKNOWLEDGEMENTS

On a personal note, Professor Alexander wishes to express his deep appreciation for the decades-long academic and professional partnerships with the Potomac Institute for Policy Studies and the International Law Institute; Thanks are due particularly to PIPS's Dr. Jennifer Buss (CEO), General Al Gray (USMC (Ret.), Chairman of the Board), and Gail Clifford (VP for Financial Management & CFO). Likewise, he is most grateful to the ILI's Professor Don Wallace, Jr. (Chairman), Robert Sargin (Director), and ILI interns; Makayla Pulliam (Northeastern University); Emeline Benson (Brigham Young University); and Jinze Zhang (Pomona College).

Finally, thanks are also due to Kevin Harrington (coordinator of the IUCTS internship program since January 2021) who provided partial research and administrative support for this publication in conjunction with our graduate and undergraduate student interns: Rebecca Abbott (John Carroll University); Adrik Bagdasarian (James Madison University); William Brooks (George Washington University); Louisa Burch (American University); Andrew Conarty (DePauw University); Skyler Edinburg (University of Michigan); Nina Harbison (University of St. Andrews); Abigail Kodidek (University of Chicago); Harrison Kopitsch (American University); Nick Markiewicz (University of Georgia); Royon Meerzadah (Carnegie Mellon University); Evan Rohe (University of Kent); Daniella Semper (Fordham University); Loren Sera (American University); Harry Thoeny (University of Richmond); John Watters (Colby College); and Julia Young (Duke University).

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II. SELECTED HIGHLIGHTS [DRAWN FROM THE SEPTEMBER 15, 2022, FORUM'S PARTICIPANTS]

1. The ongoing war in Ukraine threatens its energy supply. Examples include the recent shut-down of the Zaporizhzhia nuclear power plant, which provides 20% of Ukraine's energy, and the safety of pipelines in Ukraine and Nord Stream 1 and 2.
2. Russia has threatened to cut off gas supplies and continues to sell oil as well as gas to China in order to finance the Ukraine invasion.
3. The Saudis and Russians are working together to limit energy production against Western and American interests.
4. If European countries choose to follow the lead of the British government and put a cap on energy costs, they will make life livable for their citizens at a very large cost.
5. European countries are competing for alternate sources of energy as Russian threats continue. For example, France and Italy are competing for energy from Algeria.
6. If citizens are anticipating financial assistance to buy energy at a reasonable price, countries are going to experience pressure on defense spending.
7. Countries with heavy 'Green' party influence will receive constant pressure to make nuclear power the alternative to fossil fuels.
8. Turkey and Greece are competing for gas fields and pipelines in Israel, as Greece, Cyprus, and Israel already have an agreement without Turkey.
9. The Lebanese-Israeli issue intensifies with the constant threat by Hezbollah to attack Israeli pipelines.
10. Israel is beefing up new naval forces in order to protect their gas fields against Hezbollah.
11. Fracking, as an alternative source of energy, is under great pressure by environmentalists.
12. China remains the largest buyer of Russian petroleum, creating a source of revenue for Russia even if at a discount.
13. Reducing energy pricing escalations has reached salience at both domestic and global levels. Initiatives associated with Energy Savings Trust in England are great examples of what can be done.
14. Avoiding spillover and hidden costs of raw or finished goods must be directed to simultaneously offset climate change and energy efficiency.
15. As the Deputy Commanding General in Iraq, General Reist experienced first-hand interactions within Iraq's Akkas gas and oil reserves and foreseeable plans to reroute the pipeline from Budko to Kirkuk reserves to Southern Turkey and Austria. The intention was to obviate the reliance on Russian fuel.
16. Other companies such as Korean Gas, Total Energies, Halliburton, and Delta Oil all attempting to work collaboratively with the Ministry of Iraq and the Iraqi state-owned enterprise Midland Oil to cease dependability of Russian oil.
17. Bad-state actors from Iran and complexities of ethnic cleavages, sectarianism, and secularism between Kurds and Shias interface efforts for innovation and energy security.
18. A Marshall Plan composed of key members of a consortium of nations could tackle climate change and energy security globally and counteract interruptions and interfaces that hinder human crises at large.
19. Mineral demand for electric vehicles (EVs) could grow ten times in the future.
20. China has roughly a third of the planet's mineral reserves, they have two thirds of the processing power, and they produce 85% of this specific resource.
21. Due to the recognition of this resource's value, China's consumption rate of minerals grew 7.5% annually between 2004 and 2014.
22. China's embargo on Japan, the United States, and the European Union was largely to showcase how significant their mineral reserves are in the global system.
23. Since the beginning of the Biden Administration, the federal government has been working towards the restoration of some of the United States' own mineral reserves.

24. The clean energy sector has grown so large that the United States is unable to alter it without having major ramifications on the job market.
25. An adjustment of critical mineral supply chains will most likely help with the fight against climate change.
26. Energy price shocks have had an impact on multiple sectors, especially in food production.
27. It is important to develop both the fossil fuel and renewable energy sectors, while balancing economic development and environment preservation.
28. Supply chains should always help to promote countries' economic growth. Also, it is important for countries not to become over dependent on some suppliers in this interdependent world.
29. The energy crisis needs to be addressed through striving for a global consensus on how to mitigate its impact.
30. The lack of fertilizer resulting from the Russia-Ukraine war has further exacerbated food crises in the developing world caused by climate change, poor agricultural processes, and a lack of education.
31. The shortage of nitrogen fertilizer crucial to the majority of subsidized agriculture in Africa has further worsened the food crises.
32. The populations in Africa still depend on subsidies for fossil fuels, thus leading to their large importation of refined petroleum and other products from Europe.
33. Large subsidies for refined petroleum products are unsustainable, with it currently accounting for 50% of the total budget for Nigeria.
34. The Marshall Plan should be extended to a global level to combat the energy crisis.
35. The African Development Bank created a robust plan titled "the New Deal on Energy" which provides Africa with a transition plan to renewable energy.
36. The attention paid to the potential nuclear disaster in the war between Russia and Ukraine as well as the Iran Nuclear Deal should be paid to the larger global plan to combat the energy crisis.
37. The energy crisis should not be left to the geopolitical dynamics between China and other countries.
38. China is buying up oil and energy supplies for its own strategic interest, rather than for its global interest.
39. China and India account for more than 50% of global renewable energy technology.
40. The use of renewable energy has not disappeared, but it has slowed down immensely due to the energy crisis that the world is currently facing; many have begun relying on fossil fuels.
41. Emphasized the importance of the U.S. LNG output for everybody, but specifically Europe. Touched on President Biden's promise to increase the LNG output in order to replace Russia.
42. Croatia has demonstrated that liquefied natural gas (LNG) can replace Russian oil and gas in the near term as the world transitions to renewables. Specifically, Croatia recently built a "floating LNG terminal" that began producing 2.6 billion cubic meters per year and will soon produce 6.1 billion cubic meters per year.
43. By reducing the supply of oil and gas available to Europe, Russia has inadvertently created auspicious conditions for nascent oil and gas producers, e.g. Suriname and Guyana. .
44. Many states in Europe have been trying to move away from having a single supplier for oil. These states want options and to work with suppliers that are more stable. The overall trend is replacing Russia as a supplier.
45. The main concern is that many states have turned to fossil fuels as an immediate solution, but this is not a long-term solution. Once things are satisfactory again there will be an opportunity to phase out fossil fuels and fossil energy.
46. The pressure for a deal on JCPOA will continue at least in the medium term due to the need for the West to obtain Iranian oil.
47. The Iranians put a condition on the IAEA investigation on tracing nuclear materials.
48. If the JCPOA deal is reached, it will inevitably lead to huge sources of funds that will transfer in parts to terrorists like Hamas and Hezbollah, which could cause regional instabilities.

49. It is not likely for countries to find other sources of energy in the immediate future. As people are freezing and starving in this energy and food crisis, governments should quickly get their hands on energysupplies.
50. There is a growing competition between China and the United States on their nuclear civilian levels and growth rates.
51. As time progresses, China has slowly improved in creating nuclear units. In the last decade, they have put 35 units online, roughly ten more than Russia.
52. Thus far, China has only exported its nuclear technology to Pakistan, but it is likely that they will export their nuclear products to Europe, the Middle East, and Latin America.
53. China plans on increasing their civilian power fleet from 50 gigawatts today to 75 by 2025. If this is done successfully, China will be the second largest civilian nuclear country, surpassing France.
54. Countries must have their own ability to produce and maintain the critical components of renewable energy, rather than letting China dominate the sector.
55. Renewable energy is a viable option to combat the energy crisis, as demonstrated by countries like China and India, which are making inroads in this discipline.
56. The weaponization of energy to hold other countries at ransom is a new challenge related to the energy crisis.
57. One downside to renewable energy and other alternatives is the heavy investments required to develop their infrastructure.
58. Food security and provision of basic essentials should be a global aim, and world peace could facilitate the subject of energy.
59. We have to be realistic when considering the energy crisis, for 80% of the world's energy needs are still satisfied by fossil fuels.
60. Many of the Republicans are not fully educated on the climate crisis. The liberal intelligentsia should get over the world's phobia on nuclear energy which creates less fatalities.
61. There are many non-energy problems related to security due to nasty suppliers such as Russia and China. American companies gave up their access to cobalt in the Congo and Saudi Arabia is not a very pleasant supplier to turn to due to its dependence on Iran.
62. Terrorist groups in different countries, even lone wolves, target energy suppliers' facilities, personnel, operations of energy systems, and infrastructure. It is not only up to the government but also to the companies of the private and energy sectors to enact counterterrorism strategies.
63. A Marshall Plan coalition's methodology and approaches to related global crises could be groundbreaking.
64. The ideal composition of a Marshall Plan consortium of nations would be five key representatives from the United States, Europe, Africa, Middle East and Far East.
65. Preferably, President Obama would be a critical figure and ideal person in charge of a Marshall Plan, then Chancellor Merkle because of their leadership styles to manage and resolve crises.
66. It will take time to recreate the dynamics of strong renewable energy research and work that existed prior to the conflict between Russia and Ukraine.
67. Governments are stuck in a bad situation because of the burning of coal and oil because, while they do not want people to keep dying from hunger and cold, they also do not want to continue the cycle of climate change.
68. Climate change will reach a certain percentage point of no return and it will be too late to reverse the consequences, such as our current effects of altered and extreme weather patterns.
69. The energy crisis due to the Russian-Ukraine conflict is also a food crisis as fertilizer production relies heavily on liquid natural gas.
70. The U.N. must commit to its Article 1 Charter of upholding international security and peace through enforcement of collective security.

71. Incentives matter and NATO members resisting Putin's aggression sets an example to other potentially hostile nations such as China, Iran, and North Korea all of whom may see any appeasement to the Russian invasion as validation that the rules-based system will not be enforced.
72. An ultimatum should be issued to Putin: withdraw from Ukraine or face war crime charges and a fate similar to German Nazis post-WWII.
73. NATO should persuade countries such as India and China who are buying Russian energy that doing so is against their interests, namely because it harms world peace.
74. It is critical to not let the short term demands of the Russia-Ukraine conflict distract from the long-term goal of proliferating renewable energy.
75. Individual states should resist energy dependence on any single other nation, namely Russia and China. Germany's recent reliance on Russian gas proves this geopolitical pitfall.

III. CONTRIBUTORS' PRESENTATIONS

This section of the report consists of presentations made by the contributors at the Special Forum: "The Global Energy Crisis: Challenges and Opportunities" that was held on September 15, 2022, via Zoom conferencing. Some updates and revisions were made by the invited participants.

DR. DOV S. ZAKHEIM

FORMER UNDER SECRETARY OF DEFENSE (COMPTROLLER) AND CHIEF FINANCIAL OFFICER FOR THE DEPARTMENT OF DEFENSE

It is certainly good to see some friends here. Professor Robert Turner and I go back many years. Ambassador Charles Ray and I know each other quite well. I appreciate the opportunity to kick off this distinguished panel of important discussions. We have some very important people from around the world who are tuning into this discussion of the energy crisis. This is a huge subject, and there is no way I am going to cover everything, which is probably good because that gives much for my fellow panelists to discuss.

Let me go through several points. First, and most obvious, it is going to be a very cold winter in Europe. Mr. Putin is threatening to cut off gas supplies, and the Europeans are taking him very seriously. Whether Mr. Putin would do so or not is a whole other issue. He is selling gas and oil to the Chinese at a discount, and his sales to Europe are financing him as he continues the horrible war that he started.

As already mentioned, the Saudis and the Russians seem to be working together to limit production, which is against Western and American interests. One would have hoped that Mr. Biden, who went to Saudi Arabia and met with the Crown Prince, would have obtained some sort of commitment, but he did not. The Saudis seem to be more inclined to work with Russia than with the U.S., which raises a lot of other issues that are probably beyond the scope of this discussion.

One possibility is that the Europeans will follow the lead of Liz Truss, the new Prime Minister of Britain, and put a cap on energy costs, which is going to cost a lot of money. It will cost the British taxpayers hundreds of billions of pounds. On the other hand, it is going to make life livable for the people of Britain, and hopefully, other countries will do the same. (That cap is now being reversed.)

There have been other problems and challenges for some of the European countries. For instance, they are competing for alternate sources of energy. One example of that competition is that President Macron went to Algeria, but the Italians already had an agreement with Algeria. There might be other competition amongst Western European and Central European countries to get whatever they can get from somewhere other than Russia.

There is another issue: If people anticipate financial assistance to people who need to buy energy at a reasonable price, countries that follow Liz Truss are going to generate tremendous pressure on defense spending. In Germany, rumors indicate that it is going to be very tough to meet the \$100 billion commitment to increase the defense spending that Chancellor Scholz talked about. Germany has another issue: the government is full of Green Ministers. For instance, the Vice-Chancellor, Mr. Habeck, is Green. The Foreign Minister, Annalena Baerbock, is Green. The Minister for Food and Agriculture, Cem Özdemir, whom I happen to know, is Green. Svenja Schulze, the Minister for the Environment, is Green. The Greens do not like nuclear power, the major alternative to fossil fuels. The Germans have postponed closing three nuclear plants because they recognize the energy challenge, but there is going to be constant pressure on nuclear plants, which only complicates the challenges for countries that must find alternate sources of energy.

I also want to mention the issue of pipelines. We heard earlier about a pipeline across Ukraine that gives it some leverage. Their military is doing quite well, which is giving them even more leverage in their moving ahead on three fronts. But the issue is that the Eastern Mediterranean does have gas fields. Greece, Cyprus, and Israel have an agreement in terms of coming up with a new pipeline. The Turks want to have an agreement with the Israelis for a pipeline. The problem is that the Turks and the Greeks are at each other's throats.

The further problem is the Lebanese-Israeli issue. Amos Hochstein, the U.S. Special Envoy, is trying to work on a deal. But it is not simply a matter of working to deal with the Lebanese government. The U.S. government should make sure that Hezbollah is not going to oppose it, as Hezbollah seems to keep threatening to go after the Israeli gas fields. (An agreement was reached subsequent to this presentation.)

In response, the Israelis have beefed up their navy. They have acquired a new corvette called the Sa'ar Six, which I happened to have been aboard a few months ago. It is an impressive missile ship. The Israelis are also acquiring smaller 65-ton Shaldag boats that can steam at 40 knots, which is about 45 miles an hour. These measures will help protect the gas fields. Nevertheless, the Israelis have the constant threat of Hezbollah attacks, which would make the energy situation in Europe a lot worse.

There is an alternative source of energy: fracking. Liz Truss hinted that, despite Britain's previous commitment to not frack, they might go ahead and do so, even though they already pushed off a carbon-neutral Britain for another 20 years or so. There is pressure for fracking in the United States as well. Whether it is the United States, Britain, or Continental Europe, they face the challenge of environmentalists who oppose fracking, and when there are environmentalists in the government, as there are Greens in the German government, another option is closed off.

Let me mention two other points. First is the JCPOA. It is important to think about the JCPOA in the context of the global energy crisis because the deal, as envisaged by those who want it, is essentially to open up Iranian oil and make it immediately available, since right now Western Europe, Central Europe, and the United States all need it. The deal seems to be on hold currently, but it might well happen once a new Congress sits in January, simply because it may well be the Democrats holding the Senate and the Republicans taking the House, resulting in a stalemated government. In such circumstances presidents tend to focus on foreign affairs. At that point, Mr. Biden may push for a deal in which most of the senior advisers, including himself, are involved. There are many downsides of the deal that may be beyond the scope of this discussion, but bear in mind that these downsides too have an impact on the availability of oil.

Second point: China is the biggest buyer of Russian petroleum right now. Their trade is up 17% this summer. Even though Russia's oil is being sold at a discount to China, it is still a source of revenue. How that plays out and what that does to help Putin is very important. It is energy that ties into so many other issues that are challenging world leaders right now. How the gas crisis and the oil crisis play out will have an impact and will be impacted by a whole host of other issues.

BRIGADIER GENERAL [RET.] DAVID REIST, USMC

*SENIOR FELLOW AT THE POTOMAC INSTITUTE FOR POLICY STUDIES AND
FORMER ASSISTANT DEPUTY COMMANDANT, INSTALLATIONS AND LOGISTICS DEPARTMENT*

Yonah, thank you very much. I would also like to thank you for including me in this very robust panel. When there are challenges, there are also opportunities just like on the battlefield, and you must take advantage of those things. I will mention a couple of thoughts: The need to curtail the energy price escalation right now, both in the U.S. and globally, is paramount, which was mentioned in reference to what the Prime Minister is doing in England or is looking to do. We need to look at all opportunities and shape the dialogue, and not let a singular voice champion any single source of energy. This happens especially as the American people look at it, not necessarily this group, but too often, somebody will see a report on TV or will read an article, and they will assume it is the greatest thing since sliced bread, and why are we not moving on? We need to be very cognizant of strategic material competition in building things in the future that look to be very energy efficient but could really hurt us, especially when we rely on other countries for that material. As mentioned before, we need to balance climate and energy. It is not one or the other, it will have to be both, and that pendulum is going to have to swing across the next couple of years, the next couple of decades, most likely. We need to understand the price of investment versus the price of return (on several of these initiatives that are out there); just because it is a good idea; due to there being hidden costs in everything at this point in time.

As previously mentioned, we need not be held hostage by singular countries who happen to have a little more robust capability than others, and we need to grasp opportunities when we see them. I saw this as the Deputy Commanding General for Economics and Governance in the Anbar province in 2006 and 2007 (the title stipulated Economics and Governance), but what it really meant was tribal engagement. I learned about an area, the largest gas reserve in Iraq, called the Akkas gas and oil field. At the time, if oil was \$56 a barrel, the Akkas were valued at over 2 trillion dollars. It was planned to feed the Nabucco pipeline along with reserves from Kirkuk and designed to go through southern Turkey and into Austria, which was meant to obviate the reliance on Russian gas. Imagine if that was built and the impacts of today. Now, I am not downplaying all the complexity of the consortium of nations and events that need to happen to bring something as such to bear. They are significant, and I am also not downplaying the interface between the Shias and the Kurds in a country like Iraq. Akkas and the numerical estimation of 5.6 trillion cubic feet of gas is something I witnessed, I am not sure what it entails, nonetheless, and it is significant.

At the time, Korean Gas was present, and on the western side of Anbar province, a place called Korean Village, they were set to go. Now, there are other companies that have come to bear lately. Total Energies have put 27 billion worth of projects on the table for that, and the whole concept now falls under the Ministry of Oil in Iraq, which has happened over the last year or two. It is occurring from under the Iranian anchor that they are wed to. Now, that comes with some issues. The Saudi oil company, Delta Oil, is in the mix now, and those alliances are coming into play. Midland Oil is a state-owned enterprise in Iraq, and they are going to get a slice. Halliburton is part of this, and they are going to be part of it for drilling, and the Iranians know exactly what is going on, and they have terrorists trying to stop this. At this point in time, the Iranians will do everything they can to turn it off. The complexities of these things, as mentioned by the honorable Mr. Zakheim, are going to exist across the globe, and they will cause havoc.

I would argue a big idea is required right now, and the United States might be able to lead it. This is thinking big, and I like to dream, but could the United States have a version of a Marshall Plan relative to a consortium to collaboratively get after energy for those willing to play? This is going to be a global problem that is going to continue for decades, but it is going to take leadership, investment, and vision to see the end state versus the initial cost.

JANE NAKANO

SENIOR FELLOW IN THE ENERGY SECURITY AND CLIMATE CHANGE PROGRAM, CENTER FOR STRATEGIC AND INTERNATIONAL STUDIES (CSIS)

Thank you so much for having me today. Brigadier General (Ret.) David Reist has kindly provided the perfect segue to the topic that I want to share with everyone: the geopolitics of critical mineral supply chains.

Oil has been the key energy source shaping geopolitics for much of the last century, and I think our view on energy security largely derives from the oil supply crisis of the 1970s. As a result, we've come to associate energy security issues with places like the Middle East, and I think more recently with Russia.

As energy transition is underway, we are starting to focus on clean energy technologies, and how their component minerals affect our energy security and geopolitics. Specifically, the security of supply chains for clean energy technologies and their component minerals has become a priority for many of the major liberal market democracies, including the United States.

Why? There are roughly three reasons. Firstly, the demand for critical minerals is expected to grow exponentially as more consumers and industry participants want to use them for clean energy technologies. According to the International Energy Agency, which is based in Paris, the mineral demand for EV electric vehicles alone could grow ten times under what they call "stated policy scenario", where all the policies that are currently out there are implemented.

Second, clean energy technology and component mineral supply chains, in my view, have emerged as an area of geoeconomic competition mainly between China and the West. But to some extent, this is also the case among Western economies because many economies want to be able to benefit from this clean energy value chain growth, and do not want to become more import dependent in order to deploy more clean energy technologies.

China today has about a third of rare earth reserves, two thirds of the global processing capacity, and they actually supply about 85% of the rare earth today. They also are extremely competitive in processing critical minerals like Lithium. Cobalt, for example, even though much of the cobalt supply comes from DRC, the Democratic Republic of the Congo, many of the mines there are owned by the Chinese and processed by the Chinese, feeding the supply to their higher value products that are manufactured by China today.

I wanted to also note that I think China is also starting to become more import dependent for these minerals. That is because, unlike two or three decades ago, China today is a major manufacturer of higher value-added products, such as electric vehicles, computers, and many high-tech products.

As a consequence, the Chinese consumption of these minerals is increasing. For example, Chinese consumption grew at about 7.5% annually, between 2004 and 2014; they're really starting to be much more dependent on the global supply chains than before. In that sense, I guess one could say that we do have this shared interest in seeing the global supply chains become much more diversified and more players that can supply these minerals.

The third reason is that China has long recognized that there is economic value associated with rare earth elements and other critical minerals, but in recent years China really seems to see them as a geopolitical leverage that it could use against the West. At one of the heights of the trade tensions, Xi Jinping and his chief trade negotiator actually visited a rare earth processing facility in Jiang Xi province, which is known for its rare earth wealth. This visit happened in May or June of 2019. The visit is largely understood to be Xi's message to the United States that the Chinese do

have leverage, or they have something that we do not have which is really important for our economic and industrial competitiveness.

In many ways, interdependence itself is not a bad thing, but the heavy dependence that could be exploited geopolitically is a great problem. The successive, recent U.S. administrations have recognized that problem, particularly since China's non-official embargo of rare earth supplies to Japan, the U.S., and the E.U. back in 2010. The successive administrations have tried to address that; we have invested quite a bit in research and development for substitutes, to reduce the requirement for critical minerals, and international cooperation has been another key focus.

Since the start of the Biden Administration, the Defense Production Act has been used to help revitalize some of the upstream, critical minerals capacity in the United States. The DOE (Department of Energy) Loan Program Office has become quite active, mainly tied to the Advanced Technology Vehicle Program, but the idea is to try to revitalize or establish more robust and resilient EV battery supply chains that certainly have not just the clean energy benefit but also for strategic and DOD (Department of Defense) related defense benefit.

If anyone has questions about the bipartisan Infrastructure Act, which has set aside a lot of money for research related to critical minerals, and also the more recently passed Inflation Reduction Act, that also strongly supports EV battery supply chain programs, I'd be happy to answer them later.

I've heard some folks ask, "why do we try to shift away from fossil fuels if clean energy or the energy transition comes with all these challenges, energy security and geopolitical challenges? Is it not in our interest to just stall that shift?" I think there are so many reasons why that's not the right way to think. Right at the moment, the clean energy sector is no longer a niche sector. It actually generates economic benefits, including a growing number of jobs. So, for that reason, it is not something we can really make a huge turn away from.

Clean energy technology also has energy security related benefits. That is to say when oil supply-chains are disrupted, oil prices increase and that immediately affects consumers. But, when it comes to critical minerals, they are already part of energy infrastructure, so you do not need to have a continuous supply of minerals in order for your EVs to keep running and your wind turbines to keep turning or running. It comes with a different set of challenges, but it also comes with its own set of energy security benefits.

Last but not least, critical mineral supply chains are fundamental for decarbonization. Climate change is a real crisis, and addressing critical mineral supply chains has a multitude of benefits even though it does come with its own set of geopolitical challenges and industry security concerns.

AMBASSADOR [RET.] CHARLES RAY

FORMER U.S. AMBASSADOR CAMBODIA AND ZIMBABWE

Thank you for including me in this distinguished panel of experts but let me say upfront that I am not an energy expert. I look at the energy crisis from the standpoint of general conditions within countries and relations between and among countries because it is not just an energy crisis. I think that this is something policymakers need to really understand in order to effectively address it. It is a broad crisis that affects a lot of things outside the energy sector. When energy prices go up and/or energy supplies go down, you affect the cost and the availability of many things, especially in the less developed world. For example, a reduction in supplies of fuel means less fertilizer which may slash food production, so you have an issue of food security in a lot of the poorer countries, and that must be dealt with. Those are just some of these broad challenges.

Some of the other challenges that have been alluded to, and I agree with them, but I would say that while we cannot make a complete U-turn from fossil fuels, I would hope that in this current crisis, we would not let it push us too far away from renewable energy sources. That will be critical in the coming decades. Another issue also, I was listening to the recording of a conference of African energy ministers a few days ago. One of the decisions of that meeting was that they resolved that their fuels, such as petroleum and gas, would be diverted to their own economies rather than to exports, even though this means that they would not be able to meet the carbon-neutral targets that they previously established. They are looking at developing their economies and giving that priority over preserving the environment. This is an issue that really must be looked at very carefully, and we need to make sure that we don't let our preoccupation with solving the energy crisis cause us to lose sight of the fact that we still must protect the environment. It does no good to have all the energy that you need if you destroy the environment to the point where people cannot live in it anymore.

What we need is a global solution. This is not a problem that any one country or even one small group of countries will be able to solve. We need to look on the whole at issues of supply chains and how we construct supply chains that provide the necessary things for our economies to keep growing. While the world is interdependent, and that's not going to change, we need to prevent a situation where we are not interdependent but overly dependent. The Russian invasion of Ukraine showed the danger of that because when you become overly dependent on a single or narrow set of supply sources, you leave yourself open to some very uncomfortable situations.

AMBASSADOR ZANGO ABDU

COUNTRY MANAGER, USIP NIGERIA; FORMER DEPUTY CHIEF OF MISSION, NIGERIA EMBASSY, WASHINGTON DC

Thank you very much. It's a great honor to be a member of this very robust, rich panel of experts. Like Ambassador Charles Ray mentioned, I am not an expert but a keen follower of current global affairs, particularly those related to the energy crisis.

Now, I would like to thank Professor Yonah Alexander for this wonderful and innovative conversation about energy. It is very apparent that it is really a part of global security challenges. As several of the speakers highlighted, it is not a quick fix. It is not the concern of individual nations. This is a global challenge, and I think that we need to come together to address it.

One key thing that derives from this conversation is that we urgently need a major consensus at the global level on how to deal with this crisis. It is very unprecedented, and the way it is moving, the magnitude, the speed and the coverage, are such that it raises a lot of concern.

I'm particularly concerned about three major issues that have been highlighted. First, in one way or another, some speakers have highlighted the food crisis. And I think that Ambassador Ray highlighted it very eloquently. For those in the developing world, this is a major concern. The energy crisis has put a major challenge on the issue of food. We already have a food crisis arising from climate change, very poor agricultural processes, and a lack of education. The fact that a large chunk of agriculture in developing countries depends on nitrogen fertilizer, and this important material is currently not being supplied, is indeed a cause for major concern. Available data indicates that 50% of agriculture across the globe is dependent on fertilizer. And if you look at the continent of Africa, a large chunk of it is subsidized agriculture. The lack of fertilizer has put a lot of strain on farmers causing an alarming food crisis across the continent. The little effort that the United Nations (UN), individual countries, and multilateral organizations have been making is currently being rubbished by this energy crisis. So, of course, you know that it took a major effort by the UN to broker an understanding or agreement between Russia and Ukraine so that suppliers of wheat and other strategic grains have resumed. And even with that, I think only one shipment has reached the continent. So, it really shows clearly that this is one aspect of the energy crisis that has afflicted the continent.

The second level has to do with the subsidies. For most of Africa, including Nigeria – even though we are the leading producer of crude oil – the population depends on subsidies. Due largely to poor refining capacity, we import a large chunk of refined petroleum and other related products from Europe. These are no longer coming due to acute shortages in Europe. The little that comes at a very high cost, so the government has to subsidize the price to enable people to afford it. Very recently, the subsidy for petroleum products in Nigeria is almost 50% of the total budget for the country, which is clearly unsustainable.

The issue of subsidies in Africa is very sensitive. The removal of subsidies across countries in Africa – Nigeria, Egypt, South Africa, Uganda, and Kenya – caused considerable unrest against the governments. However, most governments have no option but to accept the basic truth – to remove them. Because if they sustain them, they will not be able to undertake any development plans. They will not be able to finance education, health, or infrastructure.

Some have argued that the removal of subsidies is indeed a threat to democracy. There is a close relationship – which I think Jane Nakano highlighted – between these subsidies and the democratic gains. But the gains we have made in democracy could easily be undermined if they're not handled properly.

The other area of concern — and I am glad that Brigadier General (Ret.) Reist raised the very important issue — is a Marshall Plan for the U.S. to address the energy crisis. However, I think it should be a Marshall Plan at the global level. As the last speaker, Ambassador Charles Ray, highlighted, this is not an issue for one country or group of countries because we have seen a robust reaction in Europe, headed by Britain and Germany, on alternatives to supplies. To try to bring down the level of discontent and give people a sense of security.

But it is not about one group of countries or a group of nations or individual nations. The African Development Bank had put a very robust plan, which they called the New Deal on Energy for Africa, forward. Recently, in Nigeria, we have also articulated a wonderful transition plan for energy, focusing largely on renewable energy. Nigeria's Vice President was in the U.S. recently to market the transition plan, and he got a series of commitments. Indeed, two days ago, a Special Envoy on Climate Change, Senator John Kerry, was in Abuja trying to see how the United States can help Nigeria navigate through the transition plan.

But I believe this is inadequate. I think we need a more robust global plan to deal with the crisis. It is not a quick fix. If we focus our attention, as is being done with the potential nuclear disaster in the war between Russia and Ukraine or the Iran Nuclear Deal, we can indeed confront the energy crisis at the global level, especially if we factor in a robust Marshall Plan.

These are the challenges, but challenges come with opportunities. As Jane Nakano highlighted, the opportunities lie in coming together, in trying to chart a course that will bring a more prosperous world. When we look at what they call the “new international economic order,” we must address it in terms of energy security so that everybody is brought on board to confront this major challenge to global security. I think this crisis is not really being addressed in the most systematic way it ought to be at the global level. I think the UN needs to do something, particularly the leading countries, the United States, and the leading powers in Europe.

Finally, I believe the energy crisis should not simply be seen from the context of geopolitics, dynamics of the rising influence of China, and other key players. China is buying up all the oil and energy supplies from all over the world and building strategic reserves. China and India account for more than 50 percent of renewable energy technology in the world. We do not know what their response will be when they take full control of the global energy resources. What is certain is the fact that they are more concerned with their own strategic interests.

However, at the global level, we need to focus more on global interests: the issues that will save the world from a catastrophe. So, I think I will stop here, and once again, thank you for this very important opportunity for me to share my concerns.

IV. COMMENTATORS' REMARKS

This section of the Report consists of comments made by the commentator at the Special Forum made by the commentator at the Special Forum: "The Global Energy Crisis: Challenges and Opportunities" that was held on September 15, 2022, via Zoom conferencing. Some updates and revisions were made.

AMBASSADOR PJER SIMUNOVIC

EMBASSY OF THE REPUBLIC OF CROATIA

I would like to present a few thoughts, in a way summarizing what has been said, while adding some ideas from my part.

Looking at the whole scenery, provoked by the unprovoked, brutal Russian aggression on Ukraine, it is not unexpected what the consequences, particularly when it comes to the energy, would be of such an event. I would say that the event itself, in its full extent, had not been entirely foreseen, at least not until it would become rather obvious what was incoming, given an amassing of the Russian troops along the Ukrainian borders. True, earlier warnings were coming, mostly from the more immediate NATO neighbors of Russia, which were feeling the heat emanating from Russia, having a pulse on its intentions, and a historic memory of its moves and designs.

There was another assumption, given that Putin, with his KGB background and with a pattern of modus operandi more accustomed to operating in the shades taking bits and pieces, chunks here and there, operating on the margins, on the safe, searching for targets of opportunity, while trying to extend Russian influence, was expected to prefer not to go fully out in the open. I think the Russian engagement in the Middle East was a case in point, of Putin hitting a target of opportunity, once he identified a void which had been created and which he thought Russia might use to its advantage. I am not sure that he really got a lot from that, apart from saving one of his few allies in the world, namely President Assad of Syria, and in the process, also keeping a base in Syria.

So, the magnitude of the invasion ultimately came as a surprise, together with the willingness to escalate. But the strength of the Ukrainian defense, followed by the successes of the Ukrainian counter-offensive, also may have come as a surprise, surely a bad surprise for Putin, who has also underestimated the resolve of Western powers. This is where we are now, when it comes to strategic military developments. I will limit myself here, because that is not the main topic of our webinar. The situation remains highly volatile. We have certainly seen a most brutal but at the same time a highly incompetent Russian military. Still, it is dangerous and capable of major destruction. We also have a Russian nuclear threat hovering over it all, as well as a potential for dangerous spillovers of this war.

I am going to conclude this part of my intervention by saying that there seems to be a high level of likelihood that things may get worse and escalate much worse still before they get any better, before the whole conflict stabilizes, namely with Ukraine being able to reassert its sovereignty over its territory and Russia being defeated in its attempt of land grab other nations' territory, but we are unfortunately not yet there. The only thing we are able to say with any level of certainty is that the verdict is still out. The situation remains very dangerous, and the West's resolve is now needed more than ever. We can, fortunately, see that resolve on the part of the U.S., of the EU, of the part of NATO allies, and of other international partners. When it comes to wide-ranging and hard-hitting sanctions against Russia, they are afflicting a tremendous toll on the Russian economy.

This is the strategic horizon, a background against which to address the issue of energy, which is the topic of the webinar. Certainly, the first effect has been the shock provoked, of course, by the scarcity of supplies. Once Russia has been very much taken out of the supply chain by sanctions, prices clearly went up, the demand outrunning the supply. A green transition not yet having been developed enough to provide a ready alternative—after a period during which such a transition was getting a strong traction, including a robust dynamic of divesting from anything to do with the fossil fuels, this led to the whole world, in order to satisfy its immediate, pressing needs, reverting very much back to fossil fuels; fossil fuel producers, their stocks, were not doing great earlier, which is surely not the case now, when they are doing fine indeed. Basically, having been guided by the idea that we have to address climate change as one of the major global threats, clear and present, requiring an immediate and certainly a more durable answer, in order to survive the day, we reverted back to fossil fuels, at least for the foreseeable future, given the dynamics and the extent of the conflict we have in Europe.

The gap between today and the moment when renewables will be able to adequately fulfill our energy needs has been widened. Renewables have not disappeared from the picture, surely not in a longer-term sense, but given the magnitude of the output which can be and need to be immediately put to use by fossil fuels, we have seen a certain revival, a spike of the use of fossil fuels. An option of being able to make a more immediate, full-blown transition to renewables, has been, unfortunately, postponed until an undefined moment in future.

Within the conventional fossil fuels market, we have seen a process of adjusting to new circumstances, sanctions having severely hit Russia's output, to all likelihood with more sanctions to come, which has led to a need to replace that output and to establish more reliable supply chains. The process of diversifying sources of supply, to avoid unhealthy overreliance on Russia, as a sole or major supplier, notably of gas—with Russia weaponizing its energy supplies in order to exert strategic influence and dominance over its customers—has already been present in Europe before the war, and increasingly so. The trend is to replace Russia as a supplier of oil and gas, ensuring that Russia cannot have any source of income which would enable it to continue or to escalate the present aggression.

A crucial part of that trend is the supply of liquefied natural gas (LNG) and, in that regard, the importance of the U.S. LNG output for everybody, particularly for Europe. President Biden promised to increase largely the U.S. LNG output, specifically meant to replace Russia as a supplier, which is disappearing from the European market. We have also seen the trend of other exporters, such as Norway, becoming major suppliers of gas to Europe. That has also renewed thinking about using more domestic resources in some instances where possible.

When it comes to the trend of relying on LNG as an alternative of choice and at hand, let me use the example of my country, Croatia, which has recently, just a few years back, supported by the EU, installed a floating LNG terminal on the Island of Krk, near the northernmost port of Rijeka. The terminal, with an initial capacity of 2.6 billion cubic meters per year, increased to 2.9 billion cubic meters, is to be upgraded, with the adequate investments in the downstream infrastructure, to a capacity of 6.1 billion cubic meters per year, double the initial capacity, responding to energy needs much larger than Croatia's, encompassing other Central European countries.

The crisis has also renewed thinking about using more domestic resources in some instances where available. It has also opened up opportunities for some emerging major exporters, such as Suriname or Guyana, with large discoveries of both gas and oil. With the OPEC and the OPEC+ countries not increasing, or limiting or cutting their output, in order to keep prices high, more supplies are to be expected from the exporters outside the cartel. A revival of reliance on nuclear energy, with its massive output, is another expected trend.

Another trend in energy consumption entails saving energy, judiciously consuming less. That sounds reasonable and may also help limiting carbon emissions, at least somewhat. This is particularly applicable to Europe, where there will be energy savings campaigns, mostly institutionally enacted.

So, anyhow, we see a major upheaval. We see a huge dislocation, with a trend back to fossil fuels. Unfortunately, renewables are not immediately available in sufficient quantities, but we simply have to keep relying on them as the long-term, durable and sustainable solution. Once the present crisis gets successfully resolved, and we have to keep working towards that goal, we will be getting back to slowing down and phasing out the consumption of fossil fuels, which is increasing our carbon footprint and provoking global warming.

PROFESSOR ROBERT F. TURNER, SJD

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Thank you, Yonah. It's a great pleasure to be with you again. I also want to thank Don Wallace, and I hope my old friend General Al Gray is going to join us later. And, of course, it's great to see Dov Zakheim, with whom I worked in the Pentagon back in 1981, and to interact with our other participants.

Yonah, this has been another outstanding panel in the finest tradition of a long series of programs you and your colleagues have put on over the decades. You have an incredibly keen sense of timing and it's always a pleasure to join you.

This is not just an energy crisis. It's also a food crisis because of the particularly critical role liquid natural gas plays in producing the modern fertilizers that improve crop yield so dramatically.

But, arguably, the single most critical factor in the current crisis is the Russian aggression against Ukraine. I'm delighted no one is suggesting that we make concessions to Putin—that we sacrifice peace in order to have food and energy. But I want to focus primarily on the benefits of successfully ending Russian aggression against Ukraine, not through concessions, but by defeating Vladimir Putin.

As we seek to understand this issue, we must not lose sight of the global commitment 193 UN members have embraced to maintain world peace. Article 1 of the UN Charter provides, inter alia, that the purposes of the United Nations are: “To maintain international peace and security, and to that end: to take effective collective measures for the prevention and removal of threats to the peace, and for the suppression of acts of aggression or other breaches of the peace ”

We have not fulfilled that duty in the current crisis. The United States and several other NATO members have provided useful weapons and other equipment to the Ukraine military, but during the more than 200 days Putin’s aggression has continued, tens of thousands of lives have been lost and the “threat to the peace” has not been “removed.” If future acts of international aggression are to be deterred, the world community must “take effective collective measures” now to either persuade Mr. Putin to cease his aggression and withdraw all of his forces from Ukraine or act collectively to remove him from power.

If we fail, the lessons are clear. In 1919, following World War I, the world community came together and set up the League of Nations for the purpose of preventing future war through collective security. The League failed in no small part because the United States Senate refused to consent to U.S. ratification of the League Covenant, but the League also failed because the member states failed to carry out their commitments. When Japan invaded Manchuria in 1931, and Italy invaded Ethiopia four years later, the League of Nations debated and passed resolutions but did nothing that was in any serious way effective.

British Prime Minister Neville Chamberlain returned from the Munich Conference in September 1938 claiming he had secured “peace for our time” by appeasing Hitler, but in reality, he instead persuaded Hitler that the West lacked the will to resist his aggression. When Hitler made the decision to invade Poland a year later, every one of his admirals and generals reportedly advised him to put off the attack because Germany was not ready to take on the British and the French. Hitler looked at them and said, “I saw them in Munich. They are little worms.” And he went ahead with the invasion. Somewhere between 60 and 90 million people died as a result of World War II. Sadly, I fear that the American withdrawal from Afghanistan last year may well have sent similar signals to tyrants in Russia, China, Iran, North Korea, and elsewhere that may cost lives and freedom in the years ahead if we continue to mishandle the Ukraine aggression.

Incentives matter. If Vladimir Putin is perceived to have benefited in any way from this aggression, a number of things can be anticipated. First of all, there is a good chance that—having learned the world community is unwilling to uphold the core principles of the Charter out of fear he may use nuclear weapons—the Russian leader may try to rebuild the old Soviet Empire one invasion at a time. If we are not going to stand up to Putin over Ukraine, why should we be expected to protect any of the other former Soviet captive nations like Estonia, Latvia, or Lithuania?

To be sure, those countries are now members of NATO, but every NATO member is also a member of the UN, and no serious person can say they have thus far taken “effective collective measures ... for the suppression of [Putin’s] ...aggression.”

China is watching our response to Putin’s aggression closely. Once we demonstrate we lack the will to respond seriously to aggression by a nuclear power, China may well attack Taiwan—and, if they succeed there, commit other acts of aggression. North Korea and Iran are also watching, and their reactions will depend in part on whether they perceive Putin has benefitted from his aggression.

And very importantly, other tyrants and potential tyrants around the world will conclude that if they can get nuclear weapons, they can immunize themselves against accountability for acts of international aggression. So much for the non-proliferation dream. Put simply, we must do more than we have been doing to make it very clear that Vladimir Putin has suffered tremendously for his armed aggression.

Let me be clear. I am not discounting the risks of Putin’s nuclear weapons, but the risks of nuclear war will be far greater if we undermine the global collective security system and incentivize both international aggression and the proliferation of nuclear weapons.

There has been a lot of talk about “war crimes” in Ukraine and there have been a number of incidents where Russian forces clearly attacked civilian targets and committed other war crimes. There have been trials in Ukraine of individual Russian soldiers who committed war crimes.

But we need to understand that Putin is not just responsible for Russian attacks on civilian targets. At the 1945 London Conference that established the rules to govern the Nuremberg trials Soviet delegate, Judge Iona Nikitchenko, insisted that the very first offense to be listed was “Crimes Against Peace,” defined as: “planning, preparation, initiation or waging a war of aggression.”

Mr. Putin is flagrantly guilty of this war crime, and we ought to make it clear that he will be held personally accountable. Don Wallace mentioned my UVA colleague, Professor John Norton Moore. Thirty-two years ago, John and I co-authored what I was later told was the first public call for a war crimes trial for Saddam Hussein in an article published in the International Herald Tribune.

I chaired the American Bar Association Standing Committee on Law and National Security at that time, and I drafted the first resolution calling for an international war crimes tribunal ever approved by the ABA House of Delegates. We then worked with Congress to get it to pass a resolution endorsing such a trial.

In my view, the world community should give Putin an immediate ultimatum. It ought to be approved by numerous organizations, by NATO, by the UN General Assembly, and by any other appropriate group that will join it, giving Putin an ultimatum: Withdraw immediately from Ukraine (including Crimea), or the sanctions will be greatly enhanced and will remain in force until Mr. Putin is in the custody of an appropriate international tribunal to be tried as a war criminal, and Putin should be reminded that most Nazi leaders convicted of this offense at Nuremberg were either sentenced to death by hanging or to life in prison.

Right now, Putin is getting some relief because China and India are happy to buy his energy. We ought to find ways to persuade both of those countries that it’s not in their interest to oppose world peace. If they continue to assist Putin, the world community will seek ways to impose costs on both countries until there is a change of leadership.

I think that U.S. and global efforts to transition towards renewable sources of green energy to reduce dependency on fossil fuels are admirable. (I’ve been driving a Prius since 2005.) But, right now, we have a crisis, and I believe we need to step up production of various sources of energy and to emulate the Berlin Airlift to deliver food and energy wherever lives are at risk.

Put simply, a lot of people are going to die if we do not effectively deal with this food and energy crisis. Not only because people are not going to have heat to get through cold winters, but because people are not going to have food to feed their families. We could and should be doing much more.

Finally, I submit we need to avoid repeating the same mistakes that were made in the past. I have read German leaders have acknowledged it was a mistake to rely so extensively upon Russia for their energy needs. While we are moving towards renewable energy sources like solar power, wind turbines and so forth, we need to seek diverse sources of supply. Right now, China has almost a monopoly on some of those technologies. The International Energy Agency projects that by 2025, China will control 95% of the global supply chain for solar power. China also dominates the lithium-ion battery sector and is a key producer of wind turbines.

In March of this year, Bloomberg reported that China was reselling liquid natural gas imported from the United States to Europe at a hefty profit. China is a serial violator of fundamental international law norms, and the United States has allowed itself to become heavily dependent upon China as a source of antibiotics and other medicines— as well as many other essential commodities.

We need to avoid energy dependence not only on Russia, but also on China. And we need to provide incentives, for example, to India, telling them if they do not stand with the world community against Putin’s armed international aggression, we are not going to look to them as a potential alternative source of green energy technology if China does not clean up its act. I think there are a lot of things we can do if we focus seriously on these problems.

I’ve learned a great deal from today’s panel, and I’ve really enjoyed it, but I think as we try to solve our energy problems, we must not sacrifice our commitment to world peace; and we should see if we can combine the efforts by putting pressure on Putin to end his aggression, and then look for long-term alternative sources of cleaner energy.

V. QUESTIONS, ANSWERS, DISCUSSION

Selected comments by the contributors to this report during the discussion following the presentations. Some of the invited attendees from the United States and internationally participated during this segment.

DR. DOV S. ZAKHEIM

I want to address two points:

First, after I spoke, Professor Yonah Alexander wanted me to expand a little bit about the Iran JCPOA issue. I am reasonably confident that there won't be a deal immediately. However, the pressure for such a deal continues, not so much because of the deal itself, but because of the need for the West to obtain Iranian oil. The need is not going to go away, at least not in the medium term. Right now, the Iranians put a condition on the IAEA investigation of traces of nuclear material, which the Iranians denied existed, that none of the negotiating countries can live with. If there is a deal, it is not just a matter of nuclear threat to all of Iran's neighbors. The fact that it will open up huge funds for Iran will transfer, at least to some extent, to extremists and terrorists like Hamas and Hezbollah, causing all sorts of regional instability.

I also want to mention Robert Turner's very important point that over the longer term, we must find other sources of energy. But we are not going to come up with clean and green energy in the immediate future. Even if governments put money into new energy sources, obtaining them takes time. In the meantime, as several of the speakers pointed out, governments confront the possibility of people starving around the world, for this is not just an energy crisis but also a food crisis with people freezing and living in inhospitable climates. Even if governments want to go back to nuclear power, it takes time to build power plants. The one thing governments can do is to quickly get their hands on oil and gas so long as there are available suppliers.

In the short term, environmentalists need to sit on their hands for a while. In the interest of the environment, they want to minimize reliance on fossil fuels, but in the interest of keeping people alive, governments are going to need these fuels. We must face the harsh reality. Yes, invest in new fuels and energy, but recognize that in the interim, which could be a few years or even more, we are going to have to rely on fossil fuels as we did in the past.

JANE NAKANO

Nuclear is another important energy resource or source of electricity. You mentioned that you would be interested in some conversation around U.S.-China civilian nuclear relationship. I think that the bilateral relationship is quickly becoming more of a competitive relationship today. Where, in the past, there was much more interdependence, there was much more learning by the Chinese side about U.S. safety practices. I think the United States still has quite a bit to contribute to nuclear safety, security and nonproliferation. But, as China continues to build nuclear, their learning curve has been improving quite a bit. In the last decade, they actually brought online 35 units. There, I think, was roughly 10 units more than the number of units that the Russians built; Russia was the second largest builder.

In China's case, it's mostly a domestic story. Pakistan is the only country that China has thus far exported its technology to, but China is looking to emerge as one of the global suppliers and has a very ambitious plan for the domestic side; the target is to increase the fleet size, civilian power generation fleet, from roughly 50 gigawatts today to about 70 by 2025.

If they do achieve that, then that would turn China into the second largest civilian nuclear country, surpassing France. I think it'd be a matter of time before China surpasses the United States in that context. When it comes to exports as well, they're really seeking to export to Europe, the Middle East and, and Latin America. By being able to continue to build at home, they have been making great improvements on production cost, human resource training, and retention, something that we, the United States, have been having a bit of a challenge with.

I think nuclear power is a great way to contribute to climate mitigation. Exactly who will be part of that global nuclear commercial picture is a different issue, so we'll see how it goes for the United States.

AMBASSADOR [RET.] CHARLES RAY

The only other thing I would add as I was listening to the other speakers, who I agree with, is that I am all for finding renewable, clean sources of energy. As I was listening to people, though, something that someone said struck me, I do not remember who, is that the Chinese dominate a lot of the critical components that go into building the devices we need to generate this renewable energy, such as wind turbines and solar components. It occurred to me that if we are going to really move away from fossil fuels and move into these renewable energy sources, we also need to consider how we reshuffle access to the materials needed to manage and maintain these systems. This is going to require a whole government, a whole nation's effort to work. You cannot have the energy department or minister solely focusing on energy and not the people that control the devices we need in order to have that energy. I think that we really need to start thinking about how to pull everyone into the tent and get them to talk about all the different things, including the non-energy related things, we need to do to make this a reality.

AMBASSADOR ZANGO ABDU

Just to add to what Ambassador Ray said, I think it is a very viable alternative to look at renewable energy and those countries that are making in-roads and considerable work in that area, such as China and India. For me, that is one major way of dealing with the challenge of the weaponization of energy. I am concerned that energy is being used as a tool to hold countries ransom like Russia and other countries are doing. I think we need to move away from that. The best way to do that is, of course, to provide an alternative that is readily available, that is cheap, and all those things. But that is a major challenge that we must admit. Renewable energy and those alternatives are capital-intensive in terms of infrastructure that requires heavy investment.

And this is why I made the point that we need to come together. We need to provide a lot of impetus on this at the global level to provide these alternatives so that no one nation can use energy (fuel, fossil fuel, or gas) as a weapon to dictate other countries' actions or hold them ransom. I believe this is one area where the global community should strive to strike that balance.

MAJOR GENERAL [RET.] DR. MIHAIL E. IONESCU

What kind of consortium do you have in mind concerning the solution of those kinds of priorities?

BRIGADIER GENERAL [RET.] DAVID REIST, USMC

Thank you, Major General (Ret.) Ionescu. Let me dream again. If I were to put together the dream team for this consortium, I would have President Biden ask the following people to participate: I would ask former President Obama to lead it. I would have him ask former Chancellor Merkel to participate. I would ask for a representative from the Far East, Africa, and the Middle East; those five. No more than five, five might be too many. I would stipulate that President Obama be in charge because you do not have five people, and go for a coalition and water it down, you will get nowhere. Now, the aftereffects of what they develop are the how, and I cannot answer that. That is a tough thing because it is going to have to be resourced, and you are going to have to get by in. The reason why I mentioned those first two names, in particular, is because if you are putting together a basketball team and you get Michael Jordan's name on there, then there is some "Wasta." Something like this needs wasta, and former President Obama and Chancellor Merkel are two big names. I will offer a team of five and ask anybody to comment or join the team.

AMBASSADOR [RET.] CHARLES RAY

I think you are right, Brigadier General (Ret.) Reist, five is a good number, but I don't think that looking at the global energy situation, you could put an international team together and ignore South America. Brazil is important. I would have five players and one person on the bench because I think you have to include South America on this team.

DR. DOV S. ZAKHEIM

I agree with Ambassador Charles Ray. If you are going to do the consortium, you must be widespread, and you can't ignore a huge country like Brazil.

AMBASSADOR PJER SIMUNOVIC

Just a thought on the immediacy of our getting back to fossil fuels and putting the renewables on the backburner: Despite the fact that countries are using renewables and investing in them, we will not be able to use them to their full potential very soon, maybe not soon enough, and it would take time to recreate the dynamics which existed before this war in terms of strong emphasis on renewables. What we are seeing now is a most unfortunate revival of exploitation of fossil fuels. When it comes to gas, not so terribly problematic gas being a 'transition' fuel away from fossil fuels towards renewables, as the case of burning oil and coal. Governments are damned if they do (burn fossil fuels, fueling climate change), and they are damned if they don't (burn them, not fueling their economies, leaving people hungry and cold).

No matter how much one may like the sound of a V8 or a Harley Davidson, one has to be a firm believer in the necessity to think about the future generations. What is happening now with our energy consumption is generated by the needs of our immediate survival but in the long run is highly detrimental. What the science is telling us on climate change is that we may reach that mythical stage when we hit the point of no return, that is when global warming reaches a certain percentage point after which, no matter what we do and how hard we try, the consequences will be almost like an unstoppable nuclear chain reaction. We have already seen very altered, sinister weather patterns and the effects of extreme weather. They are to get more frequent, and once that percentage point tips the scales out of our favor, it will get simply too late. Now, at least, we have to have an acute understanding of where we are and what we are doing.

VI. CONTRIBUTORS' PRESENTATIONS 2020

This section of the Report consists of presentations made by the contributors at the Special Forum: "Global COVID-19 and Energy: Threats and Responses" that was held on June 25, 2020, via Zoom conferencing. Some updates and revisions were made by the invited participants.

GENERAL (RET.) WESLEY CLARK

RETIRED U.S. ARMY GENERAL, FORMER NATO SUPREME ALLIED COMMANDER

Yonah, thank you very much for inviting me and that kind introduction. Ambassadors, ladies and gentlemen it is a real honor to be with you; I'm really privileged to participate in this discussion. At West Point in the early 1970s, I was teaching economics and political philosophy and national security and Vietnam, and in 1972, we read with interest, the global report which suggested that by the turn of the century we would be nearly out of hydrocarbons and other minerals. We didn't believe it at the time - it seemed alarmist - and yet as the century turned, China joined the World Trade Organization, and it began to import oil. Conventional oil companies were struggling to find the new super giant fields that dominated production in the past. Well, it looked like we were leaving the age of petroleum. Even British Petroleum adopted as its motto "Beyond Petroleum."

In Arkansas, in 2006, people came through and began to tell me that there was something called fracking and that people were buying up mineral rights. But, actually, most of the United States was interested in moving beyond petroleum it seemed. We created a renewable fuel standard. This mandated by law an ever-increasing amount of biofuels to be mixed with gasoline and diesel. Companies, including oil companies, were investing left and right in biofuels. Some people said they were cynical, willing to invest and then put technology on the shelf so that there wasn't competition. I think it was genuine investment: oil prices were rising, from \$12 a barrel in 1998 up to \$30 and \$40 and \$55 a barrel. I was in Goldman Sachs at the time, I remember they told me "it will never go above \$50 a barrel." And then it was \$75 a barrel, \$100 oil was in sight and we briefly touched it along with \$13 natural gas in 2007, 2008. Fracking was just getting started, then we had a recession and a recovery, and just before COVID hit, we were the world's largest producer of oil.

On the renewables side, we need to talk about electricity and the power markets. The renewables sector fought heavy headwinds. The utilities did not like wind and solar. There were a number of reasons for it and many objections. I tried to put up a wind turbine in Arkansas and I was told I was going against the state legislature. I asked, what? Why? and I was told "oh, don't you know the legislature is owned by the utilities, and they power with coal." Yet, renewables have proven increasingly resilient; we've also broken the cycle of needing more power in proportion to growth in GDP. We are growing GDP without growing electricity consumption. At the same time, we have to acknowledge that there are threats, growing threats to the U.S. electricity grid from cyber to EMP and they require substantial investments. All this has been brought up into sharp focus by the pandemic with COVID-19.

It's not only about the global economy of energy, it's also about geostrategy. So, let me see if I can quickly sketch out some of the relationships. On the energy front, in the last three months oil demand dropped from 100 million barrels a day to a little over 80, and this occurred just as OPEC past agreements failed to be renewed with Saudi Arabia and Russia. Prices crashed, it has taken painful dialogue over the past weeks to partially recover. We are up to \$40 oil about right now, still below the previous prices of around \$55. Oil demand has gone back up, it's around 90 million barrels a day. It is not predicted to return to 100 until well into 2022. The ultimate peak if trends continue and nobody does anything extraordinary might be 120 barrels a day into the late 2020 early 2030 period.

Before the crisis hit U.S., energy production was already in trouble. So-called "tight oil" obtained by fracking declines far more rapidly than conventional wells, so a fracked well will go down 60 to 70 percent in the first year in production. We start at 500 barrels a day, maybe even 1,000 barrels a day in a premium. But, at the end of a year, we are down 70%. Conventional oil, on the other hand, averages 4% decline as wells lose reservoir pressure. The expansion of U.S. oil production was obtained by fracking, but the fracking is not capable of producing oil indefinitely; the financial model that propelled fracking was to create and grow reserves, and it was fueled by debt. Recently the banks and their investors have soured on the prospects of fracking because they've realized there is so much oil now available in "source rock" that you could "poison" the whole planet with oil virtually forever. The reservoirs therefore have much less value than previously believed. There is major uncertainty in U.S. oil production; U.S. production is down some two million barrels a day from its peak a few months ago. About a quarter of the U.S. recovery since 2010 has been driven by fracking, and since the industry is under threat this shaking merely adds to the economic anxieties of COVID.

On the renewables side of course we have been using tax credits for a long time, the production tax credit, and the investment tax credit for solar have long been critical to the expansion of renewables. Over time, wind and solar technologies have greatly improved – but investment in renewables still takes long-term money and this requires tax credit to drive these investments. Now you would think with the declining interest rates that's a good thing, but actually what we find in the investment community - and I'm an investment banker myself now 20 years out of the military - is that a lot of money is sitting on the sidelines looking for “distressed assets” as we say. But I do think we can expect the continued rapid expansion of renewables to take place, absent other forces.

What does it mean geostrategically for U.S. security and for terrorism? Well, geostrategically Russia is pursuing hydrocarbons. You know, fifteen years ago Putin believed the future was nuclear, but now he still believes its hydrocarbons. His plan has been to seize control of Syria's oil, to have European banks finance rebuilding that oil infrastructure under his control, buying Israel's offshore oil, win over Egyptian president Al-Sisi and simultaneously take Libya's oil. Putin even summoned Nigerian president Buhari and told him “you need to work with us now.” He has Russian mercenaries enlarging their presence throughout Africa so he's able to use military power “deniably.” Coupled with the North Sea pipeline, which is coming in, Russia would have the ability to dominate Europe's energy sources under Putin's plan and have much strength in its hand. Now, it hasn't quite worked out as easily, but these things never do. The Saudi's thought they could destroy Russia's markets by overproduction, underselling, taking the markets and collapsing the price of oil, a powerful move in late February - but interrupted by COVID. So that hasn't quite worked out. Russia of course has its own COVID problems, plus its added problems with Bashar Al-Assad taking control of Syria, dealing with Turkey and General Haftar in Libya hasn't been all he was cracked up to be. On the first tentative steps have been taken on rebuilding Syria's oil infrastructure, but this is geostrategy unfolding. It moves in fits and starts, but you have to see these major movements.

Europe of course talked for years about powerful undersea cables connecting to Libya's desert with its solar potential; that would supplement North Sea wind. Europe would be all renewable but that hasn't happened at all. China meanwhile is on the outlier in this, taking advantage of low prices to build its reserves, waiting in the wings to exploit Iran and Africa, seeking to invest in Europe and undercut both Russian and U.S. influence there. China is strengthening its internal controls, attempting to position itself in the crisis of COVID as a global leader and it is increasingly assertive militarily. President Xi is a powerful leader, a lifetime leader, but also insecure. He's got some of his own challenges internally.

So where are we heading? In terms of oil, moving towards \$50. It's enough to hold down U.S. fracking and delay major upstream investments. Both Saudi Arabia and Russia would like to see oil in the \$80 range, and that could happen if they are successful, and if major investments in new conventional oil are not made. Meanwhile at home, the luster of fracking continues to fade. If economic growth resumes in the world, that puts upward pressure on demand, but it doesn't solve the U.S. banking issues. In terms of renewables and the grid, we need about two trillion dollars to fix the grid and we need to invest maybe a comparable amount to really make it amenable to renewable energy. But our future depends on how we come out of this crisis, It's all about the U.S. leadership. Will we hang on with NATO? Strengthen our European connections? Work to deepen engagement in Africa? Can we avoid stumbling into a conflict with China over Taiwan and the South China Sea? All that geostrategy is continuing even as we worry about COVID. The truth is, and I've been connected with several of the pharmaceutical companies and looked closely as many of you have: no country is safe from recurrence. We have got to anticipate not just a prolonged first wave, but also a global second wave. So that by December with a new administration coming in it could look like 1932 in terms of fear and economic crisis. China and Russia cannot lead the world through this.

So, if you believe that no crisis should be wasted - as they say in politics - this COVID crisis with falling energy prices, confusion and OPEC+, and low interest rates, is an opportunity. The United States could lead in energy and addressing climate change. The mounting threat of climate change makes that leadership ever more necessary. So, I'm sure I don't have to lay out the fundamental security threats of climate change, of government dysfunction, impoverishment, disease, terrorism, etc. But it won't be fixed or even addressed without leadership from the United States. We know Kyoto 1997 failed, Paris 2015 failed. Even governments as enlightened as Australia, England, and Canada have largely moved away from the goals that they previously accepted. This month atmospheric carbon was at 417 parts per million, of course that's the highest since we began measuring sixty-odd years ago. In fact, according to scientific research, that's the highest it's been in 23 million years. There's never been a Greenland icecap when carbon is above 400 parts per million, so it's a question of how soon the ice melts away. Absent a complete collapse of the global economy, there is no way to halt atmospheric carbon levels at 450 ppm: we are going up at 2.5 parts per million per year - and the adverse impacts are already obvious in the Middle East and the Sahara. So, we need leadership, now we've got the technology for the renewables, we've got capital, but we need the leadership to put the technology at work.

So how do we do it? We need a carbon tax, plus an international carbon tax on exports of hydrocarbons. With that international tax, we could pay into a global fund to assist developing countries to promote green economic development, and at the same time we should use low interest rates at home to fund a transformation of the U.S. electricity grid. We need to segment that grid, we need stronger protections for cybersecurity, we need microgrids, we need to make it fully compatible with renewables. What are the specifics of the tax? Well, it needs to escalate over time. It needs to augment government resources as well as being given back to those at the lower income levels who are most impacted by such a tax. We need to review it periodically, and we need to show through our actions at home leadership abroad. That's the way to deal with China, to keep the EU on our side and it's a way to deal with the crises we face. As far as COVID is concerned, there is much to be said, but government goes on and energy is a fundamental part of that challenge.

PROFESSOR RITA COLWELL

UNIVERSITY OF MARYLAND, COLLEGE PARK AND JOHNS HOPKINS UNIVERSITY BLOOMBERG SCHOOL OF PUBLIC HEALTH

A predictive capacity that allows estimating the risk of an outbreak of COVID-19 would be a powerful public health benefit. A model has been developed, based on an extended set of variables including environmental parameters, that allows prediction of risk of COVID-19 cases in a community four to eight weeks in advance, making it possible to prepare for an outbreak.

The model derives from research done during the past forty years on cholera and makes it possible to predict cholera outbreaks. Much of the research on cholera was carried out in the Chesapeake Bay, United States, and Bangladesh and India, the latter beginning in 1975. Sensors deployed on satellites, e.g., Landsat initially, provided data on sea surface temperature, sea surface height, and chlorophyll in the Bay of Bengal, notably from stations in the Bay of Bengal adjacent to coastal village communities where cholera outbreaks occur annually. The early crude, but effective, correlations of those environmental parameters with cholera cases proved surprisingly strong and the model was successfully employed in subsequent studies to improve understanding of factors driving cholera epidemics. More recent sophisticated satellite sensors allow measurement of a wide array of parameters, including movement of populations. Progressive improvement of the model developed for cholera in Bangladesh was sufficiently effective that prediction of cholera was extended to include Mozambique, Senegal, and other countries in Africa.

A successful retrospective study of cholera in Yemen during 2016 was accomplished and published in 2017. A brief communication from that publication appeared in the journal *Scientific American*. Fergus McBean, a British aid agency leader who read the communication suggested a collaboration on cholera in Yemen. In the spring of 2018 we provided cholera risk maps monthly for Yemen. Regions of predicted highest risk received medical supplies, safe drinking water, and public health personnel, strategically placed in Yemen. With these and other measures, the number of cholera cases was significantly smaller in those regions in 2018. Being able to act preemptively by providing medical supplies and safe drinking water made a difference. We continue to provide monthly risk reports to the UK foreign aid agency, DFID, and collaborate with DFID, the UK meteorological agency, UNICEF, and NASA.

Interestingly, in 2019 the study area was expanded to include Sudan and prediction of cholera risk was found to be very high in Sudan in August 2019 and proved to be accurate as cholera broke out in that country. The conclusion is that real-time prediction of cholera is practical and feasible.

With onset of the COVID-19 pandemic, the question was asked if the prediction model for cholera could be applied to the coronavirus. Using COVID-19 data from 2019 to the present and the hypothesis that the virus is transmitted via airborne routes, namely aerosol transmission is a major factor, the virus attaching to water droplets, with droplet transmission in the environment, not only person to person, but over a large distance. The cholera model was further developed. Initial analyses used SARS data from earlier outbreaks globally. The COVID-19 coronavirus is known from studies of other investigators to be a variant of SARS, namely SARS CoV-2. An initial deployment of the model using COVID-19 retrospective case data for Michigan, USA, in April 2020, was successful. Additional analyses of COVID-19 cases elsewhere in the United States indicate the model does have the capacity to predict high-risk geographical areas. In complementary research, ground truth data for COVID-19 are being collected, namely detection and enumeration of the virus in wastewater. A contract from the State of Maryland Department of the Environment provides data on the presence of the virus in sewage samples collected in Prince George's County, Frederick, Seneca, and other sampling is underway in Virginia and the District of Columbia. Molecular methods are employed to detect the virus and its variants. These data allow determination of the presence of the virus before cases have been confirmed, i.e., detection of the virus circulating in the community, i.e., discharged in the feces of asymptomatic carriers, as well as individuals in early stage of infection.

Trend analysis of virus abundance in wastewaters is particularly useful. If numbers of virus in sewage rises, more confirmed cases in the community can be expected. Conversely, if distancing, masking, contact tracing, and other methods employed to reduce incidence of the disease are effective, the trend in virus discharge in sewage will decline, providing evidence to support opening community activities.

In summary, environmental data related to seasonality of the disease, biological characteristics of the virus, ground truth data and epidemiological information can provide accurate and actionable risk prediction of COVID-19. Pandemics have been recorded historically since 1347 and occurrence of such pandemics is approximately every hundred years. Thus, another COVID-like outbreak of disease in our future is a realistic possibility. It is an appropriate response to COVID-19 to reevaluate the benefits and costs of reduction of tropical forests, hunting wild animals, e.g., bush meat, and other non-sustainable practices in a world where the population is expected to increase from 7.5 B to ca. 10 B. Exposure to new emerging infectious disease agents will truly be catastrophic.

AMBASSADOR (RET.) ANDRAS SIMONYI

FORMER HUNGARIAN AMBASSADOR TO THE U.S.; NONRESIDENT SENIOR FELLOW, THE ATLANTIC COUNCIL

It's really a great pleasure to see so many friends. General Clark, what a pleasure to see you in particular. It was 21 years ago when I became the first Hungarian Ambassador to NATO. I remember on our first day as new members you said "Well, welcome to the Club. Now we are going to war."

General Clark: (laughs) And I remember Andras, you came to me and told me what the prime minister had said. He said "Hungary had been to war twice before in this century just after starting an alliance, and, in both cases, Hungary lost and lost territory. Don't let it happen this time." And we didn't.

Amb. (Ret.) Simonyi: It's incredible you remember that. And Shireen [Hunter], so good to see you and Ambassador Pjer Simunovic too.

Before I say a few words about what we are working on related to energy at the Atlantic Council, I'd like to come back to something Wes, you said, something really important. First of all, you talked about the perspective you grew up with. Well, I grew up with the perspective of 'Maybe one day my country will be free. Maybe one day my country will be part of the Free West.' And that was what was driving my generation. So true enough, we did have a perspective. Often, I wonder, just like you wonder, what is the perspective for the young generations today? What is the great idea out there? What is the big idea? Like for you it was improving your democracy; For me, it was democracy, period. And we have to be attentive to that, we have to be sensitive to the fact that most of the young people out there on the streets, they're not crazies. They just, maybe, lost their way, they are, maybe, just trying to figure out what to do. Why am I saying this? Because this is true for the kids out on the street, but perhaps it's true for the World at large.

I also want to come back to one other thing you said. It's about U.S. leadership. You know, in Europe, there is a saying: "The Europeans hate American leadership, but they hate the lack of it even more". I think that is so true. So, therefore, America cannot go AWOL. America has to be there and lead. This is true for a lot of things, and it's definitely true for climate and energy, the issues at hand. So, let me get to the point.

At the Atlantic Council, we just finished a big project, which I worked on for two years together with my good friend, Ambassador Richard Morningstar, whom you all know. Dick and I presented this report last month together, joined by leaders from the E.U. [Director General for Energy Ditte Juul Jørgensen] and the U.S. [Assistant Secretary of State Frank Fannon and DoE Assistant Secretary Ted Garrish] It's called "European Energy Security and the Critical Role of Transatlantic Energy Cooperation." You know, when we started working on this report, we had no idea there would be a COVID-19, it was nowhere in sight. This was going to be a report on how America and Europe need to hold hands and figure out the balance between growing energy needs of the world and our climate challenges. And while most of our work was pre Covid19, I believe that the conclusions of this report, are just as valid, as they would have been without COVID-19. The bottom line is that global climate challenges and energy security challenges can best be met with the European Union and the United States holding hands and working closely together.

Let me make a couple of points on what we think is important in our findings. First of all, we stress that there is a growing pressure on all of us to find this balance between energy needs, the demand by society for governments to provide affordable energy at all times and on the other hand, the growing pressure and urgency to meet climate goals. We have seen some signs of stress in the balance between the two aspects. On the one hand, there is the younger generation's demand for quick and radical solutions to the climate challenge, which I agree is an important issue.

On the other hand, as an example, look what happened in France. The "Gilets Jaunes" or the "Yellow Vests" who, when the government raised the price of gasoline just a little bit were out on the street demonstrating. We have to be smart to figure out how to do this properly.

I'd like to immediately jump to something else in our findings. In our view, the ability of the United States to send LNG to Europe has been maybe the single most important development for Europe's energy security in the last ten years. Can you imagine what Europe's energy security situation would look like if there was no alternative to importing gas from Russia? If the only country you could rely on which does not have ulterior motives to use energy for strategic pressure would be Norway. It would be a terrible thing for Europe. So therefore, I believe that it is important that the United States keep sending LNG to Europe. Of course, if LNG from the U.S. stays a part of the European energy mix, if our societies will keep using gas, they will have to make efforts to clean up production, curb methane emissions.

The European Union produced its European Green Deal, which is important. I think it is good that Europe is showing the way on climate, but I also believe that we have to be reasonable and make sure that we find the energy mix that meets both demands of climate and energy security. Therefore, I don't think it can exclude gas. In our assessment, if Europe is to reach its climate goals, nuclear will also have to be a part of the energy mix. And we have to work harder to help Europe build its infrastructure to make sure Eastern Europe will have the same energy security as Western Europe. I'm so pleased to see that Krk [LNG terminal] in Croatia is coming online, and the Three Seas Initiative that is helping Eastern Europeans establish their infrastructures.

Of course, renewables are going to be the critical, important part of our efforts to meet climate goals. In this, technology cooperation between the United States and Europe will be key.

We will have to make sure that the European Union, as it proceeds with its anticipated Carbon Border Adjustment Mechanism, it will not be discriminating and will hold all the suppliers not just the United States, but also Russia and others accountable. It must make sure that, as Europe cleans up its cities, cleans up its countryside, it doesn't simply transpose pollution to other parts of the world and that it does not replace its own dirty energy with dirty energy, gas or electricity, coming from other countries.

I would like to make a brief comment on North Stream 2. General Clark mentioned it, and to say the least, I'm not a fan either. I think it is a huge, short sighted and strategic mistake. I think we should have stopped it.

I want to conclude by saying there is no alternative to a very close energy cooperation between the United States and Europe. I hope there is a consensus on this across the aisle in the U.S. Congress. I also hope, come November [the U.S. elections], this will remain a priority.

The Transatlantic relationship has been through difficult times before. The West as a whole has been through difficult times. But I am certain we'll get over this present crisis and once we're out of it, we will be stronger, and we will be stronger together.

AMBASSADOR (RET.) GERALD FEIERSTEIN

SENIOR VICE PRESIDENT OF THE MIDDLE EAST INSTITUTE

Thanks, Yonah. You had asked that I talk about the security concerns in the larger Middle East related to the pandemic and the implications of that. It's a broad subject, and, of course, like many other regions, like most other regions, the answer to the question depends on a much more granular approach. So, some of the countries in the region, for example Tunisia, Morocco, Jordan, Lebanon, that are dependent on imported oil and gas have in some sense benefitted ... there has been a little bit of a cushion for their economy as a result of the crash of oil prices. For other states in the region, of course, the issues that are challenging them and their energy sectors are the result of outside factors. So, for example, and I think General Clark made reference to that, should there be a change in administration in Washington at the beginning of next year, that will almost certainly affect where the Iranians are on their oil industry. What's going to happen in Iraq? What's going to happen in Libya, which is a very fraught situation right now, and where the competition, particularly among Egypt and Turkey and Russia and even among some of the Europeans, the French and the Italians, for example, is making predictions about what's going to happen with the Libyan industry very difficult to assess. That will have broader implications, of course, for global energy markets as well as the global economic recovery after COVID. So, all of these issues are impacting.

Of course, the other aspect is, again, Ambassador Simonyi was talking about the importance of gas. There has been a great deal of interest and a great deal of anticipation in the Eastern Mediterranean about the possibility that their ability to develop and exploit the offshore gas reservoirs that they've found – particularly for Egypt, Israel, Lebanon – would be an important economic boost for them. But also of course it will be potentially an important source of new gas supplies for Europe. So, there are many different factors that are out there, some COVID related, some not, that are going to influence the energy sector going forward.

I thought that I would talk a little more specifically though, when you talk about Middle East and energy, generally speaking, you're talking about the GCC, particularly the Saudis, the Emirates, Kuwait, Qatar. And I thought that I would focus a little bit more on those particular societies and talk about how this current situation, both on COVID and how the global economic downturn, are affecting them and will affect their energy sectors going forward. And then I also thought, as several of the other speakers have, General Clark and Ambassador Simonyi, to bring in also the issue of renewables and climate and how that might affect them going forward. So, like the rest of the world, the Gulf has not been immune. I think early on, there was some hope, some expectation that they would be less directly affected by COVID than other regions, but that has not turned out to be the case. The Saudis have counted over 160,000 COVID-19 cases with nearly 1,500 dying from the disease. This has had a huge impact on the society. You may have seen as a side reflection of that the announcement just earlier this week that they were going to limit the Hajj, which is at the end of July this year. They are going to limit it to just 10,000 people and only people who are currently in Saudi Arabia. That's in comparison to what has been about 2.5 million participants in the Hajj in previous years. So, this is huge. It's unprecedented in fact. In 1919, the Saudis did not stop the Hajj. So, this is an absolutely dramatic change. We've seen also in the U.A.E. about 45,000 cases with over 300 dead. There is an expectation that Dubai may be one of the most directly affected urban centers in the world because of COVID. There is an expectation that about 70% of the businesses in Dubai that were operating pre-pandemic are going to be closed by the end of this year.

I also wanted to mention another aspect of the effect of COVID and that is a departure from the GCC of many of the foreign workers that their economies depended on, including in their oil industry. So, the Saudis are anticipating that over a million, maybe 1.2 million expatriates are going to be departing from Saudi Arabia by the end of this year. Most of those, of course, are unskilled or semi-skilled laborers, but it also includes an increasing number of the professional class who were very much a central element of their economies. They were the people who often made the economic progress possible and they are departing the region, many probably to never come back. And that will have also secondary and tertiary effects more broadly in the region, including for regional security and stability, but we'll get to that.

The other aspect, and I think General Clark referenced it in his comments, was, in fact, the effect of Mohammad Bin Salman's very badly timed decision to launch an oil price war that was targeting the Russians primarily but one can't rule out the idea that the U.S. unconventional oil and gas industry was also a target of the Saudi move. It turned out to be a disaster for the Saudis as well as the rest of the oil exporting countries. It has devastated, of course, the U.S. industry. As was pointed out, there has been some recovery in oil prices that were under twenty dollars a couple months ago. Both West Texas Intermediate and Brent are trading somewhere around forty dollars a barrel right now. So, it has come back, but as I think again General Clark pointed out, the Saudi budget is predicated on a level of about eighty dollars officially. Many analysts believe that, in order to balance their budget, they need over a hundred dollars a barrel, and it's going to be a long time before they get to that level, if we ever get to that level again. About 1.8 million barrels a day were taken offline in an attempt to stabilize the sector and to balance demand and supply. There is an expectation that some of that is going to come back online, but it's going to be a very slow recovery. It's not really going to be before 2021 that we'll see a significant return to pre-pandemic production levels. And, at least in some areas, it's going to be 2022 or later.

And so, if the price is going to stay in the \$40-50/barrel range, it's going to mean that all these economies in the Gulf are going to be running at substantial deficits for the next several years at least. It's going to mean that they're going to tighten their belts on some of their spending. It may affect even the defense industries and their ability to go forward with some of the basic defense spending that they were planning on making and frankly that the U.S. was anticipating from them.

But even beyond that, it also going to have an impact on their diversification plans. All of these governments were already in the position of trying to diversify their economies from their dependence on oil and gas, but their ability to succeed in these diversification programs, like Vision 2030 in Saudi Arabia, was fully contingent on having the income from the oil and gas sectors in order to finance the transition. And so, the decline in oil income is going to also affect negatively their ability to do what they needed to do on the diversification programs, which are central to their ability to also address challenges that they confront demographically as a wave of young men and young women who are entering into the labor force are going to be looking for jobs over the next four or five years.

Then last point, again which has been mentioned before, that is the impact on renewables. The fact of the matter is that we've seen significant changes here in the U.S. with a 40% increase in the usage of renewables in our electricity grid. India, another major importer of Gulf oil and gas, has increased its reliance on renewables by 45%. And Europe, especially Germany, Italy, and Spain, all are significantly increasing their use of renewables. This is going to be something that is going to be a continuing factor and is going to affect the ability of the Gulf states to recover from the impact of the COVID pandemic and global economic crisis. Even though, interestingly, the Saudis, the Emirates, and others have been leaders in their own efforts to increase their use of renewable energy in their own economies, their own societies, but still it's going to affect their economic stability.

I mentioned before the secondary and tertiary effects of the departure of the expatriate labor from the Gulf. That is absolutely going to affect the ability of Gulf economies to recover. It's going to put a great deal of pressure on them to come up with a labor force that can take on these jobs that are being left open by the departure of expatriates, but, of course, it's also going to affect the source countries. So, countries like Egypt, Pakistan, India, Bangladesh, East Asia, as well as Africa, Tunisia, Morocco, are going to see a severe impact because of the decline of the remittances that they were dependent on for their own economic stability as well as the return of a large population of people who are going to be looking for jobs and entering into the labor force in those societies.

And then the other aspect of that, and I'll close on this, the other aspect of that is the ability of societies, like Saudi Arabia, the U.A.E., Qatar, Kuwait, to continue to provide large levels of foreign assistance to these challenged societies, whether you are talking about Jordan, the Horn of Africa, Sudan, North Africa, elsewhere. Assistance programs are going to be restricted over these coming years. And again, this is potentially a source of economic and political fragility in these societies and that is something that the United States is going to need to watch very carefully because, again, in issues like counterterrorism, security and stability, the growth of extremism in the region, these are issues that can very well feed into a growing problem for the United States and the West.

PROFESSOR SHIREEN HUNTER

HONORARY FELLOW AT THE PRINCE ALWALEED BIN TALAL CENTER FOR MUSLIM-CHRISTIAN UNDERSTANDING AT GEORGETOWN UNIVERSITY

Thank you very much Yonah. It is a pleasure to participate in another of your events. You always know what issues are important and organize meetings and discussions to analyze them. And always you have been kind enough to invite me to many of these meetings in the course of the last almost forty years. This time, however, our meeting has to be virtual. And of course I am honored to be part of such a distinguished group of speakers and panelists.

Before discussing the impact of the Corona crisis on Iran's domestic and foreign policies, I need to mention the fact that, since May 2018, Iran has been subjected to the harshest sanctions that any country has ever endured. Certainly, almost throughout its history. Iran has never been subject to such wide-ranging sanctions, which really amount to a virtual embargo.

Perhaps the most damaging and crippling of these sanctions is the restrictions imposed on Iran's ability to interact with international banking and financial networks. This inability has meant that, even if Iran has the financial resources to import needed medical and other supplies, it cannot do so.

In addition, this situation has allowed some countries to pursue predatory policies towards Iran. For example, Iraq has not been paying Iran for the large amount of natural gas and electricity that it has imported. Ironically, Iran's willingness to be patient with Iraq has in many ways helped US interests there, because it has kept Iraq from going back to an all-out civil war.

South Korea has also refused to pay seven billion dollars it owes to Iran for the oil it imported while the oil was not subject to US sanctions. This means that, even before Covid 19 hit Iran, the country was facing dire economic conditions.

Already before the pandemic, Iran's oil income had been reduced to almost nothing. According to some reports, by the time Corona virus hit Iran, its oil income had fallen from 27 billion dollars to 2.7 billion dollars. It is easy to imagine the consequences of such a drastic decline in revenue on Iran's economy and on its ability to cope with the pandemic.

Moreover, Iran has had difficulties in accessing the foreign currency earned by its non-oil exports, either because of sanctions and the difficulties in banking operations or because some Iranians themselves, the exporters, have not returned the money to the country. I read, for instance, that out of 27 billion dollars of non-oil exports, close to 7 billion had not been returned to the treasury.

In short, Iran is facing tremendous economic pressure, which has become suffocating since the American withdrawal of the JCPOA in 2018 and the reimposition of new and harsher sanctions. In fact, sometimes I think that the US is running out of sanctions to impose on Iran.

But I suppose the alternative to sanctions would be war, and I don't think that at the moment the US can afford it financially. I also believe that a majority of Americans do not want another costly conflict. Meanwhile, Iran is not willing to negotiate, partly because of the terms the US presents to Tehran. The US' position is accept our conditions or else. Thus, we have a situation in which America's maximum pressure strategy is faced with Iran's maximum resistance response. So, we are in a deadlock. If this deadlock is not broken, Iran's situation in general and its ability to deal successfully with the Covid crisis is unlikely to improve.

HERE COMES COVID-19

It was under these difficult economic conditions that COVID-19 hit Iran. The severity of Iran's Covid crisis was partly because of Iranian politics. In order not to offend Beijing, Iran continued flight to China. In general, Iran increasingly is looking to China as an economic and political partner. The 25- year Iran-China cooperation agreement if implemented fully, would give China extraordinary advantages in exploiting all of Iran's natural resources from oil to mines. And the Chinese would be extensively involved in all kinds of infrastructural and industrial projects in Iran. The agreement might even provide a military entry into Iran.

In short, if fully implemented, the agreement would give China a predominant position in Iran both economically and politically.

Iran has been one of the hardest states by Covid19. The latest statistic that I heard of the number of people who have caught the virus in Iran has been about 212,000, which is pretty high, and the number of dead is about 10,000. I think that relatively speaking, given the limits that they are under, for example US sanctions even prevent Iran from getting medicine, they managed to limit the infections. (However, after a partial reopening of the economy the numbers have increased substantially. The number of dead now is closer to 2000.)

The Trump Administration has claimed that humanitarian trade is not subject to sanctions. But if you cannot have banking operations you can't buy anything. The Swiss have tried through some particular channel to get some drugs to Iran. But these supplies are like a drop in the sea.

This is one reason that the number of fatalities have been rising. However, initially, Iran's performance in controlling the pandemic was not too bad, even if compared to countries such as Spain and Italy. Given the conditions they are under, I think the Iranians did not do very badly.

MOVING AWAY FROM OIL ECONOMY

As a result of US sanctions, low prices, fall in exports and now Covid Iran has adopted a strategy of reducing its dependence on the oil income. This is something that Iran has wanted to do for a long time. The Shah used to say that Iran should not export crude oil, and I agree with him. Iran should export petrochemicals instead of crude oil.

In fact, this is what Iran is trying to do by increasing its petrochemical plants. It is also focusing on domestic production as a way of reducing imports and thus saving foreign currency as much as possible. They are shifting the production in the direction of import substitution. They are trying to domestically manufacture what they need to the extent possible.

If Iran succeeds in this strategy and boosts domestic production, in perhaps three or four years, it can increase its non-oil exports to 50-55 billion dollars, which would be just about enough for them to keep running the country and also do some development work. Expanding the country's petrochemical production is a priority.

ENERGY SUFFICIENCY

On energy, Iran is lucky, because it does not need to import energy. It has a tremendous amount of natural gas, so that it can even move towards clean energy. And they are increasingly using gas in industries and for domestic use by expanding gas pipelines throughout the country.

This strategy is partly because Iran is not allowed to export gas to Europe and even Turkey, which is a major importer of Iranian gas periodically under various pretexts stops its flow. It uses these interruptions as an instrument of political pressure on Tehran.

In general, Iranians are increasingly getting the message that they have to rely only on themselves, even if it is for a subsistence economy. But as I say, they have at least one advantage and that is that they don't have to pay for the import of energy.

Looking to future, Iran, like the Emiratis and Saudis, is also trying to bypass the Strait of Hormuz in the Persian Gulf, for its oil export. It is building a pipeline to carry oil to terminals in Jask port on the Sea of Oman.

Iran is also focusing on developing renewable energy, both solar and wind, especially in some parts of the country. They are aware of climate problems and climate change-related issues, which is encouraging the development of solar and wind energy.

Iran's main problem is the lack of financial resources. In Iran, everything now is only a question of money because there is sufficient know-how in the country. There are some companies, including in pharmaceuticals, that they call knowledge-based companies, which are not doing too badly.

POLITICAL IMPACT

The political impact of the COVID-19 has not been significant. It certainly has not led to democratization or any relaxation of cultural and political restrictions. In general, excessive pressure does not lead to democratization. On the contrary, often it results in the hardening of political positions.

For instance, many people think that the Soviet Union fell apart because of the Star Wars. But I do believe that talks and contacts and, especially detente, enabled more liberal ideas to get through to the USSR and eventually contributed to its demise. I believe this can be true in Iran's case as well.

Of course, I'm not suggesting that pressure has no place in approaches towards Iran. But I think that a more judicious mix of pressure and incentives can achieve more. Yet, the US policy, and also Pompeo's attitude, basically has been "you have to do these things first and then we will see."

Consequently, Iranians have concluded that they have to stay the course and resist US pressures rather than surrender. Therefore, voluntary regime change is very unlikely. If the US wants regime change, then it must do it itself, possibly through military action.

To sum up, at the moment, both economically and politically, Iran is in a survival mode waiting to see what would happen in the US.

REGIONAL RELATIONS

The Covid 19 has not particularly affected regional relations, certainly not between Iran and the Persian Gulf Arabs. What have to some extent affected regional relations been Saudi Arabia's mistakes, especially in launching the Yemen war. The lengthening of the war, plus the fall in oil prices which has eroded Saudi Arabia's financial power.

These developments have undermined Saudi prestige and also have demonstrated the limits of money as an instrument of foreign policy. As a result, some Gulf states do not want to be too closely identified with Saudi Arabia and its failure in Yemen.

As a result, some Gulf states, like the UAE, have reached out to Iran, although they have not altered their basic posture. For instance, the UAE sent some medical help to Iran after the outbreak of Covid 19. Other Gulf states, including Oman, Qatar, and Kuwait also did the same thing.

I believe the Aramco incident also had an impact on the UAE's attitude. Being vulnerable to potential Iranian attacks, the Emiratis have tried to reduce tensions with Tehran. Whether Iran was directly responsible for the attack or the Houthis did it with Iran's blessing is immaterial. The message was sent and received: It was, if there is conflict you won't be spared.

Beyond the Persian Gulf, economic downturn in Iran has negatively affected its neighbors, particularly Afghanistan. It has also increased tensions between the two countries. Iran, for years, has been spending billions and billions of dollars on Afghans. The children of Afghan refugees get free education up to university level. The number of Hazaras now, I hear from Afghans, that have gotten PhDs and are back in Afghanistan and working there is quite considerable. Afghan Pashtuns don't like this, because they want to dominate the country and other ethnic groups. But now, Hazaras, who used to be not very educated, no longer accept Pashtun overlordship.

Also, some Afghans because of economic downturn have had to leave Iran, which has added to Kabul's problems. Iran has also been more strict in preventing the flow of illegal Afghan migration. This caused some tensions, which were diffused, when the Afghan Minister responsible for foreign affairs visited Tehran.

Iran's economic problems also has had some negative impact on Pakistan. In short, the US policy on Iran has adversely affected Tehran's neighbors.

I will make two final points not particularly related to Iran: One relates to the lower oil prices. I think this could be salutary both in terms of the oil producers' internal development and in terms of regional security. In terms of these states' internal development, with less money available, the rulers may have to strike a new bargain with the population whereupon the people would get a voice in governments' decisions. Also, with less money available perhaps these states would not get into useless wars such as that in Yemen, or adventures in Syria, Libya and elsewhere. They might also use the available money on better things than airplanes that they cannot fly and on mercenaries and futile expansionist adventures.

The other point is that deciding what to do in future, one must realize that the world has changed and past strategies might not necessarily be of use. One change is that there has been greater dispersion of power globally, and other powers have emerged in various parts of the world. Therefore, no single power can dominate the world either through soft power or hard power.

I don't think that China is going to be able to be the new superpower telling everyone else what to do. I also don't think that the US can have the position that it did immediately after the collapse of the Soviet Union. Meanwhile, local actors have also become more powerful. For instance, look at what Turkey has been doing in Libya for instance. What Turkey is doing in Libya is at cross-purposes with at least some members of NATO. Macron and Erdogan are at loggerheads over Turkey's Libyan activities.

What this means is that, when thinking about new ways of doing politics or managing international affairs, we have to keep in mind that the world has changed and is continuing to change.

I think the COVID 19 pandemic might have sharpened our awareness of these changes. And so, as part of how we can best cope with new challenges in energy or in health pandemics and try to find new strategies, we also have to start thinking about new ways to manage international relations.

VII. COMMENTATORS' REMARKS 2020

This section of the report consists of comments made by the commentator at the Special Forum "Global COVID-19 and Energy: Threats and Responses" that was held on June 25, 2020, via Zoom conferencing. Some updates and revisions were made.

AMBASSADOR [RET.] CHARLES RAY

FORMER U.S. AMBASSADOR CAMBODIA AND ZIMBABWE

Thank you, and I'd like to particularly commend our distinguished panelists for an outstanding group of presentations on a very important subject: energy. It was, I think, outlined very clearly as key to restarting both our social and economic life on the planet. So, this is a topic that is both timely and appropriate. I was sitting in my garage this morning prepping for this and trying to think "what will I say?" Unfortunately, General Clark and others have said everything that came into my mind, so I find myself at the risk of repeating what's already been said and said very effectively, but I would like to underscore a couple of things.

I think it's been said—as we come out of this current pandemic, that we need to be smart about it and particularly with energy as with everything else. We shouldn't be looking at trying to restore the status quo ante but at making things better. Things like having more reliable sources of energy, not being overly dependent on foreign suppliers, on having more reliance on renewable energy. I mean these are all great points. I would add to that, while we are looking at rebuilding or restarting—whatever term you want to use—our own energy infrastructure, our own energy sources and needs, we shouldn't ignore the poorer countries in the world who also have energy requirements, and we need to put a little bit of effort into figuring out how we can share the wealth with them to meet the energy needs of their own people.

The other thing, though, that was mentioned by a couple of people and I think really bears re-emphasizing, and that is the need for the US to acknowledge the need for engagement with the world and US leadership. It's important not just for US national security, but I think for global security. And in order to do that what we're going to have to do here at home is to revitalize our flagging diplomatic capacity and, as was just said by the previous speaker, learn new ways to interact with the world in the changed world that's going to exist when we come out of this pandemic. I think this has been, of the four symposiums that you've had, I think this one has probably got to be the most profound and the most important of them all and it's a real honor to be a part of it.

AMBASSADOR PJER SIMUNOVIC

EMBASSY OF THE REPUBLIC OF CROATIA

Professor Yonah, thank you very much for inviting me, and indeed we are honored for having General Clark as our keynote speaker today.

A well-known political analyst, Francis Fukuyama, in his latest article in the Foreign Affairs magazine, titled "The Pandemic and Political Order," begins by saying: "Major crises have major consequences, usually unforeseen."

This statement is indeed applicable most directly to the issue of the ongoing pandemic, which is having a full range of consequences, seen and yet to be seen, foreseen and unforeseen, foreseeable and unforeseeable; political, economic, financial, security-related, technological, scientific, societal, cultural, and, also, those affecting the energy sector. While looking into the relationship of the pandemic, in terms of its impact, and the energy sector, I will be addressing briefly the main identifiable trends influencing the energy sector.

Here, we have actually seen a reinforcement of some pre-existing trends: trends toward renewable, green sources, which prior to the pandemic had been made more viable - technologically and commercially - more efficient, capable and affordable. We are talking about wind energy, solar, and also energy generated by the electric drive.

What was the impact of the pandemic on the energy sector? What has happened, essentially, was a slump created by the pandemic in the demand for the fossil fuels, as General Clark was describing, noticing also an extreme volatility of that sector. This has been coupled with the resiliency of clean energy, on the other hand, actually reinforcing a trend of a shift toward green energy, away from brown energy, driven by the decisions taken by states, and also by investors

- which may be equally important. This is big and bad news for oil companies, and for some countries, but in certain strategic aspects this also may not be that bad at all. It decreases the leverage of some international actors, strongly reliant upon the use of their fossil fuels and the income derived from them, such as Russia and Iran, a leverage employed against the interests of the West.

However, a negative impact is also felt by a full range of fossil fuels-producing developing countries. With the oil prices going down, with oil and gas not being in high demand, to use an understatement, they are finding themselves in dire straits. To mitigate their economic loss, imbalances and difficulties thus created, they will need to make some reasonable moves coupled with some enlightened support from the international community in order to bridge that gap, make a switch, and diversify their economies, making them less unidimensional, sustainable and more stable in a longer-term sense.

On the side of the green energy, what we have been seeing was a trend of increasing consumption of energy from the renewable sources. Using the example of the United States: in less than 10 weeks, the U.S. has increased the consumption of energy from renewable sources by an estimated 40%. So, there has been a recognizable shift away from fossil fuels towards renewables.

In a largest strategic, conceptual perspective, this has been consistent with a sense of clear and present danger of climate disaster of global proportions, provoked by our massive carbon footprint. This sense has been made much more acute by the pandemic, in its quality of being another previously recognized, but neglected global threat, and also coming out of our nefarious dealings with our environment to get us, brutally exposing our fragility and vulnerability.

Having neglected that particular threat - the pandemic - do we really need an escalation, potentially of an irreversible nature, of another clearly recognized and present threat, of extreme weather, climate change, global warming, destruction of bio-diversity, brought about by many of our actions, our most ruinous carbon footprint featuring prominently among them, jeopardizing our collective existence on this Earth?

When we are looking at the energy sector landscape in the context of the ongoing pandemic, we see trends which were also developing before the pandemic struck. These trends have been made more present and more acute by the pandemic. The states had been taking a lot of measures to move away from the brown energy and towards the green energy on the global, multilateral level, with the Paris Climate Accord, the European Green Deal, with the European Union very much setting the agenda and standards with its unique strength as the global normative power. This means what is decided by the EU becomes the global norm; filtering down through the entire world. The energy shift is an excellent case in point. The EU is aiming to become climate neutral by 2050, and it is earmarking one trillion euros of investments for green projects in the coming decades. We are talking about serious money and serious process. And this is surely not limited to the EU, in many U.S. federal states, such as California, not exclusively, one can detect the same trend.

Simultaneously, underpinning the trend, while making it actually fully viable while playing its crucial part, we have been seeing major investors making the same shift, strong and very visible, taken purposefully. You may call it smart, when it comes to the profit margins, and also a useful public-relations and image-enhancing move, following a logic of social responsibility, but in any event the result is, as it seems, that many major investors wish to be perceived as being at the forefront of doing something which is not only profitable, but also good, this being the main idea behind the notion of social responsibility. We see, for example, the world's largest asset manager - the U.S. company BlackRock - trying to couple its growth with impact on the environment, by investing in renewables and divesting from fossil fuel companies.

On the immediate horizon, what can we expect, looking into current situation of surviving the pandemic, and into the post-COVID-19 economic recovery? There is a strong push towards creating sustainable economies fueled by renewable energy, again stimulated very strongly by our shared responsibility to prevent extreme weather, climate change, to neutralize our carbon emissions, by shifting towards green energy in order to avoid other preventable and recognizable global disasters. At this stage, such a trend is what we may realistically identify, as well as hope that it will hold and expand. It's not a given, however: it depends upon the joint actions of many actors: the states, international organizations, as well as the investors and private companies.

In that vein, let me conclude with a quote from a recent editorial from The Economist, saying, "The COVID-19 pause is not inherently climate-friendly. Countries must make it so". So far, because of the pandemic and the associated unprecedented closures, as an unintended consequence we have been seeing very much reduced carbon emissions, due to the drastically reduced manufacturing, transportation, travel and overall industrial activity. As a genuine

economic disaster, this surely cannot be good per se nor it can or should be sustained, but it has brought some lessons learned, it has demonstrated how clearly impactful it would be if we make some important changes, this time by our own volition and in an orderly, systemic fashion. These changes relate to shifting away from brown energy and towards green energy, to doing our utmost to incentivize that move, by policy decisions and financial instruments, such as pricing, at our disposal. During Croatia's Presidency of the Council of the EU, we have been strongly advocating this shift, while supporting and promoting the European Green Deal.

With a lot of efforts, synergy and international coordination, cooperation and solidarity, and with a bit of good luck, this will become a robust global trend, stimulated, again, by the resiliency and capability demonstrated by the green technologies in the first place, and also by an understanding of our responsibility to do everything in our power to avoid another global disaster along the lines of the present pandemic, stemming from a known, but neglected issue - this time stemming from the climate change, extreme weather, and overall carbon emissions-induced environmental harm.

DR. ANTHONY FAINBERG

FORMER U.S. GOVERNMENT OFFICIAL

I had a similar experience to that of Ambassador Ray in deciding what I was going to say about energy and finding that General Clark had said it all and said it better. Then I thought I would talk about some other matters, and I found that Ambassador Simunovic covered a number of things regarding climate change that I was going to say.

First of all, on the question of COVID and biothreats, my impression from when I worked some years ago in the Department of Homeland Security was that there was a lot of focus on human-generated biothreats. Whereas there was concern about epidemics and pandemics, when I was there at least, there was much less. This was a mistake and perhaps had been fixed a little bit under the Obama administration, and then forgotten entirely now.

In general, the idea of planning is really good. The past may or may not be prologue, but one has to pay attention to the past. In the early 21st century, we had two indicators, SARS and MERS, of pandemics that did not extend beyond 1,000 fatalities in either case, but were perhaps forerunners of what might come afterward. We should, in retrospect, have paid more attention.

Regarding fossil fuels, I just wanted to make one little point. The collapse, at least temporary, if not permanent, of the fossil fuel and oil market will certainly result, coming out of a rather critical time, in an increased interest in renewables, among other things. As Ambassador Simunovic said, one consequence of this, which would actually be quite favorable in the long run, is that those countries who happen to have a lot of oil will see their imperialist leverage decrease as people go more to other sources, which incidentally would also have a much more benign influence on the climate we live in.

The main thing I want to talk about is going to be somewhat politically incorrect, but since I am not a diplomat and never have been, and since I've been kind of a scientist most of my life...

I want to talk a little bit about governance, in particular governance in the United States regarding what has happened with COVID. One indication of incompetence, and quite frankly stupidity, occurred in TSA the Transportation and Security Administration, an organization where I worked briefly (nearly 20 years ago), until I escaped. First of all, as you may know, (TSA) had a stored capacity of very many N95 masks, which people on the frontlines (the security officials, the officers, the people you see every day in airports) wanted to use; and the central TSA administration for weeks did not permit them to do so. There are 50,000, roughly speaking, officers in TSA. Over 700 have so far tested positive, five are dead, and one contractor (contractors perform the same work as TSA in a few airports) is dead. This is almost a microcosm of what has happened more broadly in the United States, because of a lack of leadership and lack of governance.

The Republic of Korea, South Korea, and the United States discovered their first COVID cases, I'm told, on the same day, somewhere around the end of January. Korea took certain measures, we took certain measures (or refused for a long time to take certain measures). Yesterday, we had something like 38,000 new cases of COVID in the United States, and in South Korea they had 51. Not 51,000, not 5,100, but 51.

There's a reason for that, and it's not only because Korea is in Asia and different societies have different norms, which include easier mobilization of the population. But compared with Germany, Germany has had a total number of 9,000 deaths from COVID, and the United States has now over 125,000. The question of governance is vital to fighting threats like pandemics, but other threats, too. You have to have federal leadership, and you have to have somebody who doesn't say, well the states are going to take over and solve the problems, because no one is able to coordinate the states effectively enough.

Some of this discrepancy in fatalities and the course of the pandemic may possibly be due to the disease's natural wave. It started in Europe more than here. Europe now has a very small number (although a small number, it's still serious), but a much smaller number of cases per day than does the US. Less than 100 per country, by and large, maybe a little bit more.

We have 38,000 (maybe we're a bit later in the process, we started later), but it looks very, very bad to me. I think that this country, the United States, being one of the leaders in the world, perhaps it used to be the leader (it is not anymore), should be able to protect itself considerably better than it has. And rather than saying we are going to go at it alone and falling down a deep hole, we have to, and I agree on this very strongly with some of the other speakers, we have to reinvigorate our alliances and work closely and collaboratively with our friends and partners, not only in strategic matters, not only in military matters, but also in international non-military matters regarding, in this case, global health. Going at it alone has not helped us, and if there is not a sea change in the leadership of this country and in the perspective of this country, I see bad things not just for the United States, but unfortunately for a good part of the rest of the world.

VIII. ABOUT THE EDITORS

PROFESSOR YONAH ALEXANDER is the Director of the International Center for Terrorism Studies (at the Potomac Institute for Policy Studies) and the Inter-University Center for Legal Studies (at the International Law Institute). He is a former Professor and Director of Terrorism Studies at the State University of New York and the George Washington University. Professor Alexander also held academic appointments elsewhere such as American, Catholic, Chicago, Columbia, and Georgetown's Center for Strategic and International Studies (CSIS). He has published over 100 books and founded five international journals. His personal collections are housed at the Hoover Institution Library and Archives at Stanford University.

PROFESSOR DON WALLACE, JR. Yale University BA, Harvard University, LLB, is a Professor of Law at Georgetown University as well as Chairman of the International Law Institute. He is a U.S. delegate to UNCITRAL, vice president of the UNIDROIT Foundation, a member of the American Law Institute, and the former chairman of the International Law Section at the American Bar Association. He is also the author and co-author of several books and articles.

IX. ABOUT THE CONTRIBUTORS

DR. DOV S. ZAKHEIM is Senior Advisor at the Center for Strategic and International Studies and Senior Fellow at the CNA Corporation, a federally funded think tank. Previously he was Senior Vice President of Booz Allen Hamilton where he led the Firm's support of U.S. Combatant Commanders worldwide. From 2001 to April 2004, he was Under Secretary of Defense (Comptroller) and Chief Financial Officer for the Department of Defense, serving as principal advisor to the Secretary of Defense on financial and budgetary matters, leading over 50,000 staff, developing and managing the world's largest budgets, and negotiating five major defense agreements with US allies and partners. From 2002-2004 Dr. Zakheim was DOD's coordinator of civilian programs in Afghanistan. He also helped organize the 2003 New York (UN) and Madrid Donors conferences for Iraq reconstruction. During the 2000 presidential campaign, Dr. Zakheim served as a senior foreign policy advisor to then-Governor Bush. In 2012 he was a policy advisor to former Governor Mitt Romney's presidential campaign. He served as co-leader for national security in former Governor Jeb Bush's presidential campaign. From 1985 until 1987, Dr. Zakheim was Deputy Under Secretary of Defense for Planning and Resources, playing an active role in the Department's system acquisition, strategic planning, programming and budget processes. He held other senior DOD posts from 1981-1985. A 1970 Phi Beta Kappa graduate of Columbia University with a B.A., summa cum laude, Dr. Zakheim also studied at the London School of Economics. He holds a doctorate in economics and politics at St. Antony's College, University of Oxford. He has been an adjunct Senior Fellow of the Council on Foreign Relations, an adjunct Scholar of the Heritage Foundation and an adjunct professor at the National War College and at four universities. Dr. Zakheim is the author of numerous books, monographs, chapters in edited volumes, articles and book reviews. His writings have been translated into Arabic, French, Hebrew, Italian and Norwegian. He lectures widely and provides print, radio and television commentary on national security policy issues domestically and internationally. He blogs on The National Interest and The Hill. Dr. Zakheim is the recipient of numerous awards for his government, professional and civic work, including the Defense Department's highest civilian award in 1986, 1987 and 2004.

BRIGADIER GENERAL DAVID G. REIST, USMC (RET.), is a Senior Fellow with the Potomac Institute for Policy Studies. He most recently served as the Assistant Deputy Commandant, Installations and Logistics Department, (LP), Headquarters, United States Marine Corps, Washington, DC. Brigadier General Reist's command assignments include: CO Company A, 2nd Landing Support Battalion (1981-1982); CO Company A, Marine Barracks 8th & I (1985-1986); CO Beach & Port Company, 2nd Landing Support Battalion (1989-1990); CO 1st Landing Support Battalion (1997-1998); CO 1st Transportation Support Battalion (2002-2004) (redesignated Transportation Support Group during Operation Iraqi Freedom; Combat Service Support Group-11 during Operation Iraqi Freedom-II) and CG 1st Force Service Support Group (redesignated 1st Marine Logistics Group) (2005-2007). Brigadier General Reist's staff assignments include: Division G-4, 3rd Marine Division (1982-1983); Head, Motor Transport, Engineer, and Utilities Writer Section, Marine Corps Institute (1983-1984); Registrar, Marine Corps Institute (1984-1985); Operations Officer, MSSG-22 for LF6F 4-87 and 1-89 (1987-1989); Executive Officer, 2nd Landing Support Battalion (1990); Ground Prepositioning Program Sponsor (1990-1992) and Maritime Prepositioning Program Sponsor (1992-1993), Plans, Policies, and Operations, Headquarters Marine Corps; Current Operations Officer, U.S. Central Command J-4/7 (1994-

1997); Deputy G-3, 1st FSSG (2000); Faculty Advisor (2000-2001) and Deputy Director (2001-2002), Marine Corps Command and Staff College; Chief of Staff, 1st FSSG (2004-2005) and Deputy CG (Support), I Marine Expeditionary Force Forward (2006-2007). Brigadier General Reist graduated from the State University of New York at Geneseo in 1978 with a Bachelor of Science in Biology. He also holds a Master of Strategic Studies from the Marine Corps War College and a Master of Arts in National Security and Strategic Studies from the Naval War College.

JANE NAKANO is a senior fellow in the Energy Security and Climate Change Program at the Center for Strategic and International Studies (CSIS). Her research interests include U.S. energy policy; global market and policy developments concerning natural gas, nuclear energy, and critical minerals; and energy security and climate issues in the Asia-Pacific region. She frequently writes and speaks on these issues at domestic and international conferences and to media around the world. She has also testified before Congress on China's competitiveness in energy technology manufacturing and exports as well as U.S. liquefied natural gas (LNG) exports and before the U.S.-China Economic and Security Review Commission on U.S.-China nuclear energy cooperation. Prior to joining CSIS in 2010, Nakano worked in the Office of International Affairs in the U.S. Department of Energy, where she covered a host of energy, economic, and political issues in Asia. From 2001 to 2002, she served at the U.S. embassy in Tokyo as a special assistant to the energy attaché. Nakano graduated from Georgetown University's School of Foreign Service and holds a master's degree from Columbia University's School of International and Public Affairs.

AMBASSADOR [RET.] CHARLES RAY served 30 years in the Foreign Service (from 1982 to 2012), after completing a 20-year career in the U.S. Army. His Foreign Service assignments were Guangzhou and Shenyang, China; Chiang Mai, Thailand; PM bureau/ DCM in Freetown, Sierra Leone; Consul General in Ho Chi Minh City, Vietnam; Ambassador, Phnom Penh, Cambodia; Diplomat in residence, University of Houston; Deputy Assistant Secretary of Defense for POW/Missing Personnel; and Ambassador, Zimbabwe. He has a B.S. from Benedictine College, Atchison, KS; an M.S. from the University of Southern California; and an M.S. the National War College. He's also a graduate of the U.S. Army Command and General Staff College, the Army War College's Land Forces Commander Course, and the Defense Intelligence School's Postgraduate Intelligence Course.

AMBASSADOR ZANGO ABDU Currently with USIP leading its programs in Abuja. New role as Country Manager, USIP Nigeria office, Abuja. Former Deputy Chief of Mission, Nigeria Embassy, Washington DC.

GENERAL [RET.] WESLEY CLARK retired as a four-star general after 38 years in the United States Army, having served in his last assignments as Commander of U.S. Southern Command and then as Commander of U.S. European Command/ Supreme Allied Commander, Europe. He graduated first in his class at West Point and completed degrees in Philosophy, Politics, and Economics at Oxford University (B.A. and M.A.) as a Rhodes scholar. While serving in Vietnam, he commanded an infantry company in combat. He later commanded at the battalion, brigade, and division level, and served in a number of significant staff positions, including service as the Director, Strategic Plans and Policy (J-5). In his final assignment as Supreme Allied Commander Europe, he led NATO forces to victory in Operation Allied Force, a 78-day air campaign, backed by ground invasion planning and a diplomatic process, saving 1.5 million Albanians from ethnic cleansing. His awards include the Presidential Medal of Freedom, Defense Distinguished Service Medal (five awards), Silver star, bronze star, purple heart, honorary knighthoods from the British and Dutch governments, and numerous other awards from other governments. A best-selling author, General Clark has written four books and is a frequent contributor on TV and to newspapers.

PROFESSOR RITA COLWELL, Ph.D., is a pioneering microbiologist and the first woman to lead the National Science Foundation. She is a Distinguished University Professor at both the University of Maryland and Johns Hopkins University's Bloomberg School of Public Health. She has received awards from the Emperor of Japan, the King of Sweden, the Prime Minister of Singapore, and the President of the United States. Her interests are focused on global infectious diseases, water issues, including safe drinking water for both the developed and developing world. She is a nationally recognized scientist and educator and has authored or co-authored 16 books and more than 700 scientific publications. She produced the award-winning film, *Invisible Seas*, and has served on editorial boards of numerous scientific journals. She is the author of the highly acclaimed book *A Lab of One's Own* (Simon & Schuster).

AMBASSADOR [RET.] ANDRÁS SIMONYI is a former Hungarian ambassador now living and working in Washington, DC. He was the managing director of the Center for Transatlantic Relations at SAIS Johns Hopkins University (2012-2018), presently working with the George Washington University School of Engineering and Applied Science. Prior to moving to the United States, he was Hungary's ambassador to the US (2002-2007). He was the first Hungarian ambassador to NATO, becoming the first permanent representative of Hungary, after the country's accession to the Alliance. His prior assignments include deputy chief of mission of Hungary to the European Union (later European Commission). Ambassador Simonyi is a trained transportation economist, with a PhD in International Affairs. In his academic work he specializes in transatlantic relations, transatlantic energy, and the Nordic countries. He publishes frequently in *The Hill*, *The Huffington Post*, and other media outlets.

AMBASSADOR [RET.] GERALD FEIERSTEIN retired from the U.S. Foreign Service in May 2016 after a 41-year career. At the time of his retirement, Feierstein held the personal rank of Career Minister. Over the course of his career, he served in nine overseas postings, including three tours of duty in Pakistan, as well as tours in Saudi Arabia, Oman, Lebanon, Jerusalem, and Tunisia. In 2010, President Obama appointed Feierstein U.S. Ambassador to Yemen, where he served until 2013. From 2013 until his retirement, Feierstein was Principal Deputy Assistant Secretary of State for Near East Affairs. In addition to his career-long focus on the Near East and South Asia, Feierstein also played a prominent role in developing and implementing State Department policies and programs to counter violent extremism. As Deputy Coordinator and Principal Deputy Coordinator in the State Department's Counter-Terrorism bureau, Feierstein led the development of initiatives to build regional networks to confront extremist groups as well as to counter terrorist financing and promote counter-terrorism messaging. He continued to focus on defeating terrorist groups through his subsequent tours as Deputy Chief of Mission in Pakistan and as Ambassador to Yemen. Feierstein joined the Middle East Institute in October 2016 as a Senior Fellow and the Director of a new Center for Gulf Affairs. In November 2018, the MEI Board of Directors named him as Senior Vice President and director of the Institute's Policy Center.

PROFESSOR SHIREEN HUNTER, with a career spanning more than 50 years in international affairs, Shireen Hunter served as Iran's first woman diplomat, she directed programs at leading think tanks, she taught and lectured widely, and she published prolifically in the field. Now an honorary fellow at the Prince Alwaleed bin Talal Center for Muslim-Christian Understanding at Georgetown University, where she previously served as a research professor, she has held leadership positions at the Center for Strategic and International Studies in Washington, D.C., and the Brussels-based Centre for European Policy Studies, among other organizations. She was an academic fellow at Carnegie Corporation of New York, at the Oxford Centre for Islamic studies, and at the Hellenic Foundation. From 1965 to 1979, Hunter served with the Iranian foreign service out of London, Geneva, and Tehran. A member of the Council on Foreign Relations, Hunter is the author and editor of 27 book and major monographs, as well as a frequent speaker on a range of topics, including U.S.-Iran relations and the role of religion in international affairs. Through her books and countless articles, talks, and media appearances, Hunter has encouraged a greater understanding of complex geopolitical issues, called out human rights abuses, and elevated the importance of cross-cultural dialogue.

X. ABOUT THE COMMENTATORS

AMBASSADOR PIER SIMUNOVIC has been Croatia's Ambassador to the United States since September 2017. Croatia is currently holding the presidency of the Council of the European Union. Before assuming his Ambassadorship, together with a career in international affairs journalism and academic research he served in various high-level positions in the Croatian Government, in the fields of national security, defense and diplomacy. He was Director of the Office of the National Security Council, Ambassador to Israel, Defense State Secretary in charge of defense policy, National Coordinator for NATO and Assistant Foreign Minister, heading Division for International Organizations and Security, Political Counselor at the Embassy in Paris, and Deputy Director of Analytical Department in the Foreign Ministry. During his career in journalism, he worked with the BBC World Service in London, with the magazine *Europ* in Paris, and with the Croatian daily 'Večernji list' in Zagreb, covering the collapse of Communism, crisis and war in the former Yugoslavia, and European and Transatlantic affairs.

PROFESSOR ROBERT F. TURNER, SJD holds both professional and academic doctorates from the University of Virginia School of Law. He co-founded the Center for National Security Law with Professor John Norton Moore in April 1981 and has served as its associate director since then except for two periods of government service in the 1980s and during 1994-95, when he occupied the Charles H. Stockton Chair of International Law at the U.S. Naval War College in Newport, Rhode Island. A former Army captain and veteran of two tours in Vietnam, Turner served as a research associate and public affairs fellow at Stanford's Hoover Institution on War, Revolution and Peace. He has also served in the executive branch as a member of the Senior Executive Service, first in the Pentagon as special assistant to the undersecretary of defense for policy, then in the White House as counsel to the President's Intelligence Oversight Board, and at the State Department as principal deputy and then acting assistant secretary for legislative affairs. In 1986, he became the first president of the congressionally established United States Institute of Peace.

DR. ANTHONY FAINBERG retired from the Institute for Defense Analyses in 2016. He had joined this firm upon retiring from federal service having become a Research Staff Member there, where he focused on risk assessment methodologies, on policies and practice in countering nuclear terrorism, and on nuclear non-proliferation policies. At his retirement from federal government service after twenty years, Dr. Fainberg was Director of the Office of Transformational Research and Development of the Domestic Nuclear Detection Office of the Department of Homeland Security. Previously, he had been Division Chief at the Advanced Systems and Concepts Office, Defense Threat Reduction Agency, Department of Defense; and before that, he directed the Office of Policy and Planning for Aviation Security in the Federal Aviation Administration. At present, Dr. Fainberg is semi-retired, performing occasional consulting work for the National Academies of Sciences, Engineering, and Medicine. After receiving his degrees in experimental particle physics, Dr. Fainberg worked as a researcher and university lecturer for over a decade, producing some 40 technical publications. Dr. Fainberg is active in professional organizations, such as the American Physical Society (APS) and the American Association for the Advancement of Science (AAAS) and is a Fellow of both. He has co-edited and written several chapters of a book on energy supply and demand. He is an APS Fellow and has served in official capacities in the Forum on Physics and Society of the APS, where he currently is Secretary-Treasurer. Dr. Fainberg has testified before Congress on a number of occasions and has briefed both congressional staff and media in his areas of expertise; he has appeared on National Public Radio, CNN, and other outlets. He speaks several languages and possesses Top Secret and SCl security clearance.

