JULY 2024

EMERGING VOICES NETWORK

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De-siloing Existential Threats II: Tackling the Interconnections Between Global Dangers

Based on a policy cycle by BASIC's Emerging Voices Network (EVN)

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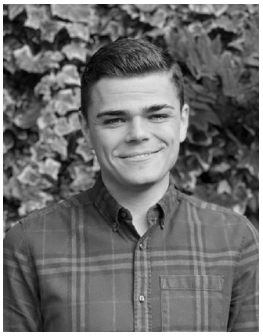
Emerging Voices Network

Launched in December 2020, the Emerging Voices Network (EVN) is a digital network of high-potential, next-generation leaders on nuclear issues who will inherit the responsibility of managing nuclear threats. In founding the EVN, BASIC's aim was to create a truly inclusive digital space wherein younger voices from marginalised communities around the world are heard on nuclear issues. The network promotes collaboration, dialogue and bridge-building between next-generation leaders from the Global North and South, with diversity and inclusivity at the forefront of the Network's ethos and mission.

BASIC

BASIC is an independent, non-profit think tank working to safeguard humanity and Earth's ecosystem from nuclear risks and interconnected security threats for generations to come. We have a global reputation for convening distinctive, empathic dialogues that help states overcome complex strategic and political differences. Our established networks and expertise, developed since 1987, enable us to get the right people in the room and facilitate effective, meaningful exchange between siloed and often hostile political communities.



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Acknowledgements

This project has been made possible by the generous financial support of the Ploughshares Fund. This report does not reflect the views of the Ploughshares Fund, nor the views of BASIC. This publication would not have been possible without the support of the BASIC team, particularly Michelle Houghton, Chiara Cervasio, Anahita Parsa, Gry Thomasen, Chris Spedding, and Kim Obergfaell who provided valuable insights, review, and support throughout the project. The team is grateful to all of the EVN members who have participated and contributed throughout the policy cycle. We are also thankful to Pupul Bisht and the Horizon 2045 team for guiding utilising future-looking scenarios methodologies, and for educating our policy cycle members on their work.

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List of Acronyms

AI	Artificial Intelligence
COP28	2023 Conference of the Parties of the UNFCCC
DEI	Diversity, Equity, and Inclusion
EU	European Union
FG1	Focus Group One
FG2	Focus Group Two
FG3	Focus Group Three
FG4	Focus Group Four
IAEA	International Atomic Energy Agency
IPCC	Intergovernmental Panel on Climate Change
NATO	North Atlantic Treaty Organisation
NGO	Non-Governmental Organisation
NNWS	Non-Nuclear Weapon State
NWS	Nuclear Weapon State
SDG	Sustainable Development Goals
SNF	Spent Nuclear Fuel
UAV	Unmanned Aerial Vehicle
UN	United Nations
UNFCCC	UN Framework Convention on Climate Change
UNSC	United Nations Security Council

Introduction

BASIC's Emerging Voices Network (EVN) seeks to reach, engage, and platform early career and young experts from around the globe. As part of the recruitment and selection process, the EVN ensures a high proportion of members are from communities, countries, and backgrounds that are typically underrepresented in mainstream nuclear policy fora. The EVN is committed to helping these individuals overcome institutional barriers to ensure that those spaces are truly global and that the perspectives and expertise of communities that are often minoritised – yet crucially impacted by nuclear weapons development and policy – are centred and integrated into mainstream nuclear dialogue.

In November 2023, the EVN launched the second phase of a policy cycle focused on de-siloing existential threats and how they relate to nuclear weapons. Existential threats are not just literal threats to humanity's existence, but also threats to our way of life and place in the natural world. With generous support from the Ploughshares Fund, this EVN policy cycle investigates the web of interconnections between existential threats and how all states can better recognise these links and develop policies that reflect these connections. In previous iterations of this work (Phase I), EVN members tackled the siloing of the nuclear field, investigating issues such as social justice, racism and white supremacy, and environmental impacts.

At a time when there are a plethora of existential threats all competing for our attention, it is important to recognise that they are, in fact, inextricably linked. Nuclear war, climate change, pandemics, biotechnology, and AI are some of the issues that could threaten our very existence. This is especially important to recognise at a time of increased global tensions amongst Nuclear Weapon States (NWS), rising global temperatures, and the ongoing development of new and potentially disruptive technologies. It is essential to comprehensively consider these threats and how they impact each other, or else there will be serious gaps in our understanding and, consequently, in our policies to address them.

Against this backdrop, BASIC organised a focus-group-based policy cycle for EVN members to develop their understanding of these issues and use this to inform policy recommendations for states, Non-State Actors (NGOs), and civil society. This policy cycle examines the intersection of interconnected existential threats and asks how we can legislate to mitigate them on a collective basis.

The first workshop of the policy cycle focused on de-siloing the nuclear field. In the second workshop to help imagine how existential threats may impact our future, Pupul Bisht of Horizon 2045 introduced members to their work in developing future-looking scenarios and how their *Foresight Radar* was created. The focus groups then developed their own scenarios for 2045 and considered how existential threats would impact them. In the third workshop, members were introduced to visualising these interconnections using mapping by BASIC's former Growth and Impact Manager Chris Spedding. Some of the focus groups shared the maps they created with us at the end of the policy cycle. They can be found at the end of the report in the appendixes. During the fourth workshop, the focus groups started developing their policy recommendations based on previous discussions. The notes and policy recommendations from the four focus groups have been used to inform this important and timely anthology report.

Focus Group One

Group members: Nivedita S, Vanessa Canola, Anna Hauschild, Mikhail Kupriyanov, Sanaa Alvira, Samanvya Hooda

Mapping Interdependencies: A Stakeholder Atlas for the Existential Threat Nexus

Bridging gaps, unveiling disproportionate impacts, and illuminating un(der) represented communities

Focus Group One (FG1) made 'research' their first policy recommendations theme. Specifically, they propose encouraging policymakers to fund research that investigates existential threat interlinkages to better inform their policymaking. The group discussed the case of the Sellafield nuclear site, the UK's most hazardous nuclear facility, being hacked by Russian and Chinese-linked cyber groups.[1] Worryingly, it is unclear exactly when the IT systems were first compromised, but it is believed to have started at least as early as 2015 and as of December 2023 it was unknown if the hack had been fully eradicated. This one case shows several interlinking existential issues, including nuclear security, the environment, and emerging technologies, to name just a few. Systems responsible for the security and maintenance of nuclear materials could be left dysfunctional or sabotaged, increasing the risk of radiation exposure through nuclear accidents and even sabotage. Drawing lessons from incidents such as this, policymakers can devise appropriate laws and policies to avoid significant security risks and prioritise the creation of international treaties and regimes to address these issues.

FG1 collectively and promptly concluded that it is critical to recognise the intricate web of stakeholders and affected communities across diverse fields dealing with interconnected existential threats. Affected communities are those who have been impacted by the nuclear weapons production and fuel cycle. This includes Indigenous communities whose land has been polluted by uranium mining and nuclear weapons testing,[2] and the workers and military personnel who have been exposed to radiation through these activities.[3] Their first priority was to identify all of the relevant stakeholders involved in these existential risks by asking who is impacted by the connections between existential threats and, therefore, who will be the beneficiaries of any potential policy recommendations. They immediately looked to recognise affected communities as stakeholders, not just the states and individuals who typically undertake nuclear weapons policymaking. Consequently, their second policy recommendation theme was to focus on the collaborative, inclusive, and meaningful participation of communities that are simultaneously impacted by different existential threats. As noted in the previous phase of this policy cycle, the Indigenous communities often most impacted by the nuclear weapons production cycle, such as testing and uranium mining, have been excluded and marginalised from the nuclear weapons process and policymaking.[4]

1. Anna Isaac and Alex Lawson, "Sellafield nuclear site hacked by groups linked to Russia and China", *The Guardian*, (4th December 2023) https://www.theguardian.com/business/2023/dec/04/sellafield-nuclear-site-hacked-groups-russia-china.
2. Sheil Desai, "Mining Indigenous Communities: A Long Legacy", *Kleinman Center for Energy Policy*, (20th December 2021) https://kleinmanenergy.upenn.edu/news-insights/mining-indigenous-communities-a-long-legacy/; Hsuan L. Hsu, "Nuclear Colonialism", *Environment and Society Portal*, https://www.environmentandsociety.org/exhibitions/risk-and-militarization/nuclear-colonialism#:~:text=Many%20of%20these%20activities%20occured,thyroid%20diseases%20and%20birth%20defects.
3. National Cancer Institute, "Accidents at Nuclear Power Plants and Cancer Risk", (12th May 2022) https://www.cancer.gov/about-cancer/causes-prevention/risk/radiation/nuclear-accidents-fact-sheet; Anna Lamche, "Nuclear test veterans demand compensation and medical records access", BBC News, (19th March 2024), https://www.bbc.co.uk/news/uk-68611769.
4. Sneha Nair, Ian Flemming Zhou, Louis Reitmann, Monalisa Hazarika, Almuntaser Bluwi, "Beyond the Echo Chamber: Creating a More Equitable, Diverse and Inclusive Nuclear Weapons Policy Field", in Kim Obergfaell (ed) *De-siloing Existential Threats: Challenging Identity, Power, and Inclusivity in the Nuclear Policy Field*, (London: BASIC, 2023) https://basicint.org/wp-content/uploads/2023/07/Anthology_De-siloing-Existential-Threats_A4-2-1.pdf.

After being introduced to futures and foresight methodologies, the group also recommended incorporating this method into research on existential threats. Forecasting and foresight offer valuable tools for exploring potential future scenarios in which existential threats may manifest and assessing the ability to respond. This methodology is also useful because formulating these scenarios encourages researchers to consider how interlinking stakeholders and issues interact. Often different stakeholders, such as nuclear policymakers, civil society, affected communities, and those with expertise are siloed and have little to no interaction. Futures and Foresight methodologies bring these stakeholders together and help to demonstrate how connected they are. This has been demonstrated by the Horizon 2045 Foresight Radar, which visually displays the complex web of drivers, domains, and issues that go into developing future scenarios.[5] To create this radar, Horizon 2045 utilised their horizon scanning group which is comprised of many experts from across the world.

Another recommendation that Group One made was that the research community exploring nuclear and existential threats should incorporate mapping methodologies to reveal the complex web of stakeholders impacted by interlinking existential threats. They suggested that researchers look at the *BASIC-N Square UK Nuclear Threat Community Network Map* as an example of showing the links between different stakeholders.[6] Utilising the program *Kumu* (https://kumu.io/), the map is designed to show the loose collection of organisations, academics, and funders working to reduce, minimise, or eliminate the threat of nuclear weapons. The map demonstrates not only where links are present, but also where more work is needed to de-silo the nuclear field in the UK. More work is needed to explore these links in the UK and internationally to map and de-silo the different communities working on existential threats.

It was also felt the interlinkages between individuals, groups, and existential threats had not received adequate attention in education. Thus, 'education' became another policy recommendation theme for the group. One priority was encouraging policymakers, researchers, and civil society to fund and create disarmament education initiatives targeted at different stakeholders and demographics to educate them on these issues and how they are linked.

Initiatives such as the Highly Nriched *Decolonizing Nuclear Studies* project,[7] which seeks to transform nuclear studies curricula by centralising antiracism, postcolonialism, and feminism and offering modules on race, colonialism, gender, disability, and environmental justice, should be used as an example.

The group's final recommendations theme was 'transparency and accessibility.' They called on states to support the *Nuclear Truth Project*, highlighting the harm people have suffered due to nuclear activities.[8] Acknowledging the truth of the legacies of nuclear harms is the first step to addressing them and dealing with these injustices. This will not only involve state leaders taking responsibility but also raising awareness in the wider public of these harms. This project shares the values of connecting marginalised Indigenous and affected voices and developing protocols for working with these people.

Focus Group One's Policy Recommendations

FG1 made the following policy recommendations, which can be categorised into four themes: (i) research, (ii) collaboration and inclusive meaningful participation of communities simultaneously impacted by different existential threats, (iii) education, and (iv) transparency and accessibility. The recommendations are targeted at the following groups of stakeholders: (i) the research community, (ii) policymakers, and (iii) civil society.

I. Research

1) The group encourages **policymakers** to:
Ensure and maximise research funding for research relating to interlinkages, the group recommends that the research community look for various funding sources and consider pooling resources with other communities in other fields. Integrate forecasting and foresight as essential methodologies and processes in our efforts to effectively understand and mitigate existential threats. In particular, the group urges policymakers to: i) incorporate foresight exercises into regional, national, and multilateral strategic planning processes; ii) allocate funding and resources for

5. Horizon 2025, *Horizon 2045 Foresight Radar*, https://radar.horizon2045.org/?pg=home.
6. BASIC and N-Square, B*ASIC-N Square UK Nuclear Threat Community Network Map*, 2022, https://basicint.org/the-basic-n-square-uk-nuclear-threat-community-network-map/.
7. *Decolonizing Nuclear Studies*, https://highlynriched.com/decolonizing-nuclear-studies/.
8. *Nuclear Truth Project* https://nucleartruthproject.org/.

research and capacity-building in the field of forecasting and foresight; iii) foster collaboration and knowledge-sharing among policymakers, researchers, and practitioners to enhance the effectiveness of foresight efforts; iv) integrate foresight findings and recommendations into policy development and implementation frameworks.

2) The group encourages the **research community** to:
Better understand and consider nuclear weapons policy's interconnected risks and impacts, the group recommends further research on interlinkages between nuclear policy and other fields, such as nuclear science, political science, environmental studies, public health, and economics. Interdisciplinary research should also Involve marginalised communities. This will require fostering interdisciplinary collaboration among experts from diverse fields, developing integrated risk assessment frameworks that consider the social, economic, environmental, and geopolitical dimensions of nuclear weapons policy decisions, establishing joint projects/initiatives on horizontal interlinkages between nuclear and other fields, and adopt an intersectional approach that acknowledges the interconnected nature of social, economic, and environmental injustices faced by marginalised communities and includes their perspectives in future research and policy recommendations. Researchers should also integrate forecasting and foresight as essential methodologies and processes in our efforts to effectively understand and mitigate existential threats. In particular, the group encourages researchers to explore interdisciplinary approaches and collaborate with experts in fields such as risk assessment, nuclear non-proliferation and disarmament, climate science, cybersecurity, and public health to enhance the effectiveness and relevance of foresight analyses.

II. Collaboration and inclusive, meaningful participation of communities simultaneously impacted by different existential threats

1) The group encourages the **research community** to:
Conduct network mapping to identify all relevant stakeholders, establish collaborative processes and develop participatory processes that best include their perspectives. Recognised stakeholders should also include those not typically identified, such as those communities affected by multiple existential threats and stakeholders not in the established hierarchies. Efforts need to be made to widely disseminate research findings, not just to policymakers in the nuclear field but to all the relevant fields and stakeholders identified. To foster capacity-building efforts at the local level, researchers should focus on empowering leadership, advocacy skills, and scientific literacy for these communities to advocate for their rights and interests effectively. They should also promote advocacy efforts to hold governments and responsible parties accountable for nuclear environmental violations and to seek justice for affected communities. To raise awareness among the broader public and decision-makers researchers should educate people about the experiences and struggles of marginalised communities affected by nuclear tests and climate change and connect advocacy networks across fields to organise shared initiatives.

2) The group encourages **policymakers** to:
Support the dissemination of research to officials and policymakers outside the nuclear domain and open up platforms to share findings. They should also make efforts to bridge the gaps and engage in cross-sectoral collaboration within the policy space.

III. Education

1) The group encourages **policymakers** to:
Fund disarmament educational initiatives which focus on relationships with other educational spheres, such as climate education and human rights education. Ensure that such education initiatives involve the research community and civil society. They should also participate in such initiatives themselves where appropriate. Advocate for such initiatives in their relevant policy spaces and raise awareness about the necessity of such initiatives.

2) The group encourages the **research community** and **civil society** to:
Foster initiatives on disarmament education tailored for different stakeholder groups such as the general public; communities in remote areas; policymakers in different fields; and specialised groups such as youth, women, and Indigenous communities. These initiatives should be accessible and specialised for these different groups for maximum impact and accessibility. They should also ensure that such initiatives also include a 'train the trainer' component so that these initiatives can empower stakeholders and be sustained and amplified.

IV. Transparency and Accessibility

1) The group encourages **states** to:
Allow affected communities and the research community access to nuclear archives by committing to transparency and openness. States should support the translation of such nuclear archives to make them accessible to different stakeholders, including those in diverse policy fields. They should also promote the Nuclear Truth Project and its calls for openness and transparency, accountability and redress for those people and places that have been harmed, and prevention of future harms from nuclear activities.

Focus Group Two

Group members: Ian Fleming Zhou, Elin Bergner, Shaza Arif, Valentine Wangari Kamau.

Interrelations and Cyber Technology: Preparing for the AI Nuclear Age

Identifying interrelations, connecting existential threats, and understanding emerging technologies

Using futures and foresight methodologies, focus group two (FG2) expressed significant concern with the potential impacts of Artificial Intelligence (AI) and emerging cyber technologies on nuclear weapons decision-making. The group focused heavily on the interconnection between nuclear and cyber threats, highlighting that the increasing trend of considering the use of AI in nuclear weapons systems could continue even in their scenario imagined for 2045. If we do not recognise the potential risks of increasing our reliance on AI and how this could impact nuclear security, we will be unprepared to deal with these risks. Legislating and minimising these risks as early as possible is essential to ensuring the development and integration of AI into the nuclear sphere does not destabilise global nuclear security.

Nuclear weapons systems are already deeply dependent on cyber technologies, so much so that there are concerns that cyberattacks on nuclear command and control could result in a nuclear escalation.[9] In light of this fear, the group put forward in their 2045 scenario that there would be a global legal framework to regulate AI and cyber technology in nuclear command and control. States are already showing an awareness of the need to regulate AI. The European Union (EU) have produced a comprehensive AI Act, while China has deemed that all algorithms must be reviewed by the state in advance.[10] Yet not all states have produced such legislation, or at least as far-reaching regulations. Furthermore, there are currently no significant international agreements on the regulation of AI. Considering the increasing role AI is playing in nuclear command and control, such regulations and international agreements to limit the role of AI and prohibit interference with other state's systems could be essential for limiting the potentially destabilising effects of AI.

There have already been attacks on nuclear cyber assets. For example, as mentioned in group one's section, the Sellafield Nuclear Site in the UK was hacked by Russian and China-linked groups.[11] In another significant example, hackers accessed the US nuclear weapons agency systems at the National Nuclear Security Administration, which maintains the US nuclear weapons stockpile.[12] It is not difficult to see how alarming hacks such as these should be to policymakers. The central role cyber plays in nuclear weapons systems and nuclear security demands that further measures are taken to improve cybersecurity and to hold states accountable who would seek to compromise others' cyber assets. It is clear that cyber security already has an enormous impact on the risk of nuclear conflict and accidents. Cybersecurity will be vital to nuclear security for the foreseeable future and policymakers must keep this in mind and continue to work towards improving domestic and international legislation.

9. Wilfred Wan, Andraz Kastelic, Eleanor Krabill, *The Cyber Nuclear Nexus: Interactions and Risk*, Friction Points Series No. 2. (Geneva: Switzerland, 2021) p.11.
10. Bill Whyman," AI Regulation is Coming- What is the Likely Outcome?", *CSIS*, (10th October 2023), https://www.csis.org/blogs/strategic-technologies-blog/ai-regulation-coming-what-likely-outcome.
11. Anna Isaac and Alex Lawson, "Sellafield nuclear site hacked by groups linked to Russia and China", *The Guardian*, (4th December 2023) https://www.theguardian.com/business/2023/dec/04/sellafield-nuclear-site-hacked-groups-russia-china.
12. Natasha Bertrand and Eric Wolff, "Nuclear weapons agency breached amid massive cyber onslaught", *POLITICO*, (17th December 2020) https://www.politico.com/news/2020/12/17/nuclear-agency-hacked-officials-inform-congress-447855.

While the group believed that AI is likely not to be integrated entirely into the nuclear realm (such as AI having direct control over the decision to fire a nuclear weapon), there was a consensus that it could influence the human decision-making process through its rapid information provision and interpretation. This remains potentially dangerous due to inherent AI limitations such as "hallucinations", but also due to the increasing methods of cyberattacks beyond hacking, such as using spoofing and data poisoning to cause AI to provide incorrect data and analysis.[13] The role of AI in militaries might increase considerably over time, particularly in interpreting large quantities of data and providing strategic insights for decision-makers.

Moreover, the group discussed that autonomous drones and AI-integrated military equipment are already being used in conflicts, further complicating decision-making processes. Military applications of AI may also increase the risk of escalations due to a potentially lower threshold of use than conventional means, and leaders may feel more comfortable using autonomous technologies than endangering soldiers, which could increase the chance of risk-taking.[14] These AI risks overlapping in a conflict between nuclear powers could contribute to a nuclear escalation. For example, if decision-makers have full faith in the accuracy of their 'impartial' and 'emotionless' AI systems to provide accurate information and strategies, incorrect data through hacking, spoofing, or a technical error could lead to dangerous misinformation suggesting a nuclear attack contribute to an escalation. Decision-makers need to understand the potential limitations and vulnerabilities of AI before becoming overconfident in its ability to improve decision-making.

The group was also concerned about the continuing lack of progress on Diversity, Equity, and Inclusion (DEI) in the nuclear field and policymaking. In 2019, it was estimated that women comprise only 20% of the nuclear workforce, and this figure is even less within the nuclear security workforce, decreasing further in specific areas such as cybersecurity.[15] Diversity can help tackle homogeneity in the workforce, equity reduces unfair treatment by challenging existing societal inequities in opportunities for nuclear security professionals, and inclusion can promote an open-minded nuclear security field and expand our understanding of potential nuclear security and existential threats.[16]

Focus Group Two's Policy Recommendations

FG2 made the following recommendations that focus on the nuclear-cyber nexus. These recommendations are also designed to help de-silo the multiple existential risks that international society currently faces that are deeply interlinked as research on such topics remains siloed. This includes cyber risks, as well as many others. The resulting approaches and solutions thus remain similarly siloed and do not adequately address intersecting risks to humanity.

I. Develop integrated approaches to interrelated existential risks

1) The group encourages **states** to:
Ensure greater coordination across entities working on interrelated existential risks. Such approaches could be inspired by the UN's internal coordination mechanism. They should also ensure funding for interdisciplinary research on existential risks. Governments and other funding providers must also ensure accessible and sustainable funding streams for long-term multidisciplinary research, including futures and foresight methodologies, to address existential risks in the present and the future.

II. Sustainable peace and nuclear risk reduction through AI regulations

1) The group encourages **states** to:

a) Actively engage in international forums to collaborate on establishing and enforcing AI regulations. This collaboration is essential to ensuring consistency and effectiveness in addressing the global challenges posed by AI advancements. They believe this collaboration should extend to govern the ethical and safe use of AI systems and reduce the risk of escalations. They also believe that the United Nations Security Council (UNSC) should actively oversee the implementation of AI regulations at the international level. Its involvement is crucial for promoting compliance and coordination among member states in addressing AI-related security risks. Furthermore, the UN's involvement ensures legitimacy.

13. James Johnson, and Eleanor Krabill, "AI, Cyberspace, and Nuclear Weapons", *War on the Rocks*, (31st January 2020) https://warontherocks.com/2020/01/ai-cyberspace-and-nuclear-weapons/.
14. Peter Burt, "Not too clever? Military applications of artificial intelligence", *Drone Wars UK*, (Oxford: Drone Wars UK, 2021).
15. WINS, *Gender and Nuclear Security: Challenges and Opportunities* (July 2019) p. 6 https://www.wins.org/wpcontent/uploads/2020/12/Gender-and-Nuclear-Security_Pg33.pdf.
16. Sneha Nair, *Converging Goals: Examining the Intersection Between Diversity, Equity, and Inclusion and Nuclear Security Implementation,* (NTI, 2023).

b) Build consensus on the linkage between AI technologies and decision-making in the nuclear domain. Stakeholders should engage in dialogue and research to understand AI's implications for strategic stability and nuclear risk eduction. This should also involve ensuring humans remain in control of key decisions. While AI technologies offer potential benefits, human command and control must remain central to decision-making processes, particularly in sensitive areas such as nuclear security. Policies should prioritise human oversight to mitigate the risks of AI-enabled systems and maintain accountability.

c) Efforts should be made to enhance transparency in adversarial machine-learning processes. This includes improving the explainability of training data and machine-learning models to foster trust and accountability in AI systems. Data security laws must be emphasised to avoid attacks on training data and models. Policymaking processes related to AI should prioritise inclusivity and diversity of perspectives. This inclusive approach will help ensure that regulations address the needs and concerns of all stakeholders, including marginalised communities and developing states.

2) The group encourages **all stakeholders** to:
Foster collaboration between government, private sector, industry, and academia on this issue. This could enable better integration of the technology in different realms, including nuclear, and better inform future regulations.

III. Recommendations on cybersecurity

1) The group encourages **states** to:
Strengthen cybersecurity measures at both national and international levels. Governments should invest in robust cybersecurity infrastructure, including advanced threat detection systems and secure communication protocols, to defend against cyber-attacks and mitigate the risks of cyber warfare. Additionally, international cooperation and information-sharing mechanisms should be established to facilitate coordinated responses to cyber threats, thereby promoting global cyber resilience and stability.

IV. Recommendations on inclusion

1) The group encourages **states** to:
Prioritise the inclusion of human impacts of nuclear weapons in non-proliferation norms. By prioritising Indigenous rights in uranium mining policies, nuclear states can uphold social justice and environmental responsibility principles while ensuring the sustainable supply of nuclear fuel.

Focus Group Three

Group members: Haleema Saadia, Jan Quosdorf, Tristan Norman, Wandile Shezi, Fateme Fazel, and Carla Montilla

The Nuclear-Climate Nexus: The Intersection of Climate Change and Nuclear Weapons

Developing policy recommendations to better understand and address the combined risks climate change and nuclear weapons pose

Focus group three (FG3) focused on the interlinkages between nuclear weapons and climate change. They recognised that the intersection presents multifaceted challenges with far-reaching implications for global security and human well-being. Climate security has recently become an increasingly pressing non-traditional national and international security risk. Conflict and crisis-affected areas are more susceptible to the negative consequences of climate change which can further exacerbate conflicts by fuelling resource competition.[17] The group saw increasing resource competition due to climate change between NWS as a threat multiplier and as a result, recommended that states work to address this issue.

The Kumu map of interconnections that the group developed reflects a focus on future-looking scenarios and discussion on the intersection between nuclear weapons and climate change (see Appendix x). The group imagined an increase in climate security risks that would impact geopolitical dynamics, leading to resource competition that could increase the chances of a nuclear escalation. For example, India and Pakistan have been facing rising tensions over freshwater. The Indus River runs through both India, which is upstream, and downstream Pakistan, and Pakistan is particularly dependent on the river for irrigational and consumptive uses.[18] The 2022 IPCC report stated that international transboundary river basins, including the Indus, are predicted to suffer severe water shortages by 2050, with climate change as a driver.[19] There have already been significant disagreements over India building dams against Pakiststan's wishes and there are concerns these tensions will further intensify as climate change increases.[20] More hopefully, the group also anticipated significant progress towards decarbonisation that would lead to nuclear energy becoming the cornerstone of most states' energy strategies.

Many states have acknowledged the impact of climate change on the global security environment.[21] NATO has recently published a report on the links between the environment, climate change, and security.[22] This follows the NATO Brussels Summit in 2021 where member states agreed that climate change is a threat multiplier which impacts Alliance security.[23] It has become increasingly apparent that climate change is a

17. UN Environment Programme, "Climate change and security risks", https://www.unep.org/topics/fresh-water/disasters-and-climate-change/climate-change-and-security-risks#:~:text=Security%20concerns%20linked%20to%20climate,and%20forced%20migration%20and%20displacement.
18. United States Institute for Peace, "India and Pakistan Are Playing a Dangerous Game in the Indus Basin", (23rd February 2023), https://www.usip.org/publications/2023/02/india-and-pakistan-are-playing-dangerous-game-indus-basin.
19. IPCC, "Climate Change 2022: Impacts, Adaptation and Vulnerability", *IPCC Sixth Assessment Report*, (2022) https://www.ipcc.ch/report/ar6/wg2/.
20. Siwat Varnakomola, "Will There Be a Water War between India and Pakistan by 2025?", *Kings College London*, (15th August 2022), https://www.kcl.ac.uk/will-there-be-a-water-war-between-india-and-pakistan-by-2025.
21. Lloyd J. Austin III, "Statement by Secretary of Defense Lloyd J. Austin III on the Department of Defense Climate Adaptation Plan", *U.S. Department of Defense*, (7th October 2021) https://www.defense.gov/News/Releases/Release/Article/2803761/statement-by-secretary-of-defense-lloyd-j-austin-iii-on-the-department-of-defen/.
22. NATO, "Environment, climate change and security", (18th April 2024) https://www.nato.int/cps/en/natohq/topics_91048.htm#:~:text=At%20the%20NATO%20Summit%20in,of%20climate%20change%20on%20security.
23. NATO, "Brussels Summit Communiqué", (14th June 2021) https://www.nato.int/cps/en/natohq/news_185000.htm.

national security issue in policy and academic spaces.[24] Experts, such as Jamie Kwong, have researched how climate change could impact the US nuclear deterrent through climate events such as flood waters claiming US nuclear weapons.[25] It is therefore not only important to better prepare nuclear weapons sites for the impacts of climate change, but also to work to combat climate change directly to minimise the harm it could bring to nuclear security. The group recommends that states commit to more ambitious emissions targets urgently to mitigate climate risks before it is too late.

Yet, there remains resistance to recognising and addressing the threat of climate change amongst some of the nuclear states. China still sees climate change as mainly an economic and development issue, and on the international stage it has argued against the securitisation of climate change.[26] Much of the existing climate securitisation has been created in and been limited to Europe.[27] Calls for the UNSC to take leadership on climate-related security risks have been met with strong resistance.[28] Not treating climate change as a security issue limits our ability to prepare for and reduce the potential negative impacts climate change will have on international security. Climate change will exacerbate several national security issues, such as forcing people to become climate refugees as their homelands become incapable of sustaining crops. It has been estimated that there could be 1.2 billion climate refugees by 2050.[29] It also ignores the clear links between climate change and security, including nuclear security. The group urged all states to seriously consider the link between climate change and nuclear weapons and focused several of its policy recommendations discussed below on this issue.

Climate change and nuclear weapons are both considered global threats and can have disastrous humanitarian impacts (HI).[30] The HI of nuclear weapons ties in with their devastating impact on the climate through contamination. The radiological contamination because of nuclear detonation has disastrous consequences for both humans and the environment.[31] Nuclear fallout contaminates air, soil, and water, can render vast areas uninhabitable and disrupt food and water supplies. This contamination poses continuing health risks to affected populations as it persists for decades. Even a limited nuclear exchange could disrupt global climate and agriculture and can potentially lead to widespread famine.[32] For example, research has shown that using a few hundred nuclear weapons could nearly stop all rain over India and central China.[33]

The group also emphasised the connection between resource competition and nuclear weapons. International resource competition could fuel nuclear escalation and bargaining scenarios, where crises break out over access to increasingly scarce resources or newly accessible ones. Climate change exacerbates resource scarcity further, increasing the risk of states competing over resources, including nuclear states.[34] Resources already filter into the tensions in the South China Sea or India-Pakistan rivalry, for example.[35] Further, the competition and armament costs also exacerbate internal resource constraints, adding to domestic and regime instability.

Globally, the energy sector faces a paramount challenge: ensuring a secure and sustainable energy supply while mitigating its impact on climate change. The 2015 Paris Agreement aims to limit global warming to

24. Andrew R. Hoehn, and Thom Shanker, "Climate Security Is National Security", *RAND*, (30th June 2023) https://www.rand.org/pubs/commentary/2023/06/climate-security-is-national-security.html.
25. Jamie Kwong, "The Waters Could Claim Nuclear Weapons", *Foreign Policy*, (12th July 2023) https://foreignpolicy.com/2023/07/12/nuclear-weapons-climate-change-deterrence/.
26. Arnaud Boehmann, "National security and the climate crisis – China is still not joining the dots", *Merics*, (21st December 2022) https://merics.org/en/comment/national-security-and-climate-crisis-china-still-not-joining-dots.
27. Jeroen Warner and Ingrid Boas, "Securitization of climate change: How invoking global dangers for instrumental ends can backfire", *EPC Politics and Space*, 37(8), (2019), pp. 1471-1488 (p. 1472).
28. UNSC, "With Climate Crisis Generating Growing Threats to Global Peace, Security Council Must Ramp Up Efforts, Lessen Risk of Conflicts, Speakers Stress in Open Debate", *UNSC Meetings Coverage*, (13th June 2023) https://press.un.org/en/2023/sc15318.doc.htm; Relief Web, "How UN member states divided over climate security", (22nd December 2021) https://reliefweb.int/report/world/how-un-member-states-divided-over-climate-security.
29. Sean McAllister, "There could be 1.2 billion climate refugees by 2050. Here's what you need to know", *Zurich*, (17th January 2024) https://www.zurich.com/en/media/magazine/2022/there-could-be-1-2-billion-climate-refugees-by-2050-here-s-what-you-need-to-know.
30. David Hannay, "Nuclear weapons and climate change: The two great challenges", *European Leadership Network*, (16th September 2021) https://www.europeanleadershipnetwork.org/commentary/nuclear-weapons-and-climate-change-the-two-great-challenges/.
31. "Humanitarian impacts and risks of use of nuclear weapons", *International Committee of the Red Cross*, (29th August 2020). https://www.icrc.org/en/document/humanitarian-impacts-and-risks-use-nuclear-weapons.
32. SAGE Publications, *PHYS ORG*, (12th July 2012) https://phys.org/news/2012-07-nuclear-weapons-contribution-climate-science.html.
33. "Humanitarian impacts and risks of use of nuclear weapons", *International Committee of the Red Cross*, (29th August 2020). https://www.icrc.org/en/document/humanitarian-impacts-and-risks-use-nuclear-weapons.
34. Jasmine Auda, Nivedita S, Shane Ward, Elia Duran-Smith, Wandile Shezi, and Youssef Hosny, "The Dual Threat of Nuclear Weapons and Climate Change: The Danger of Inaction", in Kim Obergfaell (ed) *De-siloing Existential Threats: Challenging Identity, Power, and Inclusivity in the Nuclear Policy Field*, (BASIC, 2023) p. 20. https://basicint.org/wp-content/uploads/2023/07/Anthology_De-siloing-Existential-Threats_A4-2-1.pdf.
35. US Martitime Transparency Initiative, "South China Sea Energy Exploration and Development", *Center for Strategic & International Studies*, https://amti.csis.org/south-china-sea-energy-exploration-and-development/; Climate Diplomacy, "Water conflict and cooperation between India and Pakistan", https://climate-diplomacy.org/case-studies/water-conflict-and-cooperation-between-india-and-pakistan.

1.5°C or less above pre-industrial levels. However, it is crucial to recognise that developing and emerging economies require increased, not decreased, energy access.[36] Despite global efforts, progress towards Sustainable Development Goal 7 (SDG7) is insufficient.[37] Nuclear energy technology is a reliable baseload energy source that aids in climate change mitigation by offering a carbon-free energy alternative. The group believes nuclear energy could help bring a sustainable energy mix and recommends that states collaborate on developing sustainable energy sources, including nuclear energy.

The group was concerned that a handful of nuclear-armed states could potentially threaten global security without any accountability from NNWS who want the risk of nuclear war to be eliminated.[38] One issue some states would like to rectify is the lack of measures to ensure nuclear states would have to take responsibility for the global harm caused by a nuclear conflict.[39] Inclusive decision-making on climate change is essential for addressing diverse perspectives and regional challenges and incorporating diverse perspectives, particularly from marginalised states in the Global South.[40] Challenges persist in involving the Global South in nuclear decision-making, as their perspectives are often sidelined.[41]

Focus Group Three's Policy Recommendations

FG3 made the following recommendations focusing on their concern about the link between nuclear weapons and climate change. These recommendations are also designed to foster increased collaboration between stakeholders and to embrace new innovative approaches and methodologies to address climate change. Climate change is not just a threat multiplier for nuclear war, it impacts all other existential threats and we need to recognise this if we are to produce effective legislation.

I. Addressing the climate-nuclear nexus

1) The group encourages **states** to:

a) Protect critical infrastructure and populations from climate disasters like sea level rise, extreme weather events, and food/water insecurity, specifically through measures such as establishing an international climate disaster response force and funding mechanism for emergency aid. They also recommend investing in strengthening critical infrastructure like power grids and food/water systems against climate/nuclear impacts and keeping a stockpile of emergency supplies of food, water, and medical provisions for mass humanitarian crises.

b) Establish binding international agreements to dramatically reduce greenhouse gas emissions beyond and more ambitious than the Paris Agreement and transition to renewable energy sources to mitigate climate change risks and enhance global governance mechanisms to improve coordination on these transnational threats and facilitate collective action. They should implement binding national carbon emissions reduction targets at least in line with limiting global warming to 1.5°C, and strengthen international coordination mechanisms for disaster response and humanitarian assistance to ensure swift and effective aid delivery in the aftermath of nuclear incidents and climate-related emergencies. High-income states should provide technical assistance and financing to help middle- and lower-income states rapidly transition away from fossil fuels and towards renewable energy sources like nuclear, wind and hydroelectric power.

II. Innovating existential risk policymaking

1) The group encourages **states** to:

a) Develop best practices, foresight tools, and simulation exercises to anticipate better and manage climate security risks across national, regional, and international contexts. They should utilise whole-of-society approaches to climate risk and hazard management that target military and civilian infrastructure integral to nuclear energy and weapons facilities. Part of this innovation should be to integrate climate security risks into nuclear decision-making and command-and-control operations.

36. Federal Ministry for Economic Cooperation and Development, "Climate Change and Development: Energy and Climate", https://www.bmz.de/en/issues/climate-change-and-development/energy-and-climate.
37. UN. Department of Economic and Social Affairs, "The sustainable development goals report 2022", https://digitallibrary.un.org/record/3980029?ln=en&v=pdf.
38. Union of Concerned Scientists, "Nuclear Weapons Justice", https://www.ucsusa.org/nuclear-weapons/justice.
39. George Perkovich, "Accountability after Nuclear War: Why Not Plan Ahead?", *Journal for Peace and Nuclear Disarmament*, 3(1), (2020), pp. 115-122 (p. 115).
40. US Aid, "Inclusive Climate Action: An Emerging Perspective", *RALI Series: Promoting Solutions for Low Emission Development*, https://pdf.usaid.gov/pdf_docs/PA00VPHQ.pdf.
41. Dan Plesch, "The South and disarmament at the UN", *International Peace and Security*, 37(7), (2016) pp. 1203-1218.

b) Recognise that climate-related issues such as future resource competition, do not fundamentally change the international system but dictate future arenas. Managing this issue does not necessarily require re-inventing established tools, but implementing risk reduction and management effectively, amidst changing balances of power should still be explored.

III. Enhancing nuclear security and safeguards

1) The group encourages **states** to:

a) Establish and strengthen regulatory frameworks to foster rigorous oversight of nuclear safeguards and security, including regulatory agencies for monitoring and enforcement activities. States should also develop and enhance a skilled workforce in nuclear security and safeguard by improving education and training initiatives with academic institutions, offering scholarships, internships, and career development opportunities. Outreach programs can raise public awareness in surrounding areas and on social media.

b) They also call for all states to pursue transparency in their nuclear policies and decisions and inform the public about the sources and motives of such policies and decisions. This approach will clarify the logic of a decision.

IV. Making progress towards nuclear disarmament

1) The group encourages **states** to:

a) Strengthen international cooperation and collaboration on nuclear disarmament, nuclear risk reduction, and climate change mitigation by leveraging existing multilateral forums and diplomatic channels.

b) Encourage the Global South states to form alliances based on shared interests to amplify their voices and influence policy outcomes like what we have witnessed by the Non-Aligned Movement.

Focus Group Four

Group members: Kyle Tucker, Morgan Slessor Galina Salnikova, Etfa Khurshid Mirza, Sebastian Niemetz, Johannes Nordin, and Hala Alises.

Nuclear Energy and Security: Mitigating nuclear proliferation and security risks after COP28

Contributing policy recommendations that acknowledge the potential of nuclear energy to combat climate change but also recognise and mitigate nuclear security and proliferation risks

Like FG3, Focus Group Four (FG4) used the intersection of nuclear risks and climate change as the starting point for their exploration of interconnected existential threats. Their interest in this linkage was due to the 2023 COP28 meeting in Dubai, where signatories to the UN Framework Convention on Climate Change (UNFCCC), for the first time officially called for the deployment of low-emission technologies, which included nuclear power.[42] Recognising the need for "deep, rapid and sustained reductions in greenhouse gas emissions in line with 1.5 °C pathways," the Global Stocktake's 28th paragraph called on UNFCCC Parties to contribute to the global efforts to reach the Paris Agreement targets, including "(a) Tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030."[43] At the summit, 22 states directly signed onto the 'Declaration to Triple Nuclear Energy,' committing to triple current nuclear energy capacity between 2020 and 2050.[44]

If realised, this would mean an enormous global expansion of nuclear power. There have been notable developments towards increasing global dependence on nuclear energy in recent years. In mid-2022, the European Parliament voted to include nuclear energy in its new Green Taxonomy, paving the way for the nuclear industry to receive green financing under EU law.[45] In February 2024, the EU Commission launched 'Europe's 2040 climate target' and established a new 'European Industrial Alliance on Small Modular Reactors.'[46] In late 2023, the Indian government signalled it had initiated steps to triple nuclear power capacity by 2031-2032.[47] Meanwhile, China alone is building nearly half of all new reactors currently under construction globally, aiming to double nuclear energy in its energy mix by 2035.[48] Yet, the proposition that an increasing reliability of nuclear energy can constitute a sustainable solution to the global climate crisis is highly contested.

Currently, the World Nuclear Association (WNA) says about 60 new reactors are being constructed across

42. Joseph Feyertag, "What is the Global Stocktake?", *Gantham Research Institute on Climate Change and the Environment*, (29th November 2023) https://www.lse.ac.uk/granthaminstitute/explainers/what-is-the-global-stocktake/.
43. United Nations Framework Convention on Climate Change, "First global stocktake", *Conference of the Parties serving as the meeting of the Parties to the Paris Agreement: Fifth session*, (13th December 2023). https://unfccc.int/event/cma-5?item=4.
44. US Department of Energy, "At COP28, Countries Launch Declaration to Triple Nuclear Energy Capacity by 2050, Recognizing the Key Role of Nuclear Energy in Reaching Net Zero", *Department of Energy Website*, (1st December 2023) https://www.energy.gov/articles/cop28-countries-launch-declaration-triple-nuclear-energy-capacity-2050-recognizing-key.
45. "EU Taxonomy: Commission welcomes the result of today's vote by the European Parliament on the Complementary Delegated Act", *European Comission*, (6th july 2022) https://ec.europa.eu/commission/presscorner/detail/en/ip_22_4349.
46. "Commission to ally with industry on Small Modular Reactors", *European Commission*, (9th February 2024) https://energy.ec.europa.eu/news/commission-ally-industry-small-modular-reactors-2024-02-09_en.
47. PIB Delhi, "Government has initiated steps to increase the nuclear power capacity from 7480 MW to 22480 MW by 2031-32, says Union Minister Dr Jitendra Singh", *Indian Department of Atomic Energy*, (20th December 2023).
48. "Plans For New Reactors Worldwide", *World Nuclear Association*, (30th April 2024) https://world-nuclear.org/information-library/current-and-future-generation/plans-for-new-reactors-worldwide.

the world, with a further 110 reactors in planning – most of them in Asia.[49] There are already 440 nuclear power reactors operating in 32 states today. The growing numbers of reactors worldwide, parallel to the increasing impacts of man-made climate change, will require greater resilience to resist harsher climate impacts and disasters. Nuclear power plants have already been involved in serious incidents due to natural disasters, such as the Fukushima nuclear disaster after a 9.0-magnitude earthquake hit off the coast of Japan creating tidal waves which flooded the Fukushima nuclear power plant reactors and sparking a meltdown.[50] The existing risk of earthquakes, combined with climate change increasing the frequency and severity of freak weather events like floods and hurricanes, could have severe impacts on nuclear power plants in the future. The group strongly recommends states investigate the potential impacts of such an increase in nuclear power production across a range of existential threats, including the proliferation of nuclear weapons and potential environmental catastrophes.

This proposed massive buildup of civilian nuclear power to mitigate the climate crisis and meet rising energy demand will entail new risks and threats, while also altering and amplifying existing ones. Such a significant global expansion of nuclear energy could pose unprecedented security and proliferation risks, testing our regulatory institutions and international agreements in new and potentially dangerous ways. There is also the issue of radioactive waste. Between 1954 and 2016, 390,000 tonnes of Spent Nuclear Fuel (SNF) were generated. A tripling of nuclear energy by 2050 will add significant pressure to develop storage solutions and scale up reprocessing practices[51] While several nuclear energy states have already reprocessed uranium waste, some states have opted not to, citing greater proliferation risks for transported waste materials and higher overall costs. A nuclear energy boom could elevate uranium prices, thereby making waste reprocessing more affordable relative to mining new uranium.[52]

As NWSs modernise and expand their stockpiles, and more states openly debate nuclear arms programs, the buildup of civilian nuclear power will directly affect matters of global nuclear proliferation. The Stockholm International Peace Research Institute (SIPRI) reported in its 2024 annual assessment of the state of armaments, disarmament and international security that all NWS were expanding or modernising their nuclear arsenals.[53] While civilian nuclear energy plants themselves are not considered high proliferation risks due to the difficulty of converting reactor fuel into weapons-usable material, there is a concern that the civilian nuclear fuel cycle could be used to covertly source materials, expertise and technology to develop nuclear weapons.[54] For example, Iran was for some time accused of converting its civilian enrichment plants into enrichment plants for nuclear weapons.[55] It is important to recognise these potential proliferation risks before vastly expanding global civilian nuclear energy production, particularly in the current tense geopolitical environment. This is why group four dedicates its first set of policy recommendations to addressing potential increases in proliferation risks with a mass nuclearisation of global energy supplies.

The group was also concerned about the potential health impacts (HI) of an increase in nuclear energy. According to the International Atomic Energy Agency (IAEA), global uranium consumption could amount to 100,000 metric tons by 2040. Higher uranium prices – nearly doubling year-on-year since April 2023 – are already driving a mining revival,[56] Though since April 2024 prices have stabilised and recently slightly declined.[57] The group believes it is paramount that states assess the impacts of uranium mining. In particular, these impact assessments must be especially cognisant of how past and contemporary practices for uranium extraction and waste storage have disproportionately impacted Indigenous peoples and other disadvantaged groups, whose voices have been excluded from public discourse.[58]

49. "Plans For New Reactors Worldwide", *World Nuclear Association*, (30th April 2024) https://world-nuclear.org/information-library/current-and-future-generation/plans-for-new-reactors-worldwide.
50. BBC News, "Fukushima disaster: What happened at the nuclear plant?", (23rd August 2023) https://www.bbc.co.uk/news/world-asia-56252695.
51. Nicholas Watson, "New IAEA Report Presents Global Overview of Radioactive Waste and Spent Fuel Management", I*nternational Atomic Energy Agency*, (21st January 2021) https://www.iaea.org/newscenter/news/new-iaea-report-presents-global-overview-of-radioactive-waste-and-spent-fuel-management.
52. David Kramer, "US takes another look at recycling nuclear fuel", *Physics Today*, 77(2), pp. 22-25.
53. SIPRI, "Nuclear Forces", *SIPRI Yearbook 2024: Armaments, Disarmament and International Security*, (2024) Oxford: Oxford University Press, pp. 271-367.
54. Paul I. Bernstein and Nima Gerami, "Proliferation Risks of Civilian Nuclear Power Programs", *Centre for the Study of Weapons of Mass Destruction*, (June 2012) /https://wmdcenter.ndu.edu/Portals/97/Documents/Publications/Articles/Proliferation%20Risks%20of%20Civilian%20Nuclear%20Power%20Programs.pdf.
55. Ivanka Barzashka, "Converting a civilian enrichment plant into a nuclear weapons material facility", *Bulletin of the Atomic Scientists*, (31st October 2013) https://thebulletin.org/2013/10/converting-a-civilian-enrichment-plant-into-a-nuclear-weapons-material-facility/.
56. Jim Robbins, "A Nuclear Power Revival Is Sparking a Surge in Uranium Mining", *Yale Environment 360*, (4th April 2024) https://e360.yale.edu/features/us-uranium-mining-nuclear-power.
57. Trading Economics, "Uranium", (21st June 2024) https://tradingeconomics.com/commodity/uranium.
58. Danielle Endres, "The Rhetoric of Nuclear Colonialism: Rhetorical Exclusion of American Indian Arguments in the Yucca Mountain Nuclear Waste Siting Decision", C*ommunication and Critical/Cultural Security Studies*, 6(1), (2009), pp. 39-60.

Focus Group Four's Policy Recommendations:

The group makes the following policy recommendations

I. Addressing the proliferation risks of vastly increasing global nuclear power production

1) The group encourages **states** to:

a) Update enrichment and reprocessing technology safeguards to protect against the proliferation, environmental, and humanitarian trade-offs of increasing nuclear power deployment. They should also consider the trade-off between reducing carbon emissions and increasing the risk of nuclear proliferation. More nuclear materials necessitates more resources for upholding nuclear non-proliferation and preventing accidents. They also need to recognise that fuel enrichment and reprocessing are the most significant proliferation risks of nuclear power production and consider other energy solutions where possible.

b) Pay greater attention to the humanitarian and environmental impacts across the entire nuclear supply chain, from uranium exploration and mining to processing and SNF disposal. This involves understanding that each step of the nuclear fuel cycle poses unique challenges, but all broadly present both environmental and non-proliferation challenges. States should also urgently pursue solutions to SNF disposal and long-term storage safely and sustainably.

II. Addressing the links between nuclear and environmental risks

1) The group encourages **states** to:

a) Acknowledge that a huge increase in nuclear reactors will require significant attention to potential environmental impacts. This involves considering nuclear power as a suggested climate solution that can reduce fossil fuel reliance but also increases the risks of nuclear accidents.

b) Increase funding and recognise the need for greater safeguards and physical security of nuclear facilities. States should also prepare for the impact of natural disasters, exacerbated by climate change, on the safety and security of nuclear facilities.

III. Educate about the nexus between nuclear issues and existential threats

1) The group encourages **governments, institutions of higher learning, unions, industry organisations/consortiums** to:

a) Ensure adequate training and professionals are available for the next generation and there is a need to foster continued interest and viability in pursuing such career paths. This suggestion requires an increase in funding for research and education on the subject of nuclear issues and existential risks and can be helped by mapping knowledge and skill shortages to identify focuses for capacity building and education, taking into account the context and needs of all communities.

b) Educate the general public and focus on educational opportunities for young people, especially women and underrepresented communities. Identify and address the key barriers to entry in the nuclear field which could be further aided by states ensuring the free movement of scholars and experts in the field across borders.

IV. Address new risks stemming from nuclear materials and emerging technologies

1) The group encourages **Government regulators, IAEA, urban planners, and technical experts** to:

a) Recognise that the next generation of nuclear power plants will face new distinct challenges and security risks, with new technologies and environmental conditions impacting security protocols in novel and sometimes unpredictable ways. As these reactors will likely be smaller in size and deployed in greater numbers, the next generation of power plants will thus require new safeguarding approaches and technical measures. It is also important to acknowledge that emergent technologies constitute both new opportunities and risks for nuclear security. Unmanned Aerial Vehicles (UAVs) can be used for both surveillance of and attacks on nuclear facilities, while AI for nuclear command and control can be vulnerable to biases, data poisoning, and the 'black-box problem.[59]

b) Plan to prepare for the potential energy security impacts of uranium supply chain disruptions in the event of a regional war, maritime blockade, or natural disaster.

59. Bart Lenaerts-Bergmans, "Data Poisoning: The Exploitation of Generative AI", *CrowdStrike*, (20th March 2024) https://www.crowdstrike.com/cybersecurity-101/cyberattacks/data-poisoning/; Alice Saltini, *AI and nuclear command control and communications: P5 perspectives*, (London, European Leadership Network, 2023). https://www.europeanleadershipnetwork.org/wp-content/uploads/2023/11/AVC-Final-Report_online-version.pdf.

More About the Policy Cycle Participants

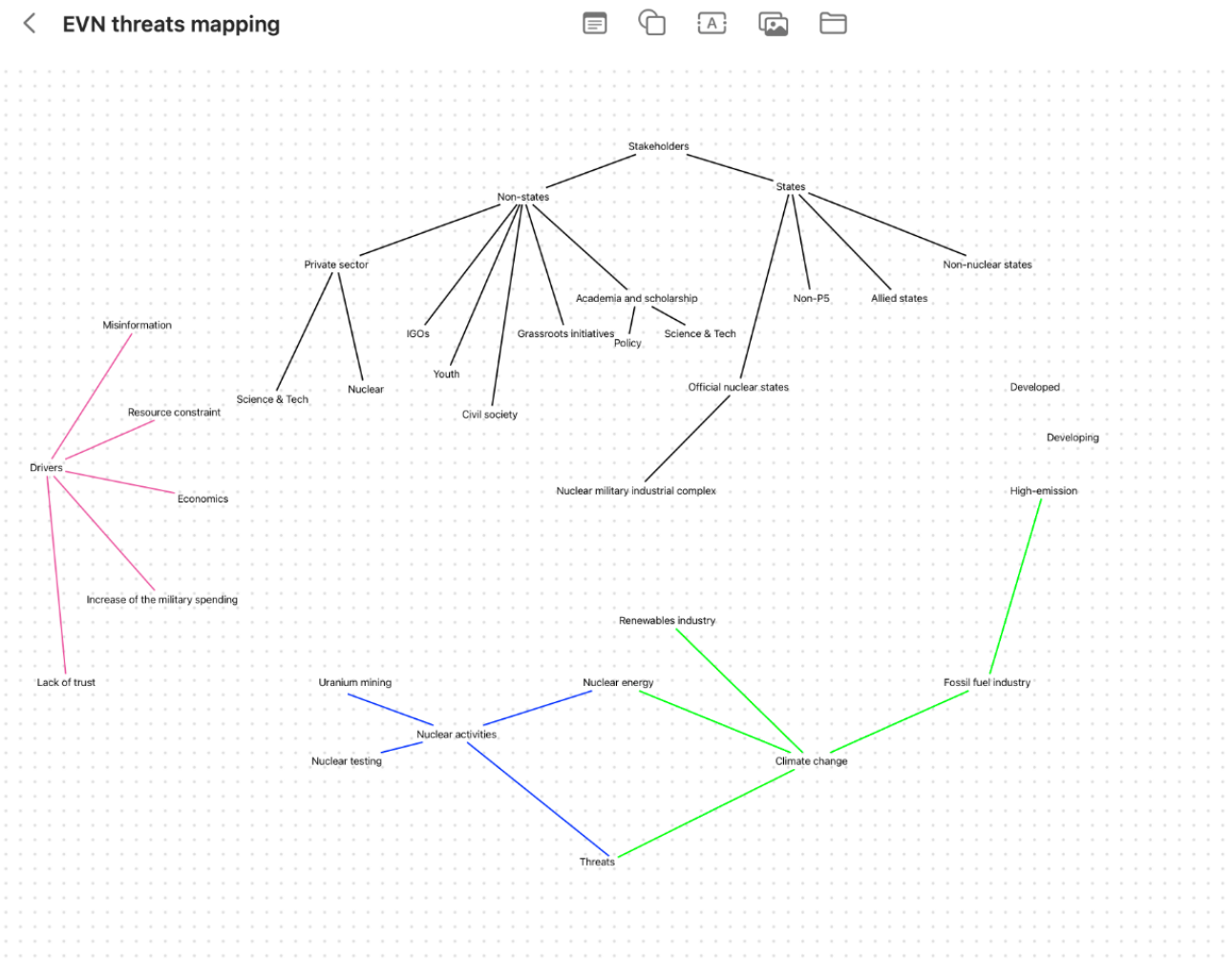
Twenty-three EVN members participated in the policy cycle for its duration and contributed the policy recommendations for this report. Twelve of whom identified as female or as a gender minority (52%). Eight policy cycle members were from Europe, 7 were from Asia, 3 were from Africa, 2 were from the Middle East, and 3 were from North America. This means that again with a total of 12 (52%) of policy cycle participants were from the Global South. There were in total 16 nations represented in this policy cycle. This helps the EVN to continue its pledge to foster dialogues and relationships between the global north and global south, and to ensure diversity and inclusivity were at the heart of this project.

We would like to thank all of the members involved in the policy cycle for their thorough engagement, their willingness to learn, and for making this report possible. The EVN is nothing without its members who will go on to be the future leaders of nuclear policymaking.

Appendices

X:

Focus Group One Workshop Three Existential Threats Map



Y:
Focus Group Three Workshop Three Existential Threats Map