

The Royal Society

Update on financial links with fossil fuels and arms corporations, April 2021

This document provides an update on information gathered for the report, *Irresponsible Science?: How the fossil fuel and arms industries finance professional engineering and science organisations*¹, published by Scientists for Global Responsibility (SGR) in October 2019. Information sourced from the society's publicly available documents is provided first, followed by commentary by SGR.

Investment policy

The Royal Society has not updated its investment policy since the time of the Irresponsible Science report. In its Trustees' report and financial statements for 2019/20², the Royal Society states that:

"The Society does not invest in organisations which conflict with the charity's purpose, or where Council deem that to do so would hamper the charity's work, for example by alienating those who support the Society financially. Council resolved that the Society should not invest in companies or funds that derive a significant portion of their income from the sale or manufacture of tobacco products."

In communication with *The Sunday Times*, the Royal Society said that³ it "holds less than 6% of its direct investment portfolio in energy companies who focus on oil and gas production. We also invest in some pooled funds, which potentially could be invested in fossil fuels. We have no investments in defence firms." In further correspondence with the publication, the society clarified that this meant at least £16m of its investments were held in the oil and gas sector and it could be more once pooled funds were taken into account. This information formed the basis of an article subsequently published in *The Sunday Times* in October 2019.⁴

Since the society's investment policy does not exclude arms corporations, it is unclear on what basis the society can state that "We have no investments in defence firms."

Investments

For the year ended 31st March 2020, the Royal Society disclosed a total of £234,075,000 in investments, made up as follows:⁵

Pooled investments £222,734,000

The Royal Society does not provide information on where these funds are held.

Amadeus RSEF £8,621,000

Royal Society Enterprise Fund was created "with the aim of becoming a financially successful contributor to early stage science based companies in the UK and a role model for the translation of

¹ <https://www.sgr.org.uk/publications/irresponsible-science>

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<https://royalsociety.org/-/media/about-us/governance/trustees-report-financial-statements-2019-2020.pdf>

³ <https://www.sgr.org.uk/sites/default/files/2019-10/A18-supplement.pdf>

⁴ The Sunday Times (2019). Royal Society urged to ditch £16m fossil-fuel investment. 6 October.

<https://www.thetimes.co.uk/edition/news/royal-society-urged-to-ditch-16mfossil-fuel-investment-drw89t35f>

⁵ <https://royalsociety.org/-/media/about-us/governance/trustees-report-financial-statements-2019-2020.pdf>

excellent science for commercial and social benefit. Due to the dual benefits expected to be received, the fund is accounted for as a mixed motive investment in the financial statements. The Society entered into a Limited Partnership Agreement with Amadeus Capital Partners in 2014 to create the Amadeus RSEF LP.” The fund makes “equity investments in innovative early stage businesses emerging from the science base in the UK and elsewhere”.

Theo Murphy Australia Fund £2,720,000

According to the Trustees’ report and financial statements for 2019/20⁶, the Theo Murphy Funds (in the UK and Australia) were created through a bequest from the estate of the late Theo Murphy. The funds ‘shall be used or applied to further scientific discovery in the fields of medicine, science, technology and engineering’. The Theo Murphy Australia Fund is an Australian company, the shares of which are owned by the Society.

Transparency

The Royal Society discloses the names of two funds in which it invests (the Amadeus RSEF and Theo Murphy Australia Fund), making up a total of 4.8% of its investments. It is not clear if these two funds have ethical investment policies. The Royal Society does not disclose the fund or companies in which it invests the remaining 95.2% of its total investments.

Corporate Patrons

The Royal Society does not appear to have corporate patrons or sponsors.

Other corporate links

The Royal Society’s list of ten “Outstanding Donors”⁷ for the 2019-20 financial year includes one company involved in the arms industry, namely Rolls Royce, and one company, Tata Sons, involved with the fossil fuels industry. The Royal Society also accepts anonymous donations.

Rolls Royce also funds the Society’s Industry Fellowship scheme although this is not currently open to applications.⁸

Education programmes

The Royal Society does not appear to have any funding for its education programmes from fossil fuel or arms companies, although it is not clear where it has spent the donations from Rolls Royce and Tata Sons.

Events sponsorship

The Royal Society does not appear to have any funding for its events from fossil fuel or arms companies, although it is not clear where it has spent the donations from Rolls Royce and Tata Sons.

Environmental policy

The Royal Society does not appear to have an environmental policy.

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<https://royalsociety.org/-/media/about-us/governance/trustees-report-financial-statements-2019-2020.pdf>

⁷ <https://royalsociety.org/about-us/funding-finances/support-us/our-donors/>

⁸ <https://royalsociety.org/grants-schemes-awards/grants/industry-fellowship/>

Other relevant information

On its website the Royal Society says that “We are the independent scientific academy of the UK, dedicated to promoting excellence in science for the benefit of humanity”.

The Royal Society’s Strategic Plan 2017-2022⁹ says that the Society:

“recognises the need to respond to future trends in science and emerging technologies and their implications for the way we live and for our environment.... In delivering this Strategic Plan, the Society will continue to promote and uphold the highest ethical standards in, and in relation to, scientific work.”

In its Trustees’ report and financial statements for 2019/20², the Society says:

“As global temperatures increase, the impacts of climate change on people and the environment are becoming more severe and adaptation is becoming harder, costlier and, in some cases, impossible. Science is central to understanding the damage that is being done and to helping us to find ways to reduce harm and adapt our lifestyles. The Royal Society is at the forefront of this work. We fund researchers working on cultivating climate resilient crops to increase food security, engineering infrastructure that is designed to withstand the growing risk of natural disasters, and integrating low-tech renewable energy solutions within communities. In 2019, we launched a series of five events across the UK to connect experts with the public to explore some of the key issues. ‘You and the planet’ looked at issues such as how we tackle climate change, how energy use affects the planet, how our diets can make a difference and how we can nurture nature. Regrettably, a further event, a family festival at the Natural History Museum, had to be cancelled because of the pandemic.”

“In November 2019, the Society published climate briefings based on the work of the Intergovernmental Panel on Climate Change (IPCC). These looked at the links between land and climate change and the impact of warming temperatures on the ocean and cryosphere. The briefings identify steps that UK policy makers can take, domestically and internationally, to address risks and opportunities...In June 2019, the UK government committed to net-zero greenhouse gas emissions by 2050. The Society’s influence can be seen in the report produced by the Committee on Climate Change that led to that decision, which heavily cited the Greenhouse gas removal report that was published jointly by the Royal Society and the Royal Academy of Engineering in 2018.”

The Society’s goals for 2021² include “provide evidence to policy makers on climate and biodiversity” and “Launch partnership grants that support schools to consider issues around climate change and biodiversity”.

In April 2021, the Royal Society issued a response to the UK raising its carbon emission reduction targets.¹⁰ Royal Society president Sir Adrian Smith said “we welcome the Government stepping up its ambition to achieve a 78% reduction in net greenhouse gas emissions by 2035. But for this to be a

⁹ <https://royalsociety.org/-/media/about-us/governance/royal-society-strategic-plan-summary-2017-2022.pdf>
¹⁰

<https://royalsociety.org/news/2021/04/royal-society-response-on-uk-raising-carbon-reduction-emissions/>

credible step on the UK's path to achieving net zero by 2050 these ambitions must be quickly backed with action. We need to be investing today in technologies and scientific innovations that will be critical to driving down carbon emissions at pace beyond 2035...Here in the UK, there is a need for an independent body of technical experts able to advise on low carbon technologies and their readiness for deployment, acting beyond the political cycle to ensure we are not blown off course."

In March 2021, the Society issued three statements to the Prime Minister's G7 Sherpa, Jonathan Black.¹¹ On "A net zero climate-resilient future" the Society said:

"Existing technologies and nature-based solutions will not be enough to decarbonise the world economy, and the science academies call on the G7 to apply their political might and resources to support the research and rapid development of technologies in those areas where we are not making progress on emissions, such as aviation, manufacturing and food production."

The Royal Society has called for the G7 nations to develop evidence-based technology road maps to net zero and plans to publish "its definitive science priorities for an international and domestic UK climate technology roadmap" in May.¹⁰

The Society also called for the G7 nations to increase investment in the research and development challenges on the road to net zero, both nationally and collaboratively between G7 nations, support middle- and low-income countries on the road to a climate-resilient, net zero future, and agree policies to economically incentivise carbon neutral options.

Professor Peter Bruce, Physical Secretary and Vice President of the Royal Society said "Getting to net-zero will be an enormous task, but we are optimistic that science can lead the way. The G7 nations can play a crucial role in supporting the scientific innovation that is going to make us more resilient to respond to climate change and the challenges the future holds."

SGR comments

SGR acknowledges that the Royal Society does not invest in tobacco. SGR has continuing concerns, however, on the following aspects.

Transparency

The Royal Society offers very limited transparency on its investments, detailing where just 4.8% of its holdings are invested.

Last January, the Charity Commission launched an investigation into factors holding charities back from responsible investments¹². With regards to transparency, the regulator said that "People place increasing value on transparency, which research shows is a key driver of public trust in charities."

In a statement in May 2017 announcing a joint statement with other G7 science academies on Science and Trust¹³, the Royal Society said "In an era marked by technological development and a

¹¹ <https://royalsociety.org/news/2021/03/royal-society-partner-academies-launch-g7-agenda/>

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<https://charitycommission.blog.gov.uk/2020/01/15/how-do-charities-approach-investing-in-line-with-their-purpose-and-values-we-want-to-know-and-we-want-to-help/>

¹³ <https://royalsociety.org/news/2019/05/g7-science-academies-meeting/>

growing need for innovation, society needs to be able to have complete trust in science – especially in a context in which the public is exposed to questionable sources of information”. It would seem appropriate for the Royal Society to provide transparency with regards to its investments in order to enhance and uphold public trust in itself and its activities promoting science.

Others believe that an increased demand for “transparency, accountability and information about the impact of investments on society” arose after the financial crash of 2008.¹⁴

Since the release of the Irresponsible Science report, several of the Royal Society’s peers – academic bodies, learned societies and professional institutions in other subject areas – mentioned in the report have tightened up their policies on fossil fuels and arms. For example, the Geological Society introduced investment policies that exclude arms and the most carbon-emitting fossil fuels – thermal coal and tar sands, whilst the Energy Institute brought in an investment policy that excludes arms and presses for alignment with Paris goals.

It is very disappointing that during this time period the Royal Society has not improved the transparency of its investments or introduced further exclusions to its investment policy. This is especially important, given that it has by far the largest level of investments in the fossil fuel industry of any of the professional and learned bodies that SGR has uncovered to date.

The British Psychological Society, Royal College of Physicians, British Medical Association, the Royal College of General Practitioners, the Faculty of Public Health, the Royal College of Emergency Medicine and the Royal College of Paediatrics and Child Health have all now fully divested from fossil fuels, are in the process of doing so, or have committed to do so. The British Medical Association took the lead, beginning its journey back in 2014. All these organisations also exclude investment in arms companies.

Financial links to corporations

It is not possible to ascertain where the Royal Society has invested the £222.7 million that it declares is in pooled investments. The Society told *The Sunday Times* in 2019 that it held at least £16 m of its investments in the oil and gas sector and it could be more once pooled funds were taken into account. The Society told the newspaper that “We have no investments in defence firms” but its investment policy does not exclude arms companies. Were the Society to have invested in defence firms subsequent to 2019 and to hold the same ratio of fossil fuels to arms holdings as another scientific institute without an arms company exclusion, its investments in such companies would total nearly £7 m.

We have identified that the Royal Society, as well as investing around £16 million in unnamed companies in the oil and gas sector, has recent financial links with the following company in the fossil fuels sector in the form of accepting donations. The Society also accepts anonymous donations.

- Tata Sons

Tata Sons holds significant coal reserves through its equity in Tata Steel.¹⁵ According to the Transition Pathway Initiative¹⁶, the long-term ambitions of Tata Steel and many other fossil fuel companies do not align with a pathway that would limit global warming to 2°C or below. (Please see the SGR

¹⁴<https://www.cazenovecapital.com/sysglobalassets/wmmmediaassets/uk/charities/documents/reports/intentionalinvestingreportpdf.pdf>

¹⁵ https://www.sgr.org.uk/sites/default/files/2021-06/Data_on_fossil_fuel_companies.pdf

¹⁶<https://www.geolsoc.org.uk/~media/shared/documents/policy/Statements/responsible%20investing%20draft%20graphics%20v35.pdf?la=en>

document *Data on fossil fuel companies* for further details¹⁷.) The goal of the UN's 2015 Paris Agreement is "to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels"¹⁸.

What's more, Tata Steel and many fossil fuel companies have not committed to meeting the rigorous criteria set by the Science Based Targets Initiative¹⁹ for emissions reductions, which numerous other leading corporations have signed up to. Until fossil fuel companies meet the criteria of the Science Based Targets initiative and have set targets to limit their emissions by 2050 in line with a 1.5 or 2°C limit to warming, we are urging thought leaders such as the Royal Society to divest from and/or sever other financial links with these companies and so keep up the pressure on them.

These links to fossil fuel companies are concerning for a number of reasons:

- The Society has issued climate briefings based on the work of the Intergovernmental Panel on Climate Change (IPCC) that "identify steps that UK policy makers can take, domestically and internationally, to address risks and opportunities" and a report on Greenhouse Gas Removal (jointly with the Royal Academy of Engineering). The Society's continued financial ties to fossil fuel companies appear highly inconsistent with these actions.
- In April 2021, in the Royal Society's response to the UK raising its carbon emission reduction targets²⁰, Royal Society president Sir Adrian Smith said "we welcome the Government stepping up its ambition to achieve a 78% reduction in net greenhouse gas emissions by 2035. But for this to be a credible step on the UK's path to achieving net zero by 2050 these ambitions must be quickly backed with action." It seems unfortunate that the Royal Society has not yet taken its own actions towards lowering the greenhouse gas emissions of its own investment portfolio.
- We believe that public concern about climate change - some 80% of the public is fairly or very concerned about climate change²¹ - is such that the Royal Society's investments in fossil fuel companies could become a barrier to its dedication to "promoting excellence in science". More than 150 scientists, engineers and academics working in, and students of, climate change have signed SGR's new Science Oath for the Climate and committed to holding their professional associations, institutions and employers to the same standards on climate change as they've committed to themselves²².
- The Royal Society has called for the G7 nations to develop evidence-based technology road maps to net zero, and planned to publish "its definitive science priorities for an international and domestic UK climate technology roadmap" in May.¹⁰ Professor Peter Bruce, Physical Secretary and Vice President of the Royal Society, said "Getting to net-zero will be an enormous task, but we are optimistic that science can lead the way." As a first step, it would seem apposite for the Royal Society to lead the way – or at least follow in the footsteps of many of its peer organisations – in applying the already available evidence on companies' carbon emissions to reducing the carbon footprint of its investment portfolio and so make us "more resilient to respond to climate change and the challenges the future holds".
- In its Trustees' report and financial statements for 2019/20², the Society says that:

¹⁷ https://www.sgr.org.uk/sites/default/files/2021-06/Data_on_fossil_fuel_companies.pdf

¹⁸ <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>

¹⁹ <https://sciencebasedtargets.org/>

²⁰ <https://royalsociety.org/news/2021/04/royal-society-response-on-uk-raising-carbon-reduction-emissions/>

²¹ <https://www.carbonbrief.org/guest-post-rolls-reveal-surge-in-concern-in-uk-about-climate-change>

²² <https://www.sgr.org.uk/projects/science-oath-climate-text-and-signing>

“Science is central to understanding the damage that is being done [as global temperatures increase] and to helping us to find ways to reduce harm and adapt our lifestyles. The Royal Society is at the forefront of this work. We fund researchers working on cultivating climate resilient crops to increase food security, engineering infrastructure that is designed to withstand the growing risk of natural disasters, and integrating low-tech renewable energy solutions within communities.”

Many of these researchers may well be surprised and disappointed to learn that the Royal Society itself has investments to the tune of some £16 m in fossil fuels and has not adapted its ‘lifestyle’ in ways that evidence has shown would be helpful to reduce harm, for example, by excluding fossil fuels from its portfolio (see further detail below).

More generally, SGR has concerns about investments in and financial ties to fossil fuel companies by professional science and engineering organisations for these reasons:

- Professional science and engineering organisations have considerable influence with politicians and the public and it’s crucial that they put in place robust science-based targets and plans that are compatible with the goals of the Paris Agreement - and end lobbying behaviour that could undermine it - particularly in the year that the UK is hosting the next round of the COP climate negotiations.
- As the UK Health Alliance on Climate Change²³ puts it, “engaging with companies whose business model relies on fuel extraction is of limited use—only divestment will stop extraction”. Worldwide, according to the Alliance, over 1,000 organisations with £7 trillion assets have committed to divesting from fossil fuels and instead investing in climate solutions²⁴. Research indicates that divestment reduces the price of fossil fuel shares. According to a team at the University of Waterloo in Canada²⁵, “lower share prices increase the costs of capital for the fossil fuel industry, which in turn decreases their ability to explore new resources and exploit proven resources”. The greater the likelihood of these fossil fuel resources staying in the ground, the more likely we are to meet the international climate change targets agreed under the Paris Agreement in order to prevent potentially catastrophic climate change.
- In order to keep to the ‘well below 2°C’ target, only one-fifth of known fossil fuel reserves can be burned, putting these assets at risk of becoming stranded²⁶. The fraction is even smaller when considering how to meet the 1.5°C target. According to the UK Health Alliance on Climate Change, fossil fuels are an increasingly risky investment and fossil fuel free indexes had equalled or outperformed unsustainable alternatives in the previous 5-10 years. “Divestment announcements by prominent investors signal financial risks to the market, which in turn depress share prices,” say the University of Waterloo researchers. “Therefore, divestment announcements can have a measurable impact on the fossil fuel industry.” Shell said in 2018 that divestment had become a material risk to its business²⁷. In 2020 fund manager CCLA, which invests on behalf of charities including Church of England dioceses and IOP, dropped its investments in oil giants Shell and Total²⁸ for financial reasons. On January

²³ ukhealthalliance.org/divestment

²⁴ <https://www.divestinvest.org/11-trillion-counting-divestinvest/>

²⁵ <https://theconversation.com/how-divesting-of-fossil-fuels-could-help-save-the-planet-88147>

²⁶ https://www.banktrack.org/download/unburnable_carbon/unburnablecarbonfullrev2.pdf

²⁷ <https://www.theguardian.com/commentisfree/2019/oct/13/divestment-bank-european-investment-fossil-fuels>

²⁸ <https://www.divestinvest.org/church-of-england-fund-drops-remaining-fossil-fuel-investments/>

27th 2021, ratings agency S&P warned 13 oil and gas companies, including Royal Dutch Shell and Total, that it was considering downgrading their credit ratings. The agency has increased its risk rating for the oil and gas sector as a whole from “intermediate” to “moderately high” because of the move away from fossil fuels, poor profitability and volatile prices, according to news reports²⁹;

- Many fossil fuel companies are relying on carbon capture technology and nature-based solutions being deployed at a huge scale to offset their planned emissions³⁰. Heavy reliance on the global scale deployment of carbon capture and storage technologies is misplaced given the lack of progress in this area for the last 20 years. According to an international group of 41 scientists and academics³¹, such technologies are “expensive, energy intensive, risky, and their deployment at scale is unproven. It is irresponsible to base net zero targets on the assumption that uncertain future technologies will compensate for present day emissions”;
- Use of fossil fuel sponsors for educational materials is likely to alienate young people and present them with difficult ethical choices, particularly given the high participation in the Youth Strike 4 Climate movement.

For those keen to retain support for the energy sector, there are plenty of companies that are much more progressive than fossil fuel companies in which to invest. For example, Orsted (formerly DONG, Danish Oil and Natural Gas) has shifted from being a fossil fuel dominated company to one heavily focused on renewable energy. Similarly, some large German engineering companies, such as Siemens and E.ON³², have also made major shifts away from fossil-fuel related work.

The Royal Society has confirmed financial links with the following company in the arms sector in the form of accepting donations, and sponsorship for its Industry Fellowship scheme. The Society also accepts anonymous donations.

- Rolls Royce

Rolls Royce is on the SIPRI list of top 25 arms-producing and military services companies in the world for 2019 and is a leading partner in the consortium building the UK’s new nuclear-armed Dreadnought submarines³³. The UK government’s recent decision to increase its nuclear weapons stockpile is regarded by the UN as a breach of the Nuclear Non-Proliferation Treaty (see further detail below). Nuclear weapons are also now illegal under international law, following the entry into force of the Treaty on the Prohibition of Nuclear Weapons (again, see further detail below). Although this law only strictly applies in nations that have ratified the treaty, there are significant ethical and legal implications for the Royal Society – and hence we urge the Royal Society to sever its financial links to companies and other organisations involved with these weapons of mass destruction. Indeed, looking ahead, the TPNW will increasingly restrict investment in the companies involved in the manufacture of nuclear weapons systems and will ultimately lower the value of their shares, increasing the risk of investing in them and the long-term sustainability of accepting money from them as an income source.

²⁹https://www.theguardian.com/business/2021/jan/27/rating-agency-sp-warns-13-oil-and-gas-companies-they-risk-downgrades-as-renewables-pick-up-steam?CMP=Share_iOSApp_Other

³⁰ <https://insideclimatenews.org/news/16072020/oil-gas-climate-pledges-bp-shell-exxon/>

³¹ <https://www.climatechangenews.com/2020/12/11/10-myths-net-zero-targets-carbon-offsetting-busted/>

³² Siemens has committed to the 1.5°C target under the SBTi and E.ON’s carbon emissions are aligned with the below 2°C pathway according to TPI.

³³ https://www.sgr.org.uk/sites/default/files/2021-06/Data_on_arms_companies.pdf

The Royal Society's acceptance of money from an arms company involved in nuclear weapons development for sponsorship of a fellowship scheme is particularly troubling as it publicly promotes this highly controversial industry.

On its website the Royal Society says that "We are the independent scientific academy of the UK, dedicated to promoting excellence in science for the benefit of humanity". SGR thinks that the prioritisation given to military spending and the international arms trade acts to put water, food and energy supplies at risk and acts to the detriment, rather than the benefit, of humanity. The UK government's recent decision to markedly increase its military spending - with a particular focus on weapons technologies - while implementing large cuts to overseas aid spending is a particular striking example of this.³⁴ There is an ongoing debate about the extent to which increases in military spending lead to arms races and increased risks of armed conflict rather than, as the industry claims, improved security.³⁵ Similarly, SGR thinks that associating with the arms industry – the only industry whose work is used to intentionally injure or kill humans - also acts against the benefit of humanity, particularly given the export of UK arms which have then been used against civilians by the Saudi Arabian military in Yemen and elsewhere. The number of deaths in Yemen – both in combat and indirectly due to lack of food and basic services – was projected to pass 230,000 by the end of 2019, with children accounting for more than half the deaths.³⁶

The Society has said that society needs to be able to have complete trust in science (see above). There is significant public concern about the arms industry, including nuclear weapons³⁷ and the use of exported arms against civilians³⁸. (Please see the SGR document *Data on arms companies* for further details on individual company activities.³⁹) We think this concern is such that the Royal Society's acceptance of arms industry donations and sponsorship could become a barrier to this need. In addition, holding financial ties to the arms trade may alienate some sections of society more than others, raising concerns about equity and diversity.

SGR has concerns about investments in and financial ties to arms companies by professional science and engineering organisations for these reasons:

- The arms industry exports weapons that fuel conflict and human right abuses. For example, over the decade to 2017, the UK government licensed exports of arms and other military equipment worth £12 billion to 29 of the 30 nations classed as "Human Rights Priority Countries" by the British Foreign Office.⁴⁰ These are nations where "the worst, or greatest

³⁴ <https://www.sgr.org.uk/resources/brexit-britain-s-security-policy-cutting-aid-spend-weapons>

³⁵ Holden, P. (2016) *Indefensible: Seven myths that sustain the global arms trade*, London: Zed Books

³⁶ UN Development Programme (2019) *Assessing the impact of war on development in Yemen*
<http://www.arabstates.undp.org/content/rbas/en/home/library/crisis-response0/assessing-the-impact-of-war-on-development-in-yemen-.html>

³⁷ https://www.icanw.org/change_natwest

³⁸

<https://hansard.parliament.uk/Commons/2021-04-20/debates/2C08829E-5B71-49D8-BC7B-302453BAA3FC/ArmsTradeYemen>

³⁹ https://www.sgr.org.uk/sites/default/files/2021-06/Data_on_arms_companies.pdf

⁴⁰ Action on Armed Violence (2018) "UK arms exports examined."

<https://aoav.org.uk/201/uk-arms-exports-examined/>

number of, human rights violations take place".⁴¹ Since 2017, the situation has arguably worsened despite successful legal challenges.⁴²

- Nuclear weapons have become even more controversial in recent years. The UK government's decision in March to increase the size of the nation's nuclear warhead stockpile by 44% - as announced in the integrated review of defence and security - has been widely condemned. The UN Secretary General's office has stated that it is a breach of Article VI of the Nuclear Non-Proliferation Treaty.⁴³ In addition, nuclear weapons have become illegal under international law, following the entry into force of the Treaty on the Prohibition of Nuclear Weapons (TPNW) on 22nd January 2021. As discussed above with regard to specific financial links, although this law only strictly applies in nations that have ratified the treaty, there are significant ethical and legal implications for organizations with ties to companies involved with these weapons of mass destruction. The treaty prohibits ratifying nations from providing assistance – including financial – for corporations involved in the development, manufacture or deployment of nuclear weapons. This will increasingly restrict investment by international banks and other financial institutions in such corporations, potentially making it harder for them to fund their activities and enhancing the risk of investment on financial grounds alone. Furthermore, a series of recent academic research studies involving scientists have warned of the devastating climatic effects of even a small nuclear war.⁴⁴ SGR's own analysis shows that, if the nuclear warheads carried by just one UK Trident submarine were launched, devastating global climate impacts could result.⁴⁵ The possibility of a nuclear war by accident - due to human or technical error - remains a very real threat.
- Many members of the public strongly object to arms company sponsorship of educational materials. We note, for example, the recent adverse publicity in the media⁴⁶ regarding the videos featuring employees and armed forces personnel reading fairy-tales and asking questions about engineering that BAE Systems released for primary school children. Engaging with arms companies seems likely to alienate significant sections of the public from a professional science organization's mission and goals.
- The arms industry removes resources – financial, human, scientific and technological – from efforts to improve the human condition through the pursuit of knowledge. In his 'Chance for Peace' speech in April 1953, US President Dwight D. Eisenhower said: "Every gun that is made, every warship launched, every rocket fired signifies, in the final sense, a theft from those who hunger and are not fed, those who are cold and are not clothed. This world in arms is not spending money alone. It is spending the sweat of its laborers, the genius of its scientists, the hopes of its children." Eisenhower goes on to compare the relative costs of a bomber and a hospital; these comments seem particularly apposite at a time when the UK has dramatically increased its military spending⁴⁷ whilst offering most NHS staff a 1% pay rise described as "pitiful" and "insulting".⁴⁸ It's also become apparent that UK hospitals were underprepared for a pandemic due to lack of funding, whereas the UK was the second

⁴¹ Foreign and Commonwealth Office (2016) *Human Rights and Democracy, 2015*.

<https://www.gov.uk/government/publications/human-rights-and-democracy-report-2015>

⁴² Court of Appeal finds government broke law over Saudi Arabia arms sales

<https://caat.org.uk/news/2019-06-20-2/>

⁴³<https://www.independent.co.uk/news/uk/politics/boris-johnson-uk-nuclear-weapons-international-law-b1817827.html>

⁴⁴ <https://www.nature.com/articles/d41586-020-00794-y>

⁴⁵ <https://www.sgr.org.uk/index.php/publications/uk-nuclear-weapons-catastrophe-making>

⁴⁶ <https://www.independent.co.uk/news/uk/politics/arms-companies-fairy-tale-stories-bae-b1780982.html>

⁴⁷

<https://www.gov.uk/government/news/pm-to-announce-largest-military-investment-in-30-years#:~:text=The%20Government%20has%20already%20pledged,compared%20to%20last%20year's%20budget.>

⁴⁸ <https://www.bbc.co.uk/news/uk-56313199>

highest spender on defence in NATO in 2019, to the tune of some \$59.4 billion. UK plans to send an aircraft carrier to the South China Sea in 2021 highlight that this spending is not for territorial defence alone. The pandemic also heightened awareness that as a nation we are not spending enough to alleviate poverty and health inequality within our own borders let alone internationally. Every child experiencing poverty and health inequality is a child less likely to pursue science as a career.

- The arms industry perpetuates power imbalances and has the potential to harm democracy. In his farewell address, in 1961, Eisenhower warned against the economic, political and “even spiritual” influence of the immense military establishment and large arms industry that had arisen as a result of the Second World War with grave implications for the structure of society. “In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex,” he said. “The potential for the disastrous rise of misplaced power exists and will persist. We must never let the weight of this combination endanger our liberties or democratic processes.”
- Financial ties to arms companies make it more difficult for professional science and engineering organisations to raise ethical and other concerns, including in educational materials and public discussion, about the use of science and engineering within the arms industry.
- Warships, combat planes, transport planes and tanks are heavy consumers of fossil fuels. The US Department of Defense is the world’s largest institutional consumer of petroleum, with annual greenhouse gas emissions greater than that of whole European nations such as Sweden.⁴⁹ SGR estimates that the UK military carbon footprint is equivalent to that of 6 million average cars.⁵⁰ National emission targets routinely exclude military carbon emissions, and even data on current emissions is sparse and unreliable for the vast majority of nations.⁵¹
- A large number of companies involved in the international arms trade have been linked to major corruption, fraud and other malpractice scandals. A review by the Stockholm International Peace Research Institute (SIPRI) found that “studies suggest that corruption in the arms trade contributes roughly 40 per cent to all corruption in global transactions”.⁵² Given that many professional engineering and science organisations include strong wording on corrupt behaviour in their codes of conduct, it appears that such organisations should be extremely careful concerning links of a financial or promotional nature with corporations found guilty of such behaviour, or else risk their reputation and the reputation of the wider science and engineering community.

⁴⁹ Crawford, N (2019) *Pentagon Fuel Use, Climate Change, and the Costs of War*
<https://watson.brown.edu/costsofwar/papers/ClimateChangeandCostofWar>

⁵⁰ <https://www.sgr.org.uk/publications/environmental-impacts-uk-military-sector>

⁵¹ <https://www.sgr.org.uk/publications/under-radar-carbon-footprint-europe-s-military-sectors>

⁵² Feinstein, A., Holden, P. and Pace, B. (2011) *Corruption and the arms trade: sins of commission in SIPRI Yearbook 2011*, Oxford, Oxford University Press