

Untenable investments

Nuclear weapon producers
and their financiers



ICAN
International Campaign to
Abolish Nuclear Weapons

Utrecht, 21 February 2024

There remains a marked lack of official information available in the public domain about the use, production, transfer and stockpiling of nuclear weapons. We strived to achieve the highest level of accuracy in reporting. The information in this report reflects official information available in the public domain. We welcome comments, clarifications, and corrections from governments, companies, financial institutions and others, in the spirit of dialogue, and in the common search for accurate and reliable information on this important subject. If you believe you have found an inaccuracy in our report, or if you can provide additional information, please contact: nukes@paxforpeace.nl.

Principal Author: Alejandra Muñoz

Contributing authors:

Susi Snyder (ICAN)

Cor Oudes (PAX, the Netherlands)

Primary researchers:

Alejandra Muñoz (PAX, the Netherlands)

Jeroen Walstra (Profundo, the Netherlands)

Our thanks:

Joseph Rowntree Charitable Trust, Frank Slijper, Ward Warmerdam,

Alistair Burnett, Lucero Oyarzún and Venessa Hanson.

And all those who work tirelessly to stigmatize, outlaw, and eliminate nuclear weapons.

Notes:

Certain figures in this report may not tally exactly due to rounding. All figures are presented in United States Dollars (USD) (unless otherwise indicated).

Commas (,) are used as thousands separators.

This document, as well as any data and any map included herein, are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

About PAX

PAX means peace. Together with people in conflict areas and concerned citizens worldwide, PAX works to build just and peaceful societies across the globe. PAX brings together people who have the courage to stand for peace. Everyone who believes in peace can contribute. We believe that all these steps, whether small or large, truly matter and will contribute to a just and peaceful world. PAX is an ICAN partner. More information about PAX can be found at: www.paxforpeace.nl.

About ICAN

ICAN is a global campaign coalition promoting adherence to and implementation of the United Nations Treaty on the Prohibition of Nuclear Weapons. ICAN is comprised of more than 650 partner organizations in over 100 countries. More information about ICAN can be found at: www.ICANw.org.

About Profundo

Profundo is an economic research consultancy analyzing commodity chains, financial institutions and corporate social responsibility issues. It works predominantly for environmental, human rights and development organizations in the Netherlands and abroad. www.profundo.nl.

© Don't Bank on the Bomb

Permission is granted for non-commercial reproduction, copying, distribution, and transmission of this publication or parts thereof so long as full credit is given to the coordinating project organization, editor, and relevant authors; the text is not altered, transformed, or built upon; and for any reuse or distribution, these terms are made clear to others.

Design

Report design: Ondergrond.Agency

Cover image: David Vives

Contents

Key Findings	4
Methodology	6
Executive Summary	8
Introduction	16
24 Nuclear weapon producing companies	19
1. Airbus Group (The Netherlands)	27
2. BAE Systems plc (United Kingdom)	29
3. Bechtel (United States)	31
4. Bharat Dynamics Limited (India)	32
5. Boeing (United States)	33
6. China Aerospace Science and Technology (CASC)	35
7. Fluor (United States)	36
8. General Dynamics (United States)	38
9. Honeywell International (United States)	40
10. Huntington Ingalls Industries (United States)	43
11. Jacobs Solutions (United States)	45
12. L3Harris Technologies (United States)	47
13. Leidos (United States)	50
14. Leonardo (Italy)	52
15. Lockheed Martin (United States)	54
16. Northrop Grumman (United States)	56
17. Peraton Inc (United States)	59
18. Rolls-Royce (United Kingdom)	61
19. Rostec (Russian Federation)	63
20. RTX Corporation (formerly Raytheon Technologies Corporation) (United States)	64
21. Safran (France)	66
22. Textron (United States)	68
23. Thales (France)	70
24. Walchandnagar Industries (India)	72
Financiers and Profiteers	73
Conclusion	94
Annex: major nuclear weapon systems	95
Endnotes	99

Key Findings

287 financial institutions finance 24 nuclear weapon producers

Between January 2021 and August 2023, 287 banks, pension funds, insurance companies, asset managers and other financial institutions had financing or investment relations with one or more of the 24 nuclear weapon producing companies profiled in this report, down from 306 institutions in previously published results.

Investors held \$477 billion in shares and bonds

Investors held \$476,843 million in shares and bonds in the 24 nuclear weapon producing companies, an increase of \$15.7 billion since the last Don't Bank on the Bomb financial analysis.

\$343 billion provided in loans and underwriting

During the analyzed period, \$342,647 million was provided to the 24 nuclear weapon manufacturers in loans and underwriting, a growth of \$57.1 billion since the last Don't Bank on the Bomb financial analysis.

24 Companies producing nuclear weapons

Companies from China, France, India, Italy, the Netherlands, the Russian Federation and the United States are significantly involved in the production of nuclear weapons. Many of the companies included in this report have multi-year contracts, totalling at least \$336 billion and continuing for decades.

Northrop Grumman and General Dynamics are the biggest nuclear weapons profiteers, with outstanding contracts with a potential value of at least \$21.2 billion and \$23.7 billion respectively, not including the consortium and joint venture revenues. BAE Systems, Boeing, Lockheed Martin and RTX also hold multi-billion-dollar contracts for nuclear weapon production and/or sustainment.

THE LIST OF COMPANIES PROFILED IN THIS REPORT AND THE ARSENALS TO WHICH THEY CONTRIBUTE ARE:

1. Airbus (France);
2. BAE Systems (France, United Kingdom, United States);
3. Bechtel (United States);
4. Bharat Dynamics (India);
5. Boeing (United Kingdom, United States);
6. China Aerospace Science and Technology (China);
7. Fluor (United States);
8. General Dynamics (United Kingdom, United States);
9. Honeywell International (United States);
10. Huntington Ingalls Industries (HII) (United States);
11. Jacobs Solutions (formerly Jacobs Engineering) (United States);
12. L3Harris Technologies (United States);
13. Leidos (United States);
14. Leonardo (France);
15. Lockheed Martin (United Kingdom, United States);
16. Northrop Grumman (United Kingdom, United States);
17. Peraton (United States)
18. RTX (formerly Raytheon Technologies) (United States);
19. Rolls-Royce (United Kingdom);
20. Rostec (Russian Federation);
21. Safran (France);
22. Textron (United States);
23. Thales (France), and;
24. Walchandnagar Industries Limited (India).

Methodology

Nuclear weapon producing companies

24 fully profiled companies

This report describes the involvement of 24 companies in the production of nuclear weapons. The companies profiled in this report are open to external financing and provide key components or services that contribute to activities prohibited under the Treaty on the Prohibition of Nuclear Weapons, including the development, testing, production, manufacture, possession, stockpiling or use of nuclear weapons. Such involvement may be related to warheads, or to specifically designed nuclear capable delivery systems, like missiles. Contributions to the production of nuclear armed submarines (SSBNs) have until now remained outside the scope of the Don't Bank on the Bomb publications. However, given that these launch platforms are specifically designed for the delivery of nuclear weapons, companies involved in their production (including Rolls-Royce) are included in the 2024 publication's list of fully profiled companies.

Watchlist

In addition to the 24 companies fully profiled, this report also includes a watchlist, which serves to provide additional information about companies connected to the nuclear weapons enterprise. For example, some companies build the facilities that allow for the stationing, installation, or deployment of nuclear weapons on national territory. Other companies may not be open to external financing. The watchlist also includes companies who act as subcontractors, as well as companies for which ties to the nuclear weapons enterprise have been identified, but where sufficient information to clarify their precise scope of activities related to nuclear weapon production, deployment or stockpiling is unavailable. The profiles included in the watchlist are not a comprehensive review of companies of this nature. Rather, they are an example of the types of companies that are also involved in the nuclear weapon industry.

Nuclear weapon financiers

This report lists the financial institutions with financing or investment relationships with one or more of the 24 nuclear weapon producing companies. This includes the providing of loans and other forms of credit (commercial banking), underwriting of share and bond issuances (investment banking), investments in shares and bonds (asset management) and other financial services. These investments can be made by financial institutions on their own behalf or on behalf of third parties. Financial institutions are listed at the parent group level, and the total amounts listed include any financing found from their subsidiaries. The companies concerned are often active in a wide range of markets and, as such, also engaged in activities other than their involvement in nuclear weapon production. This report does not claim that the entirety of capital provided by financial institutions listed exclusively flows to nuclear weapon related activities. Nevertheless, financing a company generally supports that company in its entirety, thereby connecting the financial institution to the company's overall activities. It is impossible to ensure that funds provided will *not* facilitate nuclear weapon production, as even 'earmarked' funds provided by lenders or bond underwriters tend to free other capital flows that companies can use at their discretion.

This report does not list every single investment or line of credit granted to the companies listed for their involvement in the nuclear weapon industry. Government financing is not included. Moreover, the focus of this report lies on the financial institutions which were found to have the most substantial financing relationships with one or more of the selected companies. For this purpose, the following criteria were applied:

- All financial institutions participating in loans and underwriting deals since 1 January 2021. In addition, to provide a fuller picture of the overall credit granted to the nuclear weapons producing companies, participation in loans which have been closed before that date, but have not matured before 1 October 2022, is included in this report.
- All financial institutions which own at least 0.5% of the outstanding shares or bonds of one or more of the fully profiled companies at most recent filing dates. The data was collected in August 2023, meaning the most recent filing date in many cases was June, 30rd, 2023.

The information is retrieved from annual reports, stock exchange filings, other publications of the companies, investment portfolios of financial institutions, company websites, a general media search, as well as from specialized financial databases (Refinitiv Eikon, Refinitiv EMAXX, Bloomberg, IJGlobal, TradeFinance Analytics and Preqin). While these sources of information are reputable and well-known, they are themselves not comprehensive. The numbers provided in the report are therefore a conservative estimation of the total global financing of the nuclear weapons industry. For previous Don't Bank on the Bomb publications, in addition to the main financial research, a manual search for financial relations of a selected list of institutions was conducted. This additional check was not carried out for this report.

Certain figures in this report may not tally exactly due to rounding. All figures are presented in United States Dollars (USD) (unless otherwise indicated). Commas (,) are used as thousands separators.

Executive Summary

As Russia's invasion of Ukraine approaches its two-year mark, global tensions and risks of nuclear conflict remain at a heightened level. While the very real possibility of nuclear war has prompted even nuclear-armed states to explicitly condemn and delegitimize nuclear weapon threats, they simultaneously maintain that such risks can only be answered with a continued reliance on and further expansion of their own nuclear forces.

A growing global movement is challenging this assertion. At the conclusion of the 2023 second Meeting of States Parties to the Treaty on the Prohibition of Nuclear Weapons (TPNW), states strongly condemned reliance on nuclear deterrence as obstructing progress towards nuclear disarmament and agreed to work together to challenge its underlying narratives.

It is these narratives that ensure the ongoing flow of astronomical sums of money into the nuclear weapon industry. All nuclear-armed states are currently modernizing their nuclear weapon systems.

In 2022, the nine nuclear-armed states together spent \$82.9 billion on their nuclear weapons arsenals, an increase of \$2.5 billion compared to the previous year, and with the United States spending more than all other nuclear powers combined.¹

Nuclear weapon producing companies

Northrop Grumman and General Dynamics are the biggest nuclear weapons profiteers, with outstanding contracts with a potential value of at least \$21.2 billion and \$23.7 billion respectively, not including the consortium and joint venture revenues. BAE Systems, Boeing, Lockheed Martin and RTX also hold multi-billion-dollar contracts for nuclear weapon production and/or stockpiling.

The majority of companies profiled contribute to the production of U.S. nuclear weapon systems. Others are involved in the French and UK arsenals. The report also

profiles companies based in India, Russia and China, yet the limited amount of information available on companies involved in these countries' arsenals remains a challenge.

Financiers

Altogether, 287 financial institutions were identified for having substantial financing or investments relations with 24 companies involved in nuclear weapon production. \$477 billion was held in bonds and shares, and \$343 billion was provided in loans and underwriting.

The TPNW comprehensively prohibits the development, manufacturing, testing, possession, use and threat of use of nuclear weapons, as well as assistance with those acts. For companies that build the key components needed to maintain and expand countries' nuclear arsenals, access to private funding is crucial. As such, the banks, pension funds, asset managers and other financiers that continue to invest in or grant credit to these companies allow for the production of inhumane and indiscriminate weapons to proceed. By divesting from their business relationships with these companies, financial institutions can reduce available capital for nuclear weapon related activities and thereby be instrumental in supporting the fulfilment of the TPNW's objectives.

Financial sector involvement in raising awareness and increasing opposition against nuclear weapons is growing. Financial sector actors are also increasingly calling for better regulation around responsible investment practices. During the negotiation phase of the EU's Corporate Sustainability Due Diligence Directive (CSDDD), investors and investor networks consistently advocated to be included under the Directive.² Financial institutions have also called on the European Commission to revive efforts to extend the current EU Taxonomy framework to include a social and human rights dimension.³ In 2022, the EU platform on sustainable finance issued its recommendations for such a social taxonomy, which among others include taking into account the TPNW when considering which activities should be classified as "harmful".⁴

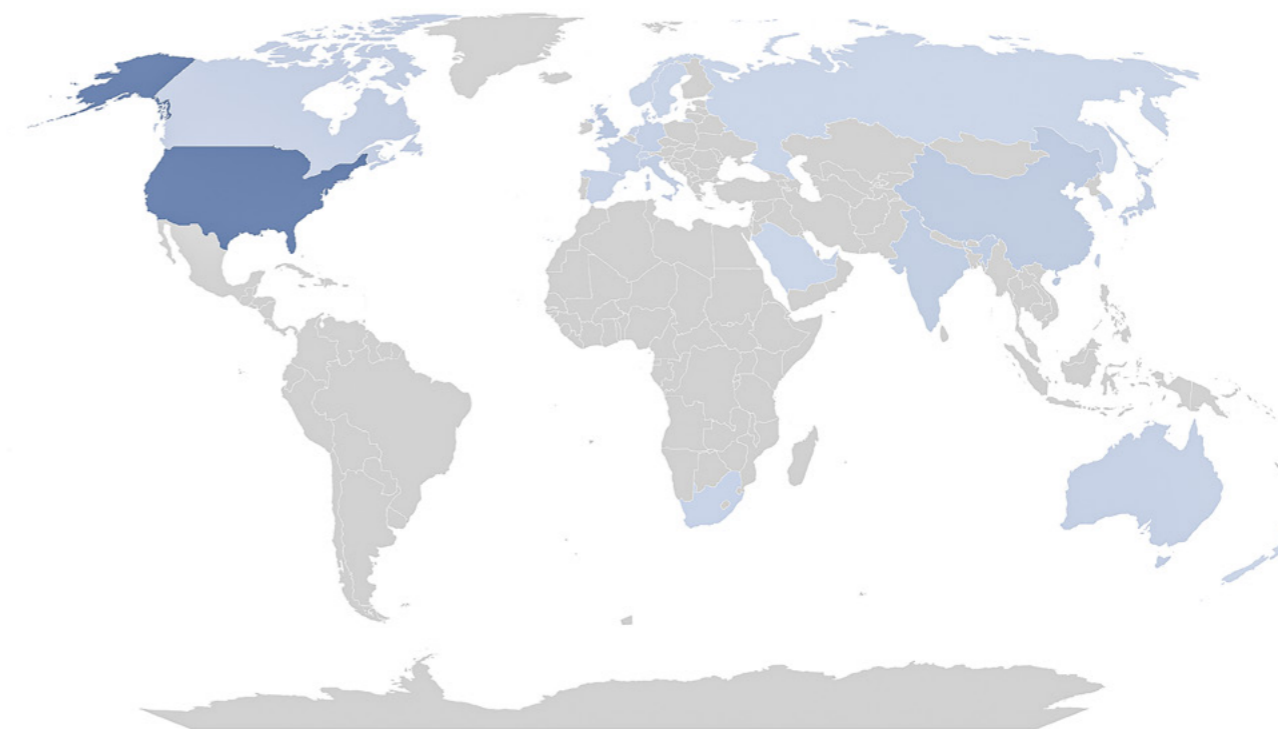
The human rights and environmental risks attached to nuclear weapons are severe and irremediable. New scientific evidence presented at the second Meeting of States Parties to the TPNW gave additional insights into the cascading effects of nuclear war on food supplies,

the financial system and energy production.⁵ Financial institutions are uniquely placed to address these risks and foster corporate sustainable and responsible behaviour. As such, they can and should play a key role in supporting efforts that seek to achieve a world free of the nuclear threat.

Global financing

There are a total of 287 institutions with financing or investment relationships to the nuclear weapon producing companies, from 28 countries. Most of these investments come from countries that either possess nuclear weapons of their own or otherwise endorse the use of nuclear weapons. With the exception of three financial institutions (from South Africa and New Zealand), none of the financiers come from countries that have joined the Treaty on the Prohibition of Nuclear Weapons (TPNW).

FIGURE 1: MAP OF FINANCIERS GLOBALLY



Top 10 financiers

The top 10 share and bondholders are all based in the United States. Their combined investments in the 24 nuclear weapon producing companies totals \$327,150 million.

TABLE 1: TOP 10 SHARE AND BONDHOLDERS COMPARED. ALL FIGURES IN USD MILLIONS

INVESTOR	COUNTRY	2023	2022	CHANGE
Vanguard	United States	\$72,487	\$68,180	\$4,307
Capital Group	United States	\$62,548	\$51,292	\$11,256
State Street	United States	\$55,503	\$56,733	-\$1,230
BlackRock	United States	\$53,161	\$48,052	\$5,110
Wellington Management	United States	\$18,712	\$22,285	-\$3,573
Fidelity Investments	United States	\$15,297	\$12,024	\$3,273
Newport Group	United States	\$14,310	\$15,683	-\$1,373
Geode Capital Holdings	United States	\$13,865	\$12,511	\$1,354
Bank of America	United States	\$12,168	\$13,383	-\$1,215
Morgan Stanley	United States	\$9,098	\$8,317	\$781
GRAND TOTAL		\$327,150	\$308,460	\$18,690

The top 10 lenders and underwriters provided \$179,661 million in loans and underwriting to the 24 nuclear weapon producing companies.

TABLE 2: TOP 10 LENDERS AND UNDERWRITERS COMPARED. ALL FIGURES IN USD MILLIONS

	COUNTRY	2023	2022	CHANGE
Citigroup	United States	\$28,097	\$27,251	\$846
Bank of America	United States	\$27,413	\$27,956	-\$543
JPMorgan Chase	United States	\$25,177	\$22,609	\$2,568
Wells Fargo	United States	\$19,805	\$17,807	\$1,998
Mizuho Financial	Japan	\$14,687	\$12,900	\$1,787
BNP Paribas	France	\$14,462	\$12,701	\$1,761
SMBC Group	Japan	\$13,558	\$10,308	\$3,250
Goldman Sachs	United States	\$12,991	\$10,701	\$2,289
Mitsubishi UFJ Financial	Japan	\$12,931	\$11,452	\$1,479
Deutsche Bank	Germany	\$10,540	\$11,443	-\$903
GRAND TOTAL		\$179,661	\$165,129	\$14,533

Types of financing compared

Overall bondholding value continued to decrease in 2023, with a drop of \$774 million compared to 2022. Total shareholding value, on the other hand, went up again in 2023, with an increase of \$16.4 billion compared to previously published results.

TABLE 3: BOND AND SHAREHOLDING COMPARED 2023-2020. ALL FIGURES IN USD MILLIONS

	2023	2022	2021	2020
Bondholding	\$5,975	\$6,749	\$7,820	\$9,180
Shareholding	\$470,868	\$454,413	\$345,919	\$413,340
GRAND TOTAL	\$476,843	\$461,162	\$353,739	\$422,520

Total loans increased in 2023 with \$83.3 billion compared to previously published results. Total underwriting, on the other hand, decreased, with a \$26.1 billion drop from the 2022 financial analysis.

TABLE 4: LOANS AND UNDERWRITING COMPARED 2023-2020. ALL FIGURES IN USD MILLIONS

	2023	2022	2021	2020
Loans	\$263,483	\$180,208	\$211,399	\$180,778
Underwriting	\$79,164	\$105,307	\$120,046	\$42,752
GRAND TOTAL	\$342,647	\$285,515	\$331,445	\$223,530

Full list of financiers

173 financial institutions had substantial investment relationships (share and bond holdings) with the 24 nuclear weapon producing companies. Only institutions with share and bond holdings of at least 0.5% of the total number of outstanding shares of the nuclear weapon producing companies are listed.

132 financial institutions provided financing in the form of loans or underwriting to the 24 nuclear weapon producing companies.

TABLE 5: FULL LIST OF INVESTORS (SHARE AND BOND HOLDING). ALL FIGURES IN USD MILLIONS

INSTITUTION	COUNTRY	INVESTMENTS
Abrams Capital Management	United States	\$223
Aditya Birla Capital	India	\$8
Aegon	Netherlands	\$52
Affiliated Managers Group	United States	\$1,055
AGF Management	Canada	\$83
Allianz	Germany	\$405
Allspring Global Investments	United States	\$797
Allstate	United States	\$115
Alpine Associates Management	United States	\$110
Alyeska Investment Group	United States	\$123
American Century Investments	United States	\$411
American Financial Group	United States	\$40
American National Insurance	United States	\$14
Ameriprise Financial	United States	\$4,825
AQR Capital Management	United States	\$323
Aristotle Capital Management	United States	\$1,786
Artisan Partners	United States	\$1,521
Auto-Owners Insurance	United States	\$15
Aviva	United Kingdom	\$59
Aware Super	Australia	\$196
Baird	United States	\$276
Balyasny Asset Management	United States	\$251
Bank of America	United States	\$12,168
Bank of New York Mellon	United States	\$1,458
Barclays	United Kingdom	\$1,468
Bessemer Group	United States	\$188
BlackRock	United States	\$53,161
Boston Private	United States	\$57
Brandes Investment Partners	United States	\$281
Calamos Investments	United States	\$33
California Public Employees' Retirement System (CalPERS)	United States	\$435
California State Teachers' Retirement System (CalSTRS)	United States	\$10
Canada Pension Plan Investment Board	Canada	\$682
Canara Bank	India	\$15
Capital Group	United States	\$62,548
Carlson Capital	United States	\$56
Cartenna Capital	United States	\$35
Causeway Capital Holdings	United States	\$1,216
Charles Schwab	United States	\$5,437
Children's Investment Fund Management	United Kingdom	\$5,592
China Southern Asset Management (CSAM)	China	\$21
China Structural Reform Fund Corporation Limited	China	\$97
CI Financial	Canada	\$114
CIBC	Canada	\$176
Cincinnati Financial	United States	\$15
Citadel	United States	\$308

Crédit Agricole	France	\$1,744
D.E. Shaw & Co.	United States	\$47
Dai-ichi Life	Japan	\$25
Deka Group	Germany	\$718
Diamond Hill Investment Group	United States	\$232
Dimensional Fund Advisors	United States	\$1,785
Dodge & Cox	United States	\$3,201
Empyrean Capital Partners	United States	\$102
Equitable Holdings	United States	\$892
Exor	Netherlands	\$464
Farallon Capital Management	United States	\$53
Fidelity International	United States	\$448
Fidelity Investments	United States	\$15,297
Findlay Park Partners	United Kingdom	\$190
First Eagle Investment Management	United States	\$590
First Seafront Fund Management	China	\$26
First Trust Advisors	United States	\$370
Fisher Investments	United States	\$1,891
Focus Financial Partners	United States	\$149
Franklin Resources	United States	\$7,552
Fullgoal Fund Management	China	\$29
Gabelli Funds	United States	\$186
Geode Capital Holdings	United States	\$13,865
Goldman Sachs	United States	\$342
Government Pension Fund Global (GFPG)	Norway	\$4,874
Government Pension Investment Fund (GPIF)	Japan	\$3,825
GQG Partners	United States	\$287
Groupe BPCE	France	\$3,142
Guardian Life Insurance Company of America	United States	\$87
Guggenheim Capital	United States	\$20
HDFC Bank	India	\$240
Hotchkis & Wiley Capital Management	United States	\$142
Hubei Juyuan Technology Investment	China	\$56
Invesco	United States	\$7,573
Invest AD	United Arab Emirates	\$8
Jackson Financial	United States	\$33
Janus Henderson	United Kingdom	\$1,115
JPMorgan Chase	United States	\$7,652
Kotak Mahindra Bank	India	\$40
Kryger Capital	United Kingdom	\$103
Lalitabai Lalchand Charity	India	\$0
Lazard	Bermuda	\$1,096
Legal & General	United Kingdom	\$3,602
Life Insurance Corporation of India	India	\$47
Lord, Abbett & Co	United States	\$165
LSV Asset Management	United States	\$359
M&G	United Kingdom	\$421
Macquarie Group	Australia	\$606

Magnetar Capital Partners	United States	\$93
Manulife Financial	Canada	\$160
MassMutual Holdings	United States	\$150
Masters Capital Management	United States	\$30
Mawer Investment Management	Canada	\$506
Max Financial Services	India	\$70
MetLife	United States	\$144
Millennium Management	United States	\$259
Minnesota Mutual Companies	United States	\$10
Morgan Stanley	United States	\$9,098
National Pension Service	South Korea	\$776
National Western Life Group	United States	\$19
Nationwide Mutual Insurance	United States	\$122
Neuberger Berman	United States	\$93
New York Life Insurance	United States	\$12
Newport Group	United States	\$14,310
Ninety One	South Africa	\$236
Northern Trust	United States	\$4,048
Northill Capital	United Kingdom	\$468
Northwestern Mutual	United States	\$161
Nuance Investments	United States	\$63
Ontario Teachers' Pension Plan	Canada	\$414
Orbis Group	Bermuda	\$524
Orix Corporation	Japan	\$1,153
Owl Creek Asset Management	United States	\$27
Passionate Investment Management	India	\$26
Pendal Group	Australia	\$112
Pensioenfonds Detailhandel	Netherlands	\$7
Pentwater Capital Management	United States	\$198
PFA Group	Denmark	\$26
Point72	United States	\$39
Power Corporation of Canada	Canada	\$592
Primecap Management	United States	\$2,054
Principal Financial Group	United States	\$25
Prudential Financial (US)	United States	\$330
PSquared Asset Management	Switzerland	\$56
Raven's Wing Asset Management	United States	\$6,086
Raymond James Financial	United States	\$178
Renaissance Technologies	United States	\$37
Royal Bank of Canada	Canada	\$2,289
Royal London Group	United Kingdom	\$55
Ruane, Cunniff & Goldfarb	United States	\$538
Rubric Capital Management	United States	\$101
Sanders Capital	United States	\$2,674
Schroders	United Kingdom	\$143
SEI	United States	\$65
Select Equity Partners	United States	\$522
Silchester International Investors	United Kingdom	\$993
Smith Capital Investors	United States	\$9

Sociedad Estatal de Participaciones Industriales	Spain	\$4,680
Sound Shore Management	United States	\$83
Southern Farm Bureau Life Insurance	United States	\$11
State Farm	United States	\$378
State Street	United States	\$55,503
Steel Partners Holdings	United States	\$155
Sun Life Financial	Canada	\$8,733
Sundarm Finance Group	India	\$9
T. Rowe Price	United States	\$6,703
The Hartford	United States	\$126
Third Point	United States	\$161
Thornburg Investment Management	United States	\$18
Thrivent Financial	United States	\$50
TIAA	United States	\$4,600
Toronto-Dominion Bank	Canada	\$212
Two Sigma Investments	United States	\$1,281
UBS	Switzerland	\$2,705
UBS SDIC Fund Management Co	China	\$21
Unum Group	United States	\$50
Van Eck Associates Corporation	United States	\$75
Vanguard	United States	\$72,487
Victory Capital	United States	\$953
Virtus Investment Partners	United States	\$123
Water Island Capital	United States	\$63
Wellington Management	United States	\$18,712
Wells Fargo	United States	\$4,542
Westchester	United States	\$117
White Mountains Insurance	Bermuda	\$137
White Oak Capital Management	India	\$15
Woodline Partners	United States	\$85
GRAND TOTAL		\$476,843

TABLE 6: FULL LIST OF LENDERS AND UNDERWRITERS. ALL FIGURES IN USD MILLIONS

INSTITUTION	COUNTRY	LOANS AND UNDERWRITING
Academy Securities	United States	\$479
Ally Financial	United States	\$52
Alter Domus	Luxembourg	\$205
Amerivet Securities Inc	United States	\$7
ANZ	Australia	\$2,553
Apple Financial Holdings	United States	\$24
Arab Banking Corporation (Bank ABC)	Bahrain	\$58
Banca Monte dei Paschi di Siena	Italy	\$175
Banca Passadore & C.	Italy	\$175
Banca Popolare di Sondrio	Italy	\$246
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain	\$4,406
Banco BPM	Italy	\$621
Banco de Sabadell	Spain	\$10
Bancroft Capital (PA)	United States	\$23
Bank of America	United States	\$27,413
Bank of China	China	\$1,810
Bank of New York Mellon	United States	\$1,182
Barclays	United Kingdom	\$7,436
BayernLB	Germany	\$1,064
Blaylock Beal Van	United States	\$96
BMO Financial Group	Canada	\$1,798
BNP Paribas	France	\$14,462
BPER Banca	Italy	\$480
Cabrera Capital	United States	\$4
Caisse des Dépôts et Consignations	France	\$143
Capital One Financial	United States	\$1,427
Cassa Depositi e Prestiti	Italy	\$221
CastleOak Securities	United States	\$85
Cathay General Bancorp	United States	\$138
Chang Hwa Commercial Bank	Taiwan	\$10
China Merchants Bank	China	\$1,908
CIBC	Canada	\$783
CITIC	China	\$1,225
Citigroup	United States	\$28,097
Citizens Financial Group	United States	\$478
CL King & Associates	United States	\$24
Comerica	United States	\$623
Commerzbank	Germany	\$3,849
Commonwealth Bank of Australia	Australia	\$213
Crédit Agricole	France	\$10,478
Crédit Mutuel	France	\$1,992
CSC Financial	China	\$303
Danske Bank	Denmark	\$329
DBS	Singapore	\$2,304
Deutsche Bank	Germany	\$10,540
Donghai Securities	China	\$13
Drexel Hamilton	United States	\$42

DZ Bank	Germany	\$321
EFG International	Switzerland	\$51
European Investment Bank	Luxembourg	\$3,546
Export-Import Bank of the United States	United States	\$350
Fifth Third Bancorp	United States	\$1,593
First Abu Dhabi Bank	United Arab Emirates	\$2,195
First Bancorp	United States	\$4
First Capital Securities	China	\$13
First Horizon	United States	\$350
FNB Corporation	United States	\$35
Fuyo General Lease	Japan	\$150
Goldman Sachs	United States	\$12,991
Great Pacific Securities	United States	\$4
Groupe BPCE	France	\$2,114
Hancock Whitney	United States	\$298
HSBC	United Kingdom	\$4,669
Hua Nan Financial	Taiwan	\$10
Hubei Bank	China	\$13
Hull Street CLO	Cayman Islands	\$2
Huntington Bancshares	United States	\$3
ICICI Bank	India	\$181
Industrial and Commercial Bank of China	China	\$1,530
ING Group	Netherlands	\$321
Intesa Sanpaolo	Italy	\$1,516
Jarden	New Zealand	\$164
Jefferies Financial Group	United States	\$18
JPMorgan Chase	United States	\$25,177
KeyCorp	United States	\$46
KfW	Germany	\$178
KKR Group	United States	\$2,221
La Banque Postale	France	\$143
La Caixa Group	Spain	\$111
Legend Holdings	China	\$13
Lloyds Banking Group	United Kingdom	\$3,441
Lone Star Funds	United States	\$79
Loop Capital	United States	\$166
Macquarie Group	Australia	\$1,290
Mediobanca Banca di Credito Finanziario	Italy	\$226
Mega Financial	Taiwan	\$10
MFR	United States	\$55
Mischler Financial Group	United States	\$65
Mitsubishi UFJ Financial	Japan	\$12,931
Mizuho Financial	Japan	\$14,687
Morgan Stanley	United States	\$10,187
NatWest	United Kingdom	\$2,123
Northern Trust	United States	\$3,362
Northwestern Mutual	United States	\$616
Opus Corporate Finance LLP	United Kingdom	\$37

Penserra Capital Management	United States	\$12
Penserra Securities	United States	\$4
People's United Financial	United States	\$34
PNC Financial Services	United States	\$4,499
R. Seelaus & Co	United States	\$54
Regions Financial	United States	\$1,286
Riyad Bank	Saudi Arabia	\$2,056
Royal Bank of Canada	Canada	\$8,347
Santander	Spain	\$6,524
SAR Holdings	United States	\$35
Scotiabank	Canada	\$5,259
Shank Williams Cisneros & Co	United States	\$101
Shenwan Hongyuan Group	China	\$13
Silvermore CLO	Cayman Islands	\$2
Skandinaviska Enskilda Banken	Sweden	\$1,296
SMBC Group	Japan	\$13,558
Société Générale	France	\$6,215
Standard Bank	South Africa	\$114
Standard Chartered	United Kingdom	\$3,573
State Bank of India	India	\$633
State Street	United States	\$711
Stifel Financial	United States	\$15
Sun Life Financial	Canada	\$482
Taiwan Business Bank	Taiwan	\$8
Taiwan Cooperative Financial	Taiwan	\$12
Taiwan Financial Holding	Taiwan	\$18
Toronto-Dominion Bank	Canada	\$5,971
Truist Financial	United States	\$881
UBS	Switzerland	\$3,973
UniCredit	Italy	\$5,230
United Bankshares	United States	\$27
US Bancorp	United States	\$7,541
Veritas Capital Fund Management	United States	\$440
VTB Group	Russia	\$3,000
Wells Fargo	United States	\$19,805
Westpac	Australia	\$1,265
Zions Bancorporation	United States	\$46
GRAND TOTAL		\$342,647

Introduction

As Russia's invasion of Ukraine approaches its two-year mark, global tensions and risks of nuclear conflict remain at a heightened level. While the very real possibility of nuclear war has prompted even nuclear-armed states to explicitly condemn and delegitimize nuclear weapon threats, they simultaneously maintain that such risks can only be answered with a continued reliance on and further expansion of their own nuclear forces.

A growing global movement is challenging this assertion. At the conclusion of the 2023 second Meeting of States Parties to the Treaty on the Prohibition of Nuclear Weapons (TPNW), states strongly condemned reliance on nuclear deterrence as obstructing progress towards nuclear disarmament and agreed to work together to challenge its underlying narratives.

It is these narratives that ensure the ongoing flow of astronomical sums of money into the nuclear weapon industry. All nuclear-armed states are currently modernizing their nuclear weapon systems.

In 2022, the nine nuclear-armed states together spent \$82.9 billion on their nuclear weapons arsenals, an increase of \$2.5 billion compared to the previous year, and with the United States spending more than all other nuclear powers combined.⁵

This report provides information and updates about the nuclear weapon systems of six of the nine nuclear-armed countries: the United States, the United Kingdom, France, China, Russia and India. This includes the new U.S. Ground Based Strategic Deterrent, the LGM-35A Sentinel, the French successor to the ASMPA missile, the ASN4G, and the Indian efforts to expand to submarine launched ballistic missiles.

Nuclear weapon producing companies

Most governments rely on the private sector for the production of key components for their nuclear weapon arsenals. This report provides an overview of the

contracts and activities of 24 companies heavily involved in nuclear weapon production. Northrop Grumman and General Dynamics are the biggest nuclear weapons profiteers, with outstanding contracts with a potential value of at least \$21.2 billion and \$23.7 billion respectively, not including the consortium and joint venture revenues. BAE Systems, Boeing, Lockheed Martin and RTX also hold multi-billion-dollar contracts for nuclear weapon production and/or sustainment.

The majority of companies profiled contribute to the production of U.S. nuclear weapon systems. Others are involved in the French and UK arsenals. The report also profiles companies based in India, Russia and China, yet the limited amount of information available on companies involved in these countries' arsenals remains a challenge.

Recent years have seen an increase in acquisitions of U.S. defense contractors by private equity companies, including Peraton (fully profiled in this report), Amentum and Arcfield (both included in this report's watchlist).⁷ As private equity firms are not subject to the same financial reporting obligations as publicly listed companies, this recent trend may have implications for transparency and, as such, oversight and accountability of the defense sector.⁸

A growing appetite for responsible investing

Altogether 287 financial institutions were identified for having substantial financing or investments relations with companies involved in nuclear weapon production. \$477 billion was held in bonds and shares, and \$343 billion was provided in loans and underwriting. While total financing amounts have increased compared to previously published findings, the number of institutions identified with substantial financial links to the nuclear weapon producers has not. Financiers are predominantly based in countries that include nuclear weapons in their national security strategies.

The TPNW comprehensively prohibits the development, manufacturing, testing, possession, use and threat of use of nuclear weapons, as well as assistance with those acts. For companies that build the key components needed to maintain and expand countries' nuclear arsenals, access to private funding is crucial. As such, the banks, pension funds, asset managers and other financiers that continue

to invest in or grant credit to these companies allow for the production of inhumane and indiscriminate weapons to proceed. By divesting from their business relationships with these companies, financial institutions can reduce available capital for nuclear weapon related activities and thereby be instrumental in supporting the fulfilment of the TPNW's objectives

Amid investors' growing appetite for Environmental, Social and Governance (ESG) compatible investment strategies, defense firms across Europe and the U.S. have heavily ramped up efforts to be classified as "sustainable", citing the war in Ukraine and rising geopolitical tensions.⁹ This rhetoric has been echoed by UK government ministers, who in July 2023 convened major international asset managers with arms companies to discuss capital allocation to the defense sector.¹⁰ Following the meeting - among others attended by BAE Systems and Leonardo, both profiled in this report - the ministers publicly called blacklisting defense firms on ESG grounds in the current security context "perverse".¹¹ In a similar vein, since the Russian invasion in Ukraine, Dutch Ministry of Defense officials have repeatedly openly questioned pension funds' exclusion policies around the defense industry.¹² Jane Fraser, CEO of U.S. bank Citigroup, the biggest lender to the nuclear weapon producers profiled in this report, also recently referred to security, including defense, as the "new S" in ESG, against the backdrop of the war in Gaza.¹³

Such narratives gloss over the main motivation behind financial institutions' reduced appetite to invest in defense firms, often based on their involvement in high-risk arms trade or the production of controversial weapons, especially nuclear weapons, rather than their nature as arms manufacturers. Many investors have thus far showed reluctance to alter these policies, despite government encouragement to invest more in arms producers.¹⁴

Financial sector involvement in raising awareness and increasing opposition against nuclear weapons is growing. At the time of writing, 111 investors have reiterated their commitment to nuclear disarmament and encourage TPNW state parties to ensure the Treaty's obligations are extended to the private sector.

Financial sector actors are also increasingly calling for better regulation around responsible investment practices. During the negotiation phase of the EU's Corporate Sustainability Due Diligence Directive (CSDDD), investors and investor

networks consistently advocated to be included under the Directive.¹⁵ As Danish and Swedish investors stressed in an open letter to their governments "Carving out the financial sector (...) would run counter to the international consensus that all businesses – financial and non-financial – have responsibilities to avoid and address adverse impacts on human rights and the environment."¹⁶ Financial institutions have also called on the European Commission to revive efforts to extend the current EU Taxonomy framework to include a social and human rights dimension.¹⁷ In 2022, the EU platform on sustainable finance issued its recommendations for such a social taxonomy, which among others include taking into account the TPNW when considering which activities should be classified as "harmful".¹⁸ At the time of writing, EU co-legislators have informally agreed that the financial sector will remain largely outside of the scope of the CSDDD, and will only be required to conduct upstream due diligence for their own operations, while exempting financial services provided to clients.¹⁹ However, co-legislators have agreed to revisit the possible expansion of the financial sector's inclusion during the first review of the legislation.²⁰

The human rights and environmental risks attached to nuclear weapons are severe and irremediable. New scientific evidence presented at the second Meeting of States Parties to the TPNW gave additional insights into the cascading effects of nuclear war on food supplies, the financial system and energy production.²¹ Financial institutions are uniquely placed to address these risks and foster corporate sustainable and responsible behaviour. As such, they can and should play a key role in supporting efforts that seek to achieve a world free of the nuclear threat.

What this report does

This report profiles the companies most heavily involved in the nuclear weapon industry. It provides information about the contracts they received to provide key components or services to support countries' nuclear arsenals. This report also provides information on the financial actors that finance these companies through providing loans or other corporate financial services. Lastly, it offers a snapshot of the investors that hold shares or bonds in these companies and thus seek to profit from the corporate actors complicit in the nuclear industry.

What it doesn't do

This report is not designed to draw a line between every rivet and the nuclear missiles they hold together.

The list of companies involved in the nuclear weapon industry included in this report is comprehensive, but not exhaustive. Other companies may still be involved in the development, testing, production, manufacture and stockpiling of nuclear weapons systems. This report provides full profiles of 24 companies and includes a watchlist with additional information about others connected to the nuclear weapons enterprise. This report does not offer investment advice, but many may choose to use the identified list of corporate actors as a guide for their own responsible investing.

24 Nuclear weapon producing companies

This report provides information about known contracts activities of companies that are involved in the production of components or services necessary to maintain the lethality of nuclear weapons. 24 companies are profiled in this report. For a company to be included in this list, it must be open to external financing and produce goods or provide services that specifically contribute to nuclear weapon development, testing, production, manufacture, possession, stockpiling or use. All these activities are outlawed under the Treaty on the Prohibition of Nuclear Weapons (TPNW).

Nuclear bombs may be dropped from airplanes, like the ones used on Hiroshima and Nagasaki. However, most nuclear weapons in the arsenals of the nine countries that possess them are designed to be delivered by missiles launched from the ground, airplanes, or submarines. It is for this reason that this report includes companies involved in producing key components for not only the nuclear warheads, but also the missiles designed specifically for nuclear weapon use. Companies involved in the production of nuclear-armed submarines, specifically designed for the delivery of nuclear weapons, also fall within this report's scope.

Where available, information about the contract duration and total estimated value is included. However, one of the challenges in reporting is providing the same level of information for each of the nuclear-armed countries. For some arsenals, the availability of this information is relatively straightforward. For other arsenals, including those of China, Russia and India, it is very difficult to obtain reliable information on the companies involved.

Northrop Grumman and General Dynamics are the biggest nuclear weapons profiteers, with outstanding contracts with a potential value of at least \$21.2 billion and \$23.7 billion respectively, not including the consortium and joint

venture revenues. BAE Systems, Boeing, Lockheed Martin and RTX also hold multi-billion-dollar contracts for nuclear weapon production and/or stockpiling.

Nuclear armed countries have dedicated facilities to nuclear weapon production, manufacture, testing, stockpiling and development. In several situations, the management and operations of those facilities are outsourced to the private sector, and where information is publicly verifiable, those companies are also included in this report.

There are always companies changing name or changing hands. This report includes updated information about those changes. There is also a section that describes the tangled web of joint ventures and consortiums. These joint ventures and consortiums also have multi-year multi-billion-dollar contracts. Millions are for example paid each year by the French government to the MBDA joint venture between BAE systems, Airbus and Leonardo to build the next generation of nuclear weapons for France. The Lawrence Livermore National Security Consortium, of which Bechtel is a part, has a \$64.8 billion contract to manage and operate the Lawrence Livermore National Laboratory. The Laboratory is, among others, the lead design agency for the life extension program for the W80-4 warhead ((for the U.S. Long-Range Stand-Off (LRSO) cruise missile)) and the modification program for the W87-1 warhead (for the U.S. new Sentinel Intercontinental Ballistic Missile programme").²²

The goal of this research is to provide information about the many actors involved in perpetuating nuclear weapons. The nuclear weapons associated companies profiled in this report are already included on the exclusion lists of numerous financial institutions as well as some indices. The hope is that this report provides further information for those who choose to avoid supporting the companies that contribute to the indefinite retention of nuclear weapons.

Changes from previous reports

NO LONGER LISTED

Aerojet Rocketdyne

In July 2023, L3Harris completed its acquisition of Aerojet Rocketdyne.²³ Aerojet Rocketdyne's involvement in the nuclear weapon industry is therefore included under L3Harris' profile, as are all financing and investment relationships with Aerojet Rocketdyne.

Groupe REEL (Constructions industrielles de la Méditerranée (CNIM))

In September 2022, Groupe REEL took over the operations of Constructions Industrielles de la Méditerranée (CNIM)²⁴, previously included as a fully profiled company. Groupe REEL is a family company, with approximately 3% owned by its employees through a mutual fund.²⁵ As no financing relations within the analyzed period were identified for Groupe REEL, the company is included in the watchlist.

NEW FULL PROFILES IN THIS REPORT

Peraton (United States)

Peraton is a U.S.-based national security and technology company, and in previous reports listed on the watchlist. By acquiring Northrop Grumman's IT and Mission Support Services Business in February 2021, Peraton is now the recipient of a contract for Missile Applications Software Support to the Minuteman III systems and has replaced Northrop Grumman as one of the subcontractors in the management and operation of Sandia National Laboratory.

Rolls-Royce (United Kingdom)

Unlike in previous reports, companies involved in the production of nuclear-armed submarines also fall within this report's scope (see *also* the methodology section). As a result, Rolls-Royce, which produces key components for the UK Dreadnought submarines, has been added to the list of companies fully profiled.

Arcfield added to watchlist

U.S. corporation Arcfield was launched in 2021, comprising Peraton's spun off systems engineering, integration and support services business.²⁶ Analex Corporation, now an Arcfield company, carries out program support services for the Trident re-entry subsystem²⁷ and has been added to this report's watchlist.

Watchlist

The 24 companies fully profiled in this report are building key components for nuclear weapons or are otherwise contributing to nuclear weapon development, testing, manufacture, possessions, stockpiling or use: acts that are all prohibited under the Treaty on the Prohibition of Nuclear Weapons (TPNW). Still, there are other companies involved in activities prohibited by the TPNW, including the building of facilities to enable any stationing, installation, or deployment of nuclear weapons on the national territory of other countries.

The watchlist also provides an overview of companies for which ties to the nuclear weapons enterprise have been identified, but who act as subcontractors or for whom sufficient details of their involvement are not available. Other companies may not be open to external financing, but information may still be of interest. For financial institutions and others seeking to implement comprehensive exclusions from any nuclear weapon associated company, the watchlist should, at a minimum, trigger additional due diligence.

The following profiles are not a comprehensive review of companies of this nature. Rather, they are an example of the types of companies also involved in the nuclear weapon industry.

Amentum (United States)

Amentum is the U.S. government services company that spun off from AECOM.²⁸ It is part of the team managing and operating the Lawrence Livermore National Laboratory²⁹ and has performed readiness assessment at the Los Alamos National Laboratory³⁰, responsible for nuclear weapons design and maintenance.³¹ Amentum also has an outstanding contract to support missile testing for U.S. nuclear weapon programmes.³² The company is also involved in nuclear waste storage at several facilities in the U.S. and UK, as well as environmental remediation.³³ When launched as an independent company in 2020, Amentum became privately held, with the equity firms American Securities and Lindsay Goldberg as equal partners.³⁴ However, in November 2023, Amentum announced a merger agreement with Jacobs Solutions' Critical Mission Solutions (CMS) and Cyber & Intelligence (C&I) Businesses, where the combined organization will be a publicly traded company.³⁵ Both Jacobs Solutions and Amentum are rumoured to be among the competing candidates for the new management contract of the Pantex Plant³⁶, after the U.S. Department of Energy

had terminated the contract award to Nuclear Production One, a joint venture between Amentum and Fluor, in 2021³⁷.

Arcfield (United States) (new!)

Arcfield "provides support for a wide range of nuclear deterrence and hypersonic missions in the U.S. and abroad through advanced modeling, simulation and analysis powered by proprietary systems engineering and integration tool sets and launch support services".³⁸ Arcfield was launched in 2021, comprising Peraton's spun off systems engineering, integration and support services business, acquired by a branch of private equity firm Veritas Capital.³⁹ Analex Corporation, an Arcfield company, carries out program support services for the Trident re-entry subsystem.⁴⁰

Atlantic CommTech Corp (United States)

In July 2022, Atlantic CommTech Corp was awarded a contract by the U.S. Air Force for "engineering services and technical expertise as needed to improve sustainability, extend service life of WS3 [Weapon Storage and Security System], and ensure systems continue to meet US Air Force in Europe and NATO requirements".⁴¹ While the current description of the contract on the U.S. Department of Defense website adds that work will be carried out "in various overseas locations", other descriptions explicitly mention the Lakenheath Airbase in the United Kingdom⁴², which will reportedly again become a storage location for U.S. nuclear bombs⁴³. The contract is potentially valued at \$14.4 million and work is expected to be complete by July 2025.⁴⁴ A similar contract held by Atlantic CommTech Corp for services in support of the WS3 of bases in Europe concluded in January 2023.⁴⁵

Babcock International (United Kingdom)

Babcock International produces submarines for the UK, and supports the life extension programme of the nuclear-armed Vanguard-class submarines.⁴⁶ In 2021, Babcock received a £3.5 billion, 5-year contract with the UK Ministry of Defence for naval base operations, including at the HMNB Clyde, where the UK nuclear armed submarines are stationed, and HMNB Devonport, where a Vanguard-class submarine was stationed for maintenance until May 2023.⁴⁷ The group also announced contracts in 2016 for design and development work on the Trident nuclear submarine replacement programme.⁴⁸ In June 2020, Babcock was subcontracted by General Dynamics for additional support for both the UK Dreadnought and the U.S. Columbia class submarines, designed to be armed with Trident nuclear weapons.⁴⁹ In

November 2023, Babcock received a four-year £750 million contract for the delivery of infrastructure to support "support the future capability of the Royal Navy and the UK's Defence Nuclear Enterprise"⁵⁰ and two further contracts for work on the UK's new Dreadnought-class submarine, with a combined value of £120 million⁵¹.

Banda Group International (United States)

Banda Group was awarded a contract valued up to \$6.5 million in January 2019 for nuclear explosive safety by the US Department of Energy.⁵² The contract description indicates that it includes efforts to maintain and enhance the safety, security, and reliability of the US nuclear weapons stockpile.⁵³ Banda Group's responsibilities have not been assessed to provide key components to facilitate nuclear weapon use, but rather to provide trainings and safety controls to ensure that nuclear weapons are not accidentally detonated.⁵⁴

Battelle Memorial Institute (United States)

Battelle is involved in the management of several U.S. facilities involved in nuclear weapon modernisation and new warhead production: Lawrence Livermore National Laboratory, the Los Alamos National Laboratory and the Savannah River National Laboratory.⁵⁵ Battelle accepts numerous contracts and, but is established as a non-profit organization and not externally or privately financed.⁵⁶

Booz Allen Hamilton Holding Corp (United States)

Booz Allen Hamilton is a teaming subcontractor for the Consolidated Nuclear Security (CNS) Joint Venture⁵⁷, and involved in a contract for design and construction of a Uranium Processing Facility (UPF) at the Y-12 National Security Complex.⁵⁸ The contract also includes an option to manage tritium operations at the Savannah River Site in South Carolina.⁵⁹

Charles Stark Draper Laboratory (United States)

Charles Stark Draper Laboratory (CSDL) is a U.S.-based non-profit research and development organization⁶⁰ that has been involved in the intercontinental ballistic missiles (ICBM) development of the United States since the 1950s.⁶¹ CSDL is not open to external investors but is significantly involved in research and design for U.S. and UK Trident II (D5) missiles.⁶² According to the U.S. Department of Defense, "CSDL possesses the unique knowledge of the total Trident Guidance system including its design and use on the Trident II weapon system."⁶³ There are several outstanding contracts between the U.S. and CSDL for Trident-related components.⁶⁴

These contracts are paid by both the U.S. and the UK governments. The estimated total value of the contracts exceeds \$3,3 billion and will include work through at least 2029.

China National Nuclear Corporation (China)

China National Nuclear Corporation (CNNC) is a state-owned enterprise that provides key components for the Chinese nuclear arsenal. The China Council for the Promotion of International Trade (CCPIT) promotes CNNC as the core of China's nuclear deterrence.⁶⁵ It adds that the company developed atomic and hydrogen weapons and that "CNNC is the main part of China's nuclear science and technology advancement [...] and the major force of nuclear power development".⁶⁶

Cray (United States)

In 2019, Cray, Inc received a \$600 million contract to build an exascale high-performance supercomputer, 'El Capitan'⁶⁷, whose instalment began in 2023⁶⁸. The system will serve to assess U.S. nuclear warheads' viability and reliability without nuclear testing.⁶⁹ El Capitan will also provide new and faster 3D simulation and modeling capabilities.⁷⁰ It will also offer advanced computational tools for scientists and weapon designers to study the use of new materials and components.⁷¹

Groupe REEL (France)

Groupe REEL is a family company, with approximately 3% owned by its employees through a mutual fund.⁷² In September 2022, Groupe REEL took over the operations of Constructions Industrielles de la Méditerranée (CNIM).⁷³ CNIM is the main subcontractor for the M51 missile integration for the French nuclear-armed submarines.⁷⁴ REEL has also designed specific equipment, notably for the assembly and loading of missiles for nuclear-armed submarines.⁷⁵

HDT Global (United States)

HDT Global is a U.S.-based company involved in military, government, industrial, and commercial markets.⁷⁶ It is owned by the asset management company Nexus.⁷⁷ HDT Expeditionary Systems, Inc, a subsidiary of HDT Global, was awarded a contract in May 2013 to contribute to the Minuteman III Transporter Erector Replacement Programme. The contract is worth up to \$107.2 million and is meant to finish in March 2024.⁷⁸ HDT Global will provide the transportation systems in support of the LGM-35A Sentinel, the new US Ground Based Strategic Deterrent, as part of a Northrop Grumman-led team.⁷⁹

Kratos Defense and Security Solutions (United States)

Kratos Defense and Security Solutions is a U.S.-based company specialized in unmanned systems, satellite communications, cybersecurity/warfare, microwave electronics, missile defense, hypersonic systems, training, and combat systems.⁸⁰ Kratos is providing vehicle transporters for the LGM-35A Sentinel, the new U.S. Ground Based Strategic Deterrent, with Northrop Grumman as the prime contractor.⁸¹

Larsen & Toubro (India)

Larsen & Toubro Limited (L&T), is a technology, engineering, construction, manufacturing and financial services conglomerate.⁸² Since 2021, L&T claims it does not "manufacture any explosives or ammunition of any kind, including [...] nuclear weapons or components of such munitions" nor any delivery systems.⁸³ However, until at least March 2023, L&T's website stated it designed and produced the launch system for the Dhanush nuclear-capable short range ballistic missile.⁸⁴ L&T continues to operate a Strategic Systems Complex (SSC) in Maharashtra, where it produces "Strategic Weapon Platforms, Sensors and Military Engineering Systems".⁸⁵ Yet, it is unclear whether these platforms, sensors and systems are specifically designed for the Indian nuclear weapons arsenal. Due to this lack of clarity, several financial institutions continue to exclude L&T, as well as its subsidiary Mindtree, for nuclear weapons involvement. L&T also built the hull for India's first nuclear armed ballistic missile submarine, the INS Arihant⁸⁶ The submarine was jointly developed by the Indian Navy, Bhabha Atomic Research Centre (BARC) and Defence Research and Development Organisation (DRDO), and built under the Advanced Technology Vessel (ATV) project, key to India's aim for a naval nuclear weapons capacity.⁸⁷ It conducted two submerged unit trials of nuclear capable K-15 missiles in 2018.⁸⁸ Sources indicate that the Arihant will primarily serve as a training vessel and technology demonstrator and will not be deployed for nuclear deterrence patrols as additional SSBNs come online.⁸⁹ A second SSBN, the INS Arighat, was launched in November 2017 and a third submarine, the S4, was reportedly launched in November 2021.⁹⁰ India plans a total of four SSBNs, to be completed within the next decade.⁹¹

Merrick & Company (United States)

Merrick & Company is an engineering, architecture, surveying, and geospatial firm, headquartered in the U.S.⁹² Merrick, along with Strategic Management Solutions, provides support for the Triad National Security joint venture

at the Los Alamos National Laboratory, which is responsible for U.S. nuclear weapon modernisation and stockpile retention.⁹³ Its work is primarily associated with large-scale infrastructure. In 2019, Merrick & Company opened an office to support activities at the Savannah River Site as well, yet the bulk of activities appear not to be specific to nuclear weapons.⁹⁴

Moog, Inc. (United States)

Moog Inc. is a worldwide designer, manufacturer and systems integrator of high performance precision motion and fluid controls and controls systems for a broad range of applications in aerospace and defense, and industrial markets.⁹⁵ Moog has an outstanding contract with the U.S. Department of Defence to replace the arm/disarm switches on the Minuteman III weapon system.⁹⁶ It also includes information on its website about producing electrohydraulic TVC systems for the Trident system, but no current contracts were identified.⁹⁷ Moreover, this part is also usable in devices that are not specifically designed for nuclear weapons. Some financial institutions choose to exclude Moog for this and for the legacy involvement in the Trident D5 system the company advertises on its website.⁹⁸

N3B Los Alamos (United States)

N3B is a limited liability company owned by HII Nuclear, a subsidiary of Huntington Ingalls Industries, and BWX Technologies, joined by critical subcontractors Longenecker and Associates and Tech2 Solutions.⁹⁹ It holds a contract for environmental remediation services at the Los Alamos National Laboratory.¹⁰⁰ While not a nuclear weapon producer, it is listed here to illustrate the complexity around some nuclear weapon associated contracts. This joint venture is involved in clean-up, but also involves companies engaged in production of key components for nuclear weapons.

Naval Group (France)

Naval Group is a prime contractor for the French Navy and is currently developing a third-generation nuclear armed submarine for France.¹⁰¹ The programme is aimed at replacing the four *Le Triomphant* nuclear armed submarines, with delivery starting in 2035.¹⁰² Naval group is also the prime contractor for the M51 missile integration for the French nuclear-armed submarines.¹⁰³

Parsons (United States)

Parsons, a U.S.-based company, provides software and hardware products, technical services and integrated solutions for the defense, intelligence and critical

infrastructure markets.¹⁰⁴ It is part of the Northrop Grumman team working to design the LGM-35A Sentinel, the next U.S. intercontinental ballistic missile.¹⁰⁵ Parsons will support the infrastructure engineering services related to the launch facilities and launch centers.¹⁰⁶

SOC LLC (United States)

SOC LLC is a privately held company, owned by Day & Zimmerman, that provides global security, operations and maintenance, architecture and engineering, and staffing services to the U.S. Government and commercial clients.¹⁰⁷ As one of the member companies of Consolidated Nuclear Security, SOC provides Safeguards, Security, and Emergency Services for the Y-12 & Pantex sites in the U.S.¹⁰⁸

Strategic Management Solutions (United States)

Strategic Management Solutions is a U.S.-based company providing technical and engineering services.¹⁰⁹ Its clients include, among others, Los Alamos National Laboratory, Lawrence Livermore National Laboratory, Savannah River Site and the Nevada National Security Site.¹¹⁰ The role played by this company is primarily one of project management.¹¹¹

Systems Planning and Analysis Inc. (United States)

Systems Planning and Analysis Inc. (SPA) is a privately-held U.S. government contracting firm providing Advanced Analytics, Systems Engineering & Safety Analysis, Strategy, Policy & Compliance, Program Support, and Agile Software Development.¹¹² SPA has two outstanding contracts for support and engineering services related to the Trident II (D5) programme, with a combined potential value of \$161 million.¹¹³ SPA also provides engineering and programmatic support for nuclear weapons surety (NWS).¹¹⁴

TechnicAtome (France)

TechnicAtome is involved in the French nuclear ballistic missile submarine programme (SNLE 3G).¹¹⁵ The programme is aimed at replacing the four *Le Triomphant* nuclear armed submarines, with delivery starting in 2035.¹¹⁶ TechnicAtome is also involved in the Laser Megajoule programme, which simulates French nuclear testing.¹¹⁷

Volat (Belarus)

Volat (Minsk Wheel Tractor Plant Open Joint Stock Company) is a manufacturer of heavy off-road vehicles.¹¹⁸ It produces the mobile launchers for the Russian Topol missiles.¹¹⁹ The company is wholly owned by the Republic of Belarus.¹²⁰

Joint ventures

There are numerous joint ventures and consortiums operating across the global nuclear weapons industry. Each of these are named in the various producer profiles, but this section provides a listing showing their composite parts.

JOINT VENTURE/ CONSORTIUM NAME	COMPANIES INVOLVED	CONTRACTED FOR
ArianeGroup	Airbus and Safran ¹²¹	M51 (France) ¹²²
Consolidated Nuclear Security (CNS)	Bechtel, Leidos, ATK Launch Systems (part of Northrop Grumman), SOC and Booz Allen Hamilton ¹²³	NNSA Production Office (NPO) Pantex Plant and Y-12 National Security Complex ¹²⁴
Lawrence Livermore National Security partnership	Bechtel National, University of California, BWX Technologies, Amentum and teaming subcontractor Battelle Memorial Institute. ¹²⁵	Lawrence Livermore National Laboratory, the lead design agency for the life extension program for the W80-4 cruise missile warhead and the modification program for the W87-1 warhead. ¹²⁶
MBDA	Airbus, BAE Systems and Leonardo ¹²⁷	ASMPA and ASN4G (France) ¹²⁸
National Technology and Engineering Solutions of Sandia	Wholly owned subsidiary of Honeywell International. ¹²⁹	Management and operations of Sandia National Laboratories (US), involved in the modernisation of at least the W88 Alt 37 warhead ¹³⁰ and the new W39/Mk7 program ¹³¹ (both used for arming the submarine launched Trident II (D5) missiles), the W87-1 warhead for the U.S. Ground Based Strategic Deterrent ¹³² , the W80-4 warheads for the Long Range Standoff missiles ¹³³ , and the new B61-12 gravity bomb ^{134,135}
Roxel	MBDA and Safran subsidiary Herakles ¹³⁶	ASMPA (France) ¹³⁷
Savannah River Nuclear Solutions (SRNS)	Fluor and Newport News Nuclear (part of Huntington Ingalls Industries) ¹³⁸	Tritium extraction and plutonium pit production (US). ¹³⁹
Triad National Security LLC	Battelle Memorial Institute, the University of California and, the Texas A&M University System ¹⁴⁰	Los Alamos National Laboratory (US), which includes the nuclear design and engineering of the B61, W76, W78, and W88 warheads. It also manages the life extension and alteration programs affecting the B61-12 bomb and the W88 warhead. ¹⁴¹



The LGM-35A Sentinel, formerly called the Ground Based Strategic Deterrent (GBSD), is an intercontinental ballistic missile (ICBM) being developed by Northrop Grumman. While the Sentinel programme was initially estimated to cost \$95.3 billion, Air Force spokespersons indicated in early 2024 a possible 37 percent cost increase. (Photo credit: U.S. Airforce)

Full company profiles

This section includes a company-by-company review. For an overview per weapon system, see the Annex.

Included in each section:

Company profile

Contact information

Nuclear Weapons involvement

Financiers table

1. Airbus Group (The Netherlands)
2. BAE Systems plc (United Kingdom);
3. Bechtel (United States)
4. Bharat Dynamics Limited (India)
5. Boeing (United States)
6. China Aerospace Science and Technology (China);
7. Fluor (United States)
8. General Dynamics (United States);
9. Honeywell International (United States)
10. Huntington Ingalls Industries (HII) (United States)
11. Jacobs Solutions (United States)
12. L3Harris Technologies (United States)
13. Leidos (United States)
14. Leonardo (Italy)
15. Lockheed Martin (United States)
16. Northrop Grumman (United States)
17. Peraton Inc (United States)
18. RTX Corporation (United States)
19. Rolls-Royce (United Kingdom)
20. Rostec (Russian Federation)
21. Safran (France)
22. Textron (United States)
23. Thales (France)
24. Walchandnagar Industries Limited (India)

1. Airbus Group (The Netherlands)

COMPANY PROFILE

Airbus is headquartered in the Netherlands but has its main production facilities in Germany, France and Spain.¹⁴² It is involved in the commercial aircraft, helicopter, defence and space sectors.¹⁴³ The company is partially state-owned by France (10.89%), Germany (10.87%) and Spain (4.10%), with the rest of its shares held by the public.¹⁴⁴ Airbus is the prime contractor for ballistic missiles used in the French nuclear arsenal through its participation in ArianeGroup and MBDA. ArianeGroup is a joint venture, equally owned by Airbus and French company Safran¹⁴⁵, and MBDA is a joint venture between BAE Systems (37.5%), Airbus (37.5%) and Leonardo (25%).¹⁴⁶ In the year ending 31 December 2022, Airbus Group generated revenues of € 58.8 billion.¹⁴⁷

Contact

Airbus Group SE
PO Box 32008
2303 DA Leiden
The Netherlands

Website: <https://www.airbus.com/en>

X: @AirbusDefence

LinkedIn: <https://www.linkedin.com/company/airbus-defence-and-space>

NUCLEAR WEAPONS

MBDA France, in which Airbus has a 37.5% stake, is the prime contractor for the ASMPA medium-range air-to-ground nuclear armed cruise missile for the French nuclear arsenal.¹⁴⁸ MBDA is also contracted by the French government for work related to development of the ASMPA-successor, the ASN4G.¹⁴⁹ The new weapon is scheduled to enter service in 2035 with range exceeding 1,000km, double that of the ASMPA,¹⁵⁰ and will incorporate new hypersonic technologies.¹⁵¹

Airbus, as part of ArianeGroup, is the main contractor for the M51 submarine-launched ballistic missiles.¹⁵² ArianeGroup states that its role in the M51 production “covers upstream research, design, development and production of the missiles, the land-based operating infrastructure and the command and control system on board the submarines. ArianeGroup is also responsible for the system support in service as well as end-of-life disposal”.¹⁵³ Through ArianeGroup, Airbus is also contracted for the development of the third version of the ballistic missile, the M51.3, to be completed around 2025.¹⁵⁴

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 7: FINANCING AND INVESTMENT RELATIONSHIPS WITH AIRBUS GROUP

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
ANZ	Australia		\$143		
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain		\$498		
Bank of America	United States		\$424		
Bank of China	China		\$424		
Barclays	United Kingdom		\$498		
BayernLB	Germany		\$321		
BlackRock	United States			\$4,132	
BNP Paribas	France		\$498		
Caisse des Dépôts et Consignations	France		\$143		
Canada Pension Plan Investment Board	Canada			\$682	
Capital Group	United States			\$10,497	
Children's Investment Fund Management	United Kingdom			\$2,549	
Citigroup	United States		\$640		
Commerzbank	Germany		\$400		

Crédit Agricole	France		\$720	\$1,204	
Crédit Mutuel	France		\$321		
DBS	Singapore		\$321		
Deka Group	Germany			\$718	
Deutsche Bank	Germany		\$577		
DZ Bank	Germany		\$321		
European Investment Bank	Luxembourg		\$947		
Fidelity Investments	United States			\$1,410	
Goldman Sachs	United States		\$321		
Groupe BPCE	France		\$498		
HSBC	United Kingdom		\$498		
Industrial and Commercial Bank of China	China		\$424		
ING Group	Netherlands		\$321		
Invesco	United States			\$1,035	
JPMorgan Chase	United States		\$498		
KfW	Germany		\$178		
La Banque Postale	France		\$143		
Lloyds Banking Group	United Kingdom		\$424		
Lone Star Funds	United States		\$79		
Manulife Financial	Canada	\$49			
MassMutual Holdings	United States	\$60			
Mitsubishi UFJ Financial	Japan		\$394		
Mizuho Financial	Japan		\$577		
Morgan Stanley	United States		\$321		\$390
NatWest	United Kingdom		\$394		
Primecap Management	United States			\$966	
Royal Bank of Canada	Canada		\$498		
Santander	Spain		\$640		
Skandinaviska Enskilda Banken	Sweden		\$424		
SMBC Group	Japan		\$498		
Sociedad Estatal de Participaciones Industriales	Spain			\$4,680	
Société Générale	France		\$498		
Standard Chartered	United Kingdom		\$143		
State Street	United States		\$286		
TIAA	United States			\$631	
Toronto-Dominion Bank	Canada		\$321		
UBS	Switzerland		\$321		
UniCredit	Italy		\$577		
Vanguard	United States			\$2,448	
Wellington Management	United States			\$956	
Wells Fargo	United States		\$143		
Westpac	Australia		\$143		
GRAND TOTAL		\$109	\$16,752	\$31,907	\$390

2. BAE Systems plc (United Kingdom)

COMPANY PROFILE

BAE Systems, based in the UK, is a defence company operating in the air, maritime, land, space, electronics and cyber domains.¹⁵⁵ The company is involved in the French, UK and US nuclear arsenals. BAE Systems has a 37.5% stake in the MBDA joint venture with Airbus and Leonardo.¹⁵⁶ In the financial year ending 31 December 2022, BAE Systems reported revenues of £21.3 billion, resulting in an operating profit of £2.38 billion.¹⁵⁷

Contact

BAE Systems PLC Headquarters
PO Box 87 Aerospace Centre,
Farnborough GU14 6YU
United Kingdom

Website: <https://www.baesystems.com/en/home>
X: @BAESystemsplc
LinkedIn: <https://www.linkedin.com/company/bae-systems>

NUCLEAR WEAPONS

BAE Systems is involved in three nuclear weapon arsenals: those of France, the United Kingdom and the United States.

BAE Systems is part of the MBDA joint venture. MBDA France is the prime contractor for the ASMPA medium-range air-to-ground nuclear armed missile for the French nuclear arsenal.¹⁵⁸ MBDA is also contracted by the French government for work related to development of the ASMPA-successor, the ASN4G.¹⁵⁹ The new weapon is scheduled to enter service in 2035 with range exceeding

1,000km, double that of the ASMPA,¹⁶⁰ and will incorporate new hypersonic technologies.¹⁶¹

BAE Systems is the prime contractor for the US Minuteman III Intercontinental Ballistic Missile (ICBM) system in engineering/technical assistance support, training, and development.¹⁶² In June 2022, BAE Systems received an 18-year, \$12 billion contract to continue supporting the sustainment of the US' ICBM inventory.¹⁶³ The contract provides for services support for both the Minuteman III and its replacement, the LGM-35A Sentinel.¹⁶⁴ BAE Systems has a second outstanding contract for work on the Minuteman III system since 2013, valued at \$1.8 billion.¹⁶⁵

BAE is also contracted by the U.S. government for work on the U.S. and UK Trident II D5 strategic weapon systems, under contracts valued at up to \$607.8 million.¹⁶⁶

BAE Systems is also part of the Dreadnought Alliance, a joint management team between the Submarine Delivery Agency (SDA) of the British Ministry of Defence, BAE Systems and Rolls-Royce.¹⁶⁷ BAE Systems is the lead for the whole boat build and secondary propulsion and is also the platform technical authority on the Dreadnought programme.¹⁶⁸ In May 2022, the Ministry of Defense announced it had awarded additional contracts for the Dreadnought programme of over £2 billion to BAE Systems and Rolls-Royce, as an initial investment within a planned overall total of £10 billion for the whole delivery phase.¹⁶⁹

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 8: FINANCING AND INVESTMENT RELATIONSHIPS WITH BAE SYSTEMS

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING
Affiliated Managers Group	United States			\$1,055
Allstate	United States	\$84		
Ameriprise Financial	United States	\$30		\$358
ANZ	Australia		\$91	
Artisan Partners	United States			\$436
Aware Super	Australia			\$196
Bank of America	United States		\$91	
Bank of New York Mellon	United States			\$393
Barclays	United Kingdom		\$91	\$1,313

BlackRock	United States			\$4,088
BNP Paribas	France		\$91	
California Public Employees' Retirement System (CalPERS)	United States	\$46		
Capital Group	United States			\$5,449
Citigroup	United States		\$763	
Commerzbank	Germany		\$91	
Crédit Agricole	France		\$91	
Crédit Mutuel	France		\$91	
Deutsche Bank	Germany		\$91	
Fidelity Investments	United States			\$854
First Abu Dhabi Bank	United Arab Emirates		\$901	
First Eagle Investment Management	United States			\$590
Franklin Resources	United States	\$30		
Geode Capital Holdings	United States			\$204
Goldman Sachs	United States		\$91	
Invesco	United States			\$1,640
JPMorgan Chase	United States		\$91	
Legal & General	United Kingdom			\$388
Lloyds Banking Group	United Kingdom		\$91	
M&G	United Kingdom			\$261
Macquarie Group	Australia	\$78		
Mawer Investment Management	Canada			\$271
MetLife	United States	\$30		
Mitsubishi UFJ Financial	Japan		\$1,172	
Mizuho Financial	Japan		\$91	
Morgan Stanley	United States		\$91	
Nationwide Mutual Insurance	United States	\$30		
NatWest	United Kingdom		\$91	
Northern Trust	United States		\$811	
Orbis Group	Bermuda			\$391
Prudential Financial (US)	United States	\$131		
Royal Bank of Canada	Canada		\$91	
Silchester International Investors	United Kingdom			\$993
Skandinaviska Enskilda Banken	Sweden		\$91	
SMBC Group	Japan		\$91	
Société Générale	France		\$91	
State Farm	United States	\$87		
State Street	United States			\$319
The Hartford	United States	\$26		
TIAA	United States	\$68		
Toronto-Dominion Bank	Canada		\$91	
Unum Group	United States	\$30		
Vanguard	United States			\$1,285
Wellington Management	United States	\$56		\$594
Wells Fargo	United States		\$91	
White Mountains Insurance	Bermuda	\$88		
GRAND TOTAL		\$814	\$5,456	\$21,080

3. Bechtel (United States)

COMPANY PROFILE

Bechtel Group, a private, family company based in the U.S., operates as an engineering, construction and project management company.¹⁷⁰ Bechtel manages and operates the Lawrence Livermore National Laboratory (together with Battelle and Texas A&M University), which, as its primary mission, supports the U.S. nuclear weapons capabilities.¹⁷¹ In the financial year 2021, Bechtel Group reported revenues of \$17.5 billion.¹⁷²

Contact

12011 Sunset Hills Road
Reston, VA 20190-5919
United States
+1 571 392 6300

Website: Engineering, Construction &
| Project Management | Bechtel

X: @Bechtel

LinkedIn: <https://www.linkedin.com/company/bechtel-corporation>

NUCLEAR WEAPONS

Bechtel is contracted to provide launch system design, construction, and integration during the next development phase for the Sentinel, the new U.S. Ground-Based Strategic Deterrent (ICBM).¹⁷³

Bechtel is part of the Lawrence Livermore National Security, LLC consortium, which has the management and operation contract for the Lawrence Livermore National Laboratory, the lead design agency for the life extension program for the W80-4 cruise missile warhead and the modification program for the W87-1 warhead.¹⁷⁴ The contract was originally awarded in May 2007, and currently runs until at least September 2026, with a potential value of \$64.8 billion.¹⁷⁵

Bechtel is also part of Consolidated Nuclear Security (CNS), LLC, which since 2013 has been managing the Pantex Plant and the Y-12 National Security Complex under a single \$48.9 billion contract.¹⁷⁶ CNS is “fully responsible for high-hazard enriched uranium, special nuclear material (SNM), high-explosive and nuclear weapon assembly/disassembly functions”.¹⁷⁷ The National Nuclear Security Administration (NNSA) ended the contract deal with CNS in 2020 for failing to meet safety and security standards.¹⁷⁸ Nevertheless, in October 2022, the contract held by CNS was formally extended with up to five years for the Y-12 National Security Complex and up to three years for the Pantex Plant,¹⁷⁹ as the NNSA is yet to find a new manager for both sites.

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 9: FINANCING AND INVESTMENT RELATIONSHIPS WITH BECHTEL

INSTITUTION	COUNTRY	LOANS
ANZ	Australia	\$225
Bank of America	United States	\$1,136
BNP Paribas	France	\$1,222
CIBC	Canada	\$225
Citigroup	United States	\$1,136
Crédit Agricole	France	\$723
Crédit Mutuel	France	\$225
HSBC	United Kingdom	\$225
Intesa Sanpaolo	Italy	\$429
JPMorgan Chase	United States	\$654
Mitsubishi UFJ Financial	Japan	\$723
PNC Financial Services	United States	\$429
SMBC Group	Japan	\$723
Société Générale	France	\$429
GRAND TOTAL		\$8,500

4. Bharat Dynamics Limited (India)

COMPANY PROFILE

Bharat Dynamics Limited (BDL) is a Government of India Enterprise under the Ministry of Defence.¹⁸⁰ It is also traded at the NSE India (National Stock Exchange of India) and Bombay Stock Exchange.¹⁸¹ BDL produces missiles designed to deliver Indian nuclear warheads. In the financial year ending 31 March 2023, it generated revenues of ₹24.89 billion.¹⁸²

Contact

Bharat Dynamics Limited,
Corporate office, Plot No. 38-39,
TSFC Building (Near ICICI Towers), Financial District,
Gachibowli, Hyderabad,
Telangana - 500032.

Website: <http://www.bdl-india.in/>
X: @bharat_dynamics
LinkedIn: <https://in.linkedin.com/company/bharat-dynamics-limited-official-site>

NUCLEAR WEAPONS

BDL is the prime production agency for the Indian Integrated Guided Missile Development Programme.¹⁸³ It is involved in several nuclear capable missile programmes, including the Prithvi and Agni systems, and provides support for life extension programmes.¹⁸⁴

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 10: FINANCING AND INVESTMENT RELATIONSHIPS WITH BHARAT DYNAMICS LIMITED

INSTITUTION	COUNTRY	SHAREHOLDING
Aditya Birla Capital	India	\$8
Canara Bank	India	\$15
Dimensional Fund Advisors	United States	\$7
HDFC Bank	India	\$240
Invesco	United States	\$8
Invest AD	United Arab Emirates	\$8
Kotak Mahindra Bank	India	\$40
Life Insurance Corporation of India	India	\$47
Max Financial Services	India	\$70
Passionate Investment Management	India	\$26
Sundarm Finance Group	India	\$9
Vanguard	United States	\$17
White Oak Capital Management	India	\$15
GRAND TOTAL		\$511

5. Boeing (United States)

COMPANY PROFILE

Boeing is a manufacturer of commercial and military aircraft, satellites and weapons, among others.¹⁸⁵ Boeing supports the production of the Minuteman III and Trident II (D5) missiles and produces key components for the B61-12 gravity bombs. Boeing also has contracts related to the U.S. Long Range Standoff missiles. In the financial year ending 31 December 2022, Boeing reported \$62.6 billion in revenues.¹⁸⁶

Contact

Boeing Corporate Headquarters
929 Long Bridge Drive
Arlington, Virginia 22202
+ 1 703 4146338

Website: <http://www.boeing.com/>
X: @Boeing
LinkedIn: Boeing | LinkedIn

NUCLEAR WEAPONS

Boeing remanufactured the warhead arming device for the Air-Launched Cruise Missiles of the U.S. nuclear arsenal. The Air Force Nuclear Weapons Center at Tinker Air Force Base, Oklahoma contracted Boeing in 2018 to produce 266 fuse assemblies for the air launched missiles, with a value of \$7.8 million.¹⁸⁷ The contract was completed in January 2023.

Boeing also has a \$250 million contract for the Long-Range Standoff weapon system.¹⁸⁸ The contract includes aircraft and missile carriage equipment development and modification, engineering, testing, software development, training, facilities, and support necessary to fully integrate

TABLE 11: FINANCING AND INVESTMENT RELATIONSHIPS WITH BOEING

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Academy Securities	United States				\$142
ANZ	Australia		\$482		
Arab Banking Corporation (Bank ABC)	Bahrain		\$58		
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain		\$793		\$515
Bank of America	United States		\$2,614	\$1,091	\$1,912
Bank of China	China		\$317		

the Long Range Standoff Cruise Missile on the B-52H bomber platform.¹⁸⁹ Work is expected to be completed by December 2024.

Boeing produces the guided tail-kit for the B61-12 upgrade. It currently has two outstanding contracts, with a total potential value of \$317.4 million.¹⁹⁰

Since 1958, Boeing has been responsible for the development and production of the U.S. Minuteman Intercontinental Ballistic Missile (ICBM) system.¹⁹¹ Boeing is currently contracted to provide engineering and other services for the Minuteman III under a \$771.6 million contract, set to expire in February 2024.¹⁹² In September 2021, Boeing was awarded an, 18-year contract for Minuteman III missile guidance repair, with a potential value of \$2 billion.¹⁹³ In February 2023, Boeing was also awarded a 16-year contract for Minuteman III guidance subsystem support, with a potential value of \$1.6 billion.¹⁹⁴ Under an eight year contract, awarded in April 2022, potentially valued at \$41.2 million, Boeing will produce and deliver Flight Test Telemetry Termination (FT3) Systems to support the operational test launch schedule for the Minuteman III.¹⁹⁵ Boeing was also awarded a contract in December 2022, potentially valued at \$15.5 million, to support the Communications Equipment Interface Unit (CEIU) in the Minuteman III guidance system.¹⁹⁶

Boeing provided maintenance, repair, rebuilding and technical services in support of the navigation subsystem for the Trident II (D5) missile system, under a \$52 million contract, completed in November 2023.¹⁹⁷

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

Bank of New York Mellon	United States		\$58		
Barclays	United Kingdom		\$1,519		
BayernLB	Germany		\$58		
BlackRock	United States			\$5,973	
BMO Financial Group	Canada		\$300		
BNP Paribas	France		\$2,051		\$1,086
Capital Group	United States			\$6,213	
Citigroup	United States		\$7,225		\$1,590
Commerzbank	Germany		\$1,145		\$867
Crédit Agricole	France		\$1,859		\$867
DBS	Singapore		\$931		
Deutsche Bank	Germany		\$2,091		\$1,086
Fidelity Investments	United States			\$3,760	
First Abu Dhabi Bank	United Arab Emirates		\$365		
Fisher Investments	United States			\$983	
Franklin Resources	United States	\$370			
Geode Capital Holdings	United States			\$2,159	
Goldman Sachs	United States		\$1,519		\$1,590
Groupe BPCE	France		\$195	\$2,354	
ICICI Bank	India		\$181		
Industrial and Commercial Bank of China	China		\$241		
Intesa Sanpaolo	Italy		\$221		
JPMorgan Chase	United States		\$4,199		\$1,590
La Caixa Group	Spain		\$111		
Lloyds Banking Group	United Kingdom		\$482		
Loop Capital	United States				\$142
Mitsubishi UFJ Financial	Japan		\$1,433		\$635
Mizuho Financial	Japan		\$2,091		\$1,086
Morgan Stanley	United States		\$1,519	\$904	\$1,590
Newport Group	United States			\$7,299	
Northern Trust	United States		\$547	\$696	
PNC Financial Services	United States		\$230		\$142
Riyad Bank	Saudi Arabia		\$674		
Royal Bank of Canada	Canada		\$1,918		\$1,086
Santander	Spain		\$1,166		\$536
SMBC Group	Japan		\$2,091		\$1,086
Société Générale	France		\$1,433		\$515
Standard Chartered	United Kingdom		\$648		
State Bank of India	India		\$482		
State Street	United States		\$208	\$5,578	
TIAA	United States			\$1,280	
Truist Financial	United States		\$183		
UBS	Switzerland		\$1,041		
US Bancorp	United States		\$594		
Vanguard	United States	\$339		\$9,931	
Wells Fargo	United States		\$2,803		\$1,590
Westpac	Australia		\$796		
GRAND TOTAL		\$709	\$48,873	\$48,221	\$19,650

6. China Aerospace Science and Technology (CASC)

COMPANY PROFILE

China Aerospace Science and Technology Corporation (CASC) is part of China's state-owned (aero)space and defence industry.¹⁹⁸ The company has eight large R&D and production complexes, 11 specialized companies, 13 listed companies and a number of directly affiliated units.¹⁹⁹ It is engaged in space products and strategic and tactical missile systems. CASC generated \$44.9 billion in revenue in 2022.²⁰⁰

Contact

16 Fucheng Road,
Haidian District,
Beijing 100048,
China

Website: <http://english.spacechina.com/n16421/index.html>

LinkedIn: <https://www.linkedin.com/company/china-aerospace-science-and-technology-corporation>

NUCLEAR WEAPONS

China Aerospace Science and Technology Corporation (CASC) states that it is the only manufacturer of intercontinental strategic nuclear missiles in China and that the strategic nuclear missiles it has developed range “from single-stage to multi-stage, from liquid to solid, from land-based to land/sea-based, from fixed-launch to mobile launch, and from medium and long-range to intercontinental”.²⁰¹

China is currently significantly expanding its dual-capable DF-26 intermediate-range ballistic missile force and appears to be developing a new long-range ballistic missile, the DF-27.²⁰² At the time of writing, it is still unclear whether the DF-27 will carry a nuclear payload.²⁰³

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 12: FINANCING AND INVESTMENT RELATIONSHIPS WITH CASC

INSTITUTION	COUNTRY	SHAREHOLDING	UNDERWRITING
China Merchants Bank	China		\$1,908
China Southern Asset Management (CSAM)	China	\$21	
China Structural Reform Fund Corporation Limited	China	\$97	
CITIC	China		\$1,225
CSC Financial	China		\$303
Donghai Securities	China		\$13
First Capital Securities	China		\$13
First Seafont Fund Management	China	\$26	
Fullgoal Fund Management	China	\$29	
Hubei Bank	China		\$13
Hubei Juyuan Technology Investment	China	\$56	
Legend Holdings	China		\$13
Shenwan Hongyuan Group	China		\$13
UBS SDIC Fund Management Co	China	\$21	
GRAND TOTAL		\$250	\$3,501

7. Fluor (United States)

COMPANY PROFILE

Fluor, based in the United States, provides complex engineering, procurement, fabrication, construction, and maintenance projects for commercial and government clients.²⁰⁴ Fluor provides support to the U.S. Department of Defence, the U.S. Department of Energy and the National Nuclear Security Administration (NNSA) that includes management, the operation of nuclear facilities, environmental remediation, rapid response and emergency recovery solutions, and base engineering and construction.²⁰⁵ In the year ending December 2022, Fluor reported \$13.7 billion in revenue.²⁰⁶

Contact

Fluor Corporation
6700 Las Colinas Blvd Irving, TX 75039
United States

Website: <https://www.fluor.com/>
X: @FluorCorp
LinkedIn: <https://www.linkedin.com/company/fluor>

NUCLEAR WEAPONS

Fluor is the lead partner in Savannah River Nuclear Solutions (SRNS), a joint venture with Stoller Newport

News Nuclear (SN3, part of Huntington Ingalls Industries).²⁰⁷ Since 2008, SRNS remains responsible for the management and operation of the Department of Energy's Savannah River Site and Savannah River National Laboratory, which produces tritium and is currently being expanded to also include plutonium pit production, both critical components for nuclear weapons.²⁰⁸ The contract²⁰⁹ with a potential value of \$36.1 billion²¹⁰ was extended in September 2022 by five more years.²¹¹

As a subcontractor of the joint venture Triad National Security²¹², Fluor "provides personnel, systems, tools and corporate reachback support for the critical area of capital construction" for the Los Alamos Laboratory.²¹³ The Los Alamos National Laboratory is responsible for the nuclear design and engineering and life extension programmes for U.S. nuclear warheads.²¹⁴ In 2023, the NNSA also approved the start of the construction of infrastructure to allow for the production of plutonium pits.²¹⁵ The contract awarded to Triad National Security has a potential value of \$33.1 billion and is expected to run until at least October 2028.²¹⁶

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 13: FINANCING AND INVESTMENT RELATIONSHIPS WITH FLUOR

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
American National Insurance	United States	\$14			
Auto-Owners Insurance	United States	\$15			
Bank of America	United States		\$1,210		\$305
Bank of New York Mellon	United States			\$139	
BlackRock	United States			\$458	
BMO Financial Group	Canada		\$450		\$47
BNP Paribas	France		\$1,210		\$305
Boston Private	United States			\$57	
Cartenna Capital	United States			\$35	
Charles Schwab	United States			\$36	
Cincinnati Financial	United States	\$15			
Citadel	United States			\$81	
Citigroup	United States		\$1,090		\$305
Comerica	United States		\$440		\$47
D.E. Shaw & Co.	United States			\$47	

Dimensional Fund Advisors	United States			\$72	
Equitable Holdings	United States			\$137	
Fidelity Investments	United States			\$332	
Fifth Third Bancorp	United States		\$250		\$14
Franklin Resources	United States			\$36	
Geode Capital Holdings	United States			\$83	
Goldman Sachs	United States		\$200		\$47
Hotchkis & Wiley Capital Management	United States			\$142	
Lazard	Bermuda			\$43	
Lord, Abbett & Co	United States	\$53			
Masters Capital Management	United States			\$30	
Millennium Management	United States			\$62	
Mitsubishi UFJ Financial	Japan		\$740		\$47
Morgan Stanley	United States			\$86	
Northern Trust	United States			\$48	
Point72	United States			\$39	
Regions Financial	United States		\$450		\$47
Renaissance Technologies	United States			\$37	
Royal Bank of Canada	Canada		\$100		
Rubric Capital Management	United States			\$101	
SMBC Group	Japan		\$450		\$47
Standard Bank	South Africa		\$100		\$14
Standard Chartered	United Kingdom		\$400		\$47
State Farm	United States	\$56			
State Street	United States			\$145	
Thrivent Financial	United States			\$50	
TIAA	United States			\$44	
Two Sigma Investments	United States			\$61	
US Bancorp	United States		\$400		\$47
Van Eck Associates Corporation	United States	\$37			
Vanguard	United States			\$422	
Victory Capital	United States			\$52	
Wellington Management	United States			\$520	
Wells Fargo	United States		\$1,210		\$305
GRAND TOTAL		\$190	\$8,700	\$3,395	\$1,626

8. General Dynamics (United States)

COMPANY PROFILE

General Dynamics is an aerospace and defense company.²¹⁷ It produces business jets, combat vehicles, command and control systems, and nuclear submarines.²¹⁸ General Dynamics is involved in the production of components for the U.S. and UK Trident II (D5) nuclear-armed submarine-launched ballistic missiles. In the financial year ending 31 December 2022, General Dynamics reported revenues of \$ 39.4 billion.²¹⁹

Contact

General Dynamics
11011 Sunset Hills Road
Reston, Virginia 20190
+1.703.876.3000

Website: <http://www.gd.com/>

X: @generaldynamics

LinkedIn: <https://www.linkedin.com/company/general-dynamics/>

NUCLEAR WEAPONS

General Dynamics is responsible for integrating Trident nuclear weapons for the U.S. Columbia-class program and the UK Dreadnought-class submarines.²²⁰ In October 2022, General Dynamics was awarded a contract to provide

U.S. Trident II Strategic Weapon System Kings Bay Trident Trainer Facility kit and engineering support services, with a potential value of \$33.1 million.²²¹ While General Dynamics receives contracts through the U.S. contract system, sometimes this is for work only on UK weapons. An example of this six-year contract, awarded in 2019 and potentially valued at \$69.1 million, for the Strategic Weapon System Fire Control Subsystem hardware, associated deliverables, and spares for the second hull of the UK Dreadnought Class ballistic missile submarines.²²²

General Dynamics Mission Systems has three additional outstanding contracts for U.S. and UK Trident II (D-5) Fleet Ballistic Missile Submarines Fire Control System and other support, with a combined potential value of \$885.9 million.²²³

General Dynamics is also building the new nuclear-armed submarines (Columbia class) for the U.S. Navy, under a 14-year contract through 2031, potentially valued at \$22.8 billion.²²⁴

General Dynamics is also part of the Northrop Grumman Sentintel team, working on command-and-control systems for these new U.S. nuclear missiles.²²⁵

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 14: FINANCING AND INVESTMENT RELATIONSHIPS WITH GENERAL DYNAMICS

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Academy Securities	United States				\$45
ANZ	Australia		\$422		
Aristotle Capital Management	United States			\$700	
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain		\$422		\$270
Bank of America	United States		\$2,231	\$1,778	\$450
Bank of New York Mellon	United States		\$150		
BlackRock	United States			\$2,406	
Blaylock Beal Van	United States				\$30
Capital Group	United States			\$1,801	
Capital One Financial	United States		\$150		
Citigroup	United States		\$150		
Crédit Mutuel	France		\$150		
Drexel Hamilton	United States				\$30

Fidelity Investments	United States			\$407	
Fifth Third Bancorp	United States		\$150		
First Abu Dhabi Bank	United Arab Emirates		\$422		
Franklin Resources	United States			\$382	
Fuyo General Lease	Japan		\$150		
Geode Capital Holdings	United States			\$935	
Goldman Sachs	United States		\$150		
Government Pension Fund Global (GFPG)	Norway			\$593	
Government Pension Investment Fund (GPIF)	Japan			\$323	
Invesco	United States			\$302	
Janus Henderson	United Kingdom			\$548	
JPMorgan Chase	United States		\$951	\$1,321	\$450
Lloyds Banking Group	United Kingdom		\$697		\$150
Mitsubishi UFJ Financial	Japan		\$1,094		\$150
Mizuho Financial	Japan		\$951		\$270
Newport Group	United States			\$3,537	
Northern Trust	United States		\$422		
Northwestern Mutual	United States	\$55			
Orix Corporation	Japan			\$337	
PNC Financial Services	United States		\$1,072		\$90
Prudential Financial (US)	United States	\$62			
Raven's Wing Asset Management	United States			\$6,086	
Regions Financial	United States		\$150		
Royal Bank of Canada	Canada		\$786	\$544	\$270
Sanders Capital	United States			\$861	
Scotiabank	Canada		\$686		\$105
SMBC Group	Japan		\$572		\$135
State Street	United States			\$2,137	
Sun Life Financial	Canada			\$1,671	
T. Rowe Price	United States			\$495	
Toronto-Dominion Bank	Canada		\$422		\$45
Truist Financial	United States		\$150		
US Bancorp	United States		\$572		\$60
Vanguard	United States			\$4,775	
Wellington Management	United States			\$3,142	
Wells Fargo	United States		\$1,847	\$1,347	\$450
GRAND TOTAL		\$117	\$14,920	\$36,426	\$3,000

9. Honeywell International (United States)

COMPANY PROFILE

Honeywell International is involved in aerospace, commercial real estate, performance materials & technologies, and safety & productivity solutions.²²⁶ The company contributes to the U.S. ICBM programme and is also involved in management and operations of several U.S. nuclear weapon production facilities. In the financial year ending 31 December 2022, Honeywell International announced sales of \$35,466 million.²²⁷

Contact

Honeywell International
300 S Tryon St Suite 500,
Charlotte, NC 28202,
United States

Website: <https://www.honeywell.com/>

X: @honeywell

LinkedIn: <https://www.linkedin.com/company/honeywell>

NUCLEAR WEAPONS

Honeywell will work on guidance and missile electronics in developing the LGM-35A Sentinel, the new U.S. ICBM, also known as the Ground Based Strategic Deterrent.²²⁸

Honeywell is the original equipment manufacturer of the Pendulous Integrating Gyroscopic Accelerometer guidance instrument for the Minuteman III.²²⁹ In March 2022, Honeywell was awarded a six-year \$74.1 million contract for its repair.²³⁰

Honeywell states it has been supporting U.S. national security goals “since the dawn of the nuclear age”.²³¹ Today, Honeywell operates three sites for the U.S. Department of Energy and the National Nuclear Security Administration through joint-venture partnerships: Kansas City National Security Campus, Nevada National Security Site, and Sandia National Laboratory.²³² Together with Fluor and Stoller Newport News Nuclear (part of Huntington Ingalls Industries), Honeywell was also part of Savannah River Nuclear Solutions (SRNS), which operates the Savannah River Site, but exited this joint venture in July 2023.²³³

Since 2015, Honeywell Federal Solutions has been managing and operating the National Security

Campus (NSC) (formerly Kansas City Plant), the facility responsible for producing an estimated 80%²³⁴ of the non-nuclear components for U.S. nuclear weapons, including electronic, chemical and engineered material components.²³⁵ This includes production of the gas transfer system and the arming, fuzing, and firing subsystem of the W88 Alt 370 warhead for the Trident II submarine-launched ballistic missiles²³⁶, and firing, safing and use components of the new W80-4 warhead for the Long Range Standoff (LRSO) missiles²³⁷ and the new B61-12 nuclear gravity bomb²³⁸. The 10-year contract has a potential value of \$15.7 billion.²³⁹

Sandia National Laboratory is directly involved in the nuclear weapon modernisation programmes of at least the W88 Alt 37 warhead²⁴⁰ and the new W39/Mk7 program²⁴¹ ((both used for arming the submarine launched Trident II (D5) missiles)), the W87-1 warhead for the U.S. Ground Based Strategic Deterrent²⁴², the W80-4 warheads for the Long Range Standoff missiles²⁴³, and the new B61-12 gravity bomb^{244, 245} Sandia National Laboratory was also one of the design agencies for the refurbishment of the W76-1 warhead for the Trident II submarine-launched ballistic missiles.²⁴⁶ National Technology and Engineering Solutions of Sandia (NTESS), a “wholly-owned subsidiary” of Honeywell, has the management and operations contract. The contract, with a potential total value of \$43.8 billion, runs until April 2027.²⁴⁷ Peraton and Universities Research Association²⁴⁸ support NTESS in the performance of this contract.²⁴⁹

Together with Jacobs Engineering Group Inc., and Huntington Ingalls International subsidiary HII Nuclear Inc., Honeywell is also part of the Mission Support and Test Service (MSTS) consortium that manages and operates the U.S. Nevada National Security Site.²⁵⁰ The site is used for tests that “provide data relevant to improving our predictive capability, assessing the current stockpile and certifying the future stockpile”²⁵¹ MSTS is also contracted for producing nuclear weapon “components (particularly pit production)” as well as “strategic materials capabilities”.²⁵² The consortium was awarded a 10 year contract in 2017, with a potential value of \$9.9 billion.²⁵³

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 15: FINANCING AND INVESTMENT RELATIONSHIPS WITH HONEYWELL INTERNATIONAL

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Academy Securities	United States				\$184
Ameriprise Financial	United States			\$1,366	
ANZ	Australia		\$558		
Aristotle Capital Management	United States			\$1,041	
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain		\$790		\$245
Bank of America	United States		\$2,010	\$3,402	\$947
Bank of China	China		\$558		
Bank of New York Mellon	United States			\$655	
Barclays	United Kingdom		\$929		\$102
BayernLB	Germany		\$56		
BlackRock	United States			\$6,783	
BNP Paribas	France		\$790		\$366
Capital Group	United States			\$1,315	
Charles Schwab	United States			\$731	
CIBC	Canada		\$558		
Citigroup	United States		\$3,414		\$947
Crédit Agricole	France		\$522		\$102
Danske Bank	Denmark		\$329		
DBS	Singapore		\$582		
Deutsche Bank	Germany		\$1,800		\$887
Franklin Resources	United States			\$1,121	
Geode Capital Holdings	United States			\$2,666	
Goldman Sachs	United States		\$1,800		\$776
Government Pension Investment Fund (GPIF)	Japan			\$936	
HSBC	United Kingdom		\$582		\$102
Industrial and Commercial Bank of China	China		\$582		\$102
Intesa Sanpaolo	Italy		\$56		
Invesco	United States			\$2,120	
JPMorgan Chase	United States		\$2,058	\$1,551	\$1,058
Lazard	Bermuda			\$944	
Legal & General	United Kingdom			\$822	
Mitsubishi UFJ Financial	Japan		\$1,097		
Mizuho Financial	Japan		\$1,452		\$655
Morgan Stanley	United States		\$932	\$1,907	\$766
NatWest	United Kingdom		\$811		\$102
Newport Group	United States			\$3,475	
Northern Trust	United States		\$582	\$853	
Royal Bank of Canada	Canada		\$582	\$1,327	\$102
Santander	Spain		\$1,019		\$245
Scotiabank	Canada		\$522		\$62
SMBC Group	Japan		\$1,452		\$947
Société Générale	France		\$790		\$245
Standard Chartered	United Kingdom		\$582		\$102

State Farm	United States	\$165			
State Street	United States			\$6,429	
Sun Life Financial	Canada			\$3,275	
T. Rowe Price	United States			\$1,148	
TIAA	United States			\$1,017	
Toronto-Dominion Bank	Canada		\$790		\$245
Two Sigma Investments	United States			\$628	
UBS	Switzerland			\$915	
UniCredit	Italy		\$790		\$505
US Bancorp	United States		\$790		\$245
Vanguard	United States	\$107		\$12,635	
Wellington Management	United States			\$4,235	
Wells Fargo	United States		\$2,010		\$947
Westpac	Australia		\$326		
GRAND TOTAL		\$272	\$32,500	\$63,297	\$10,993

10. Huntington Ingalls Industries (United States)

COMPANY PROFILE

Huntington Ingalls Industries (HII) is a global engineering and defense technology provider.²⁵⁴ It designs, constructs and maintains nuclear and non-nuclear ships for the U.S. Navy and Coast Guard, and provides other nuclear and environmental services.²⁵⁵ The company is involved in the management and operation of several facilities responsible for the production, development and stockpiling of U.S. nuclear weapons. In the financial year ending 31 December 2022, HII generated revenues of \$ 10.7 billion.²⁵⁶

Contact

Huntington Ingalls Industries
4101 Washington Ave.
Newport News, VA 23607
Telephone: +1 (757) 380-2000

Website: <https://hii.com/>
X: @WeAreHII
LinkedIn: <https://www.linkedin.com/company/wearehii>

NUCLEAR WEAPONS

The Los Alamos National Laboratory is responsible for the nuclear design and engineering and life extension programmes for U.S. nuclear warheads.²⁵⁷ In 2023, the National Nuclear Security Agency also approved the start of the construction of infrastructure to allow for the production of plutonium pits.²⁵⁸ As a subcontractor of the joint venture Triad National Security²⁵⁹, Huntington

Ingalls Industries provides “personnel, systems, tools and corporate reachback in the areas of pit production, plutonium manufacturing, production scale-up and nuclear operations and manufacturing” for the Los Alamos Laboratory.²⁶⁰ The contract has a potential value of \$33.1 billion and is expected to run until at least October 2028.²⁶¹ Formerly known as the Nevada Test Site, the Nevada National Security Site maintains facilities related to nuclear weapon modernisation and stockpiling. It retains the capability to resume full-scale nuclear testing within a couple years, at the discretion of the U.S. President.²⁶² Mission Support and Test Services LLC (MSTS) manages and operates the site.²⁶³ MSTS is a limited liability company consisting of Honeywell International Inc., Jacobs Solutions Inc., and Stoller Newport News Nuclear, Inc. (SN3), a subsidiary of HII.²⁶⁴ The ten-year contract is potentially valued at \$9.9 billion and is set to expire in November 2027.²⁶⁵

Through SN3, HII is also involved in the joint venture managing and operating the Savannah River Site and Savannah River National Laboratory²⁶⁶, which produces tritium and is currently being expanded to also include plutonium pit production, both critical components for nuclear weapons.²⁶⁷ In September 2022, this contract, which has a potential value of \$36.1 billion²⁶⁸, was extended with another five years.²⁶⁹

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 16: FINANCING AND INVESTMENT RELATIONSHIPS WITH HUNTINGTON INGALLS INDUSTRIES

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Allianz	Germany	\$51			
American Century Investments	United States			\$207	
AQR Capital Management	United States			\$179	
Aristotle Capital Management	United States	\$20			
Baird	United States	\$96			
Bank of America	United States		\$601	\$104	\$200
Bank of New York Mellon	United States			\$57	
BlackRock	United States			\$745	
California Public Employees' Retirement System (CalPERS)	United States	\$36			
Capital Group	United States			\$619	
Capital One Financial	United States		\$185		\$70

Charles Schwab	United States			\$81	
Comerica	United States		\$133		
Dimensional Fund Advisors	United States			\$106	
Fidelity Investments	United States			\$569	
Fifth Third Bancorp	United States		\$133		
First Horizon	United States		\$330		\$20
Geode Capital Holdings	United States			\$206	
Government Pension Investment Fund (GPIF)	Japan	\$41		\$45	
Guardian Life Insurance Company of America	United States	\$11			
Hancock Whitney	United States		\$278		\$20
Invesco	United States			\$327	
JPMorgan Chase	United States		\$601		\$480
KKR Group	United States		\$373		
Legal & General	United Kingdom			\$51	
Lord, Abbett & Co	United States	\$73			
LSV Asset Management	United States			\$154	
Manulife Financial	Canada	\$111			
MetLife	United States	\$18			
Mitsubishi UFJ Financial	Japan		\$330		\$200
Mizuho Financial	Japan		\$601		\$200
Morgan Stanley	United States			\$237	
National Pension Service	South Korea			\$46	
Nationwide Mutual Insurance	United States	\$92			
New York Life Insurance	United States	\$12			
Northern Trust	United States			\$54	
Pendal Group	Australia			\$112	
PNC Financial Services	United States		\$185		\$70
Scotiabank	Canada		\$601		\$200
SEI	United States			\$65	
Sound Shore Management	United States			\$83	
State Street	United States	\$12		\$670	
T. Rowe Price	United States			\$248	
Thornburg Investment Management	United States	\$18			
TIAA	United States	\$52			
Toronto-Dominion Bank	Canada		\$185	\$42	\$70
Truist Financial	United States		\$185		\$70
UBS	Switzerland		\$539		
US Bancorp	United States		\$601		\$200
Vanguard	United States	\$143		\$1,137	
Veritas Capital Fund Management	United States		\$166		
Virtus Investment Partners	United States	\$17			
Wells Fargo	United States		\$601		\$200
Westchester	United States			\$117	
Woodline Partners	United States			\$85	
GRAND TOTAL		\$801	\$6,628	\$6,346	\$2,000

11. Jacobs Solutions (United States)

COMPANY PROFILE

Jacobs Solutions, previously known as “Jacobs Engineering”²⁷⁰, is a U.S. based company that provides consulting, technical, scientific and project delivery services for the government and private sector.²⁷¹ Jacobs Engineering completed its acquisition of another nuclear weapon component producer, CH2M Hill, in 2017.²⁷² On 20 November 2023, Jacobs announced a definitive agreement to spin-off and combine its Critical Mission Solutions and Cyber & Intelligence government services businesses with Amentum²⁷³, a private equity-owned U.S. government services company involved in the management and operation of the Lawrence Livermore National Laboratory and the Los Alamos National Laboratory.²⁷⁴ In the financial year ending 27 September 2022, Jacobs generated revenues of \$14.9 billion.²⁷⁵

Contact

1999 Bryan Street, Ste. 3500
Dallas, TX 75201
United States

Website: <http://www.jacobs.com/>

X: @JacobsConnects

LinkedIn: <https://www.linkedin.com/company/jacobs>

NUCLEAR WEAPONS

Formerly known as the Nevada Test Site, the Nevada National Security Site maintains facilities related to nuclear weapon modernisation and stockpiling. It retains the capability to resume full-scale nuclear testing within a couple years, at the discretion of the U.S. President.²⁷⁶ Mission Support and Test Services LLC (MSTS) manages and operates the site.²⁷⁷ MSTS is a limited liability company consisting of Honeywell International Inc., Jacobs Solutions Inc., and Stoller Newport News Nuclear, Inc. (SN3), a subsidiary of HII.²⁷⁸ The ten-year contract is potentially valued at \$9.9 billion and is set to expire in November 2027.²⁷⁹

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 17: FINANCING AND INVESTMENT RELATIONSHIPS WITH JACOBS SOLUTIONS

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Academy Securities	United States				\$3
Aegon	Netherlands	\$14			
AGF Management	Canada			\$83	
Allspring Global Investments	United States	\$10		\$424	
American Century Investments	United States			\$204	
Aviva	United Kingdom	\$19			
Baird	United States	\$17			
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain		\$134		
Bank of America	United States		\$735		\$189
Barclays	United Kingdom		\$103		\$33
BlackRock	United States			\$689	
BMO Financial Group	Canada		\$178		
BNP Paribas	France		\$1,019		\$122
Capital Group	United States			\$752	
Charles Schwab	United States			\$123	

CI Financial	Canada			\$114	
Citizens Financial Group	United States		\$134		\$33
Comerica	United States				\$3
Dimensional Fund Advisors	United States			\$125	
Empyrean Capital Partners	United States			\$102	
Equitable Holdings	United States	\$10			
Findlay Park Partners	United Kingdom			\$190	
Focus Financial Partners	United States			\$149	
Geode Capital Holdings	United States			\$316	
Government Pension Investment Fund (GPIF)	Japan			\$107	
HSBC	United Kingdom		\$282		\$79
Huntington Bancshares	United States				\$3
Industrial and Commercial Bank of China	China		\$178		\$3
Invesco	United States			\$203	
Jackson Financial	United States	\$15			
JPMorgan Chase	United States		\$147		\$72
Lord, Abbett & Co	United States	\$38			
Minnesota Mutual Companies	United States	\$10			
Mitsubishi UFJ Financial	Japan		\$194		
Morgan Stanley	United States		\$282		\$88
NatWest	United Kingdom		\$147		\$33
Neuberger Berman	United States			\$93	
Ninety One	South Africa			\$236	
Northern Trust	United States		\$103	\$87	
PNC Financial Services	United States		\$437		
Primecap Management	United States			\$755	
Regions Financial	United States		\$44		\$3
Royal Bank of Canada	Canada				\$33
Ruane, Cunniff & Goldfarb	United States			\$351	
Scotiabank	Canada		\$282		\$79
Select Equity Partners	United States			\$522	
Smith Capital Investors	United States	\$9			
Southern Farm Bureau Life Insurance	United States	\$11			
State Street	United States			\$894	
Sun Life Financial	Canada			\$86	
Third Point	United States			\$161	
Toronto-Dominion Bank	Canada		\$372	\$89	\$122
Truist Financial	United States		\$147		\$3
US Bancorp	United States		\$282		\$40
Vanguard	United States	\$22		\$1,695	
Wells Fargo	United States		\$1,019		\$164
GRAND TOTAL		\$175	\$6,220	\$8,551	\$1,100

12. L3Harris Technologies (United States)

COMPANY PROFILE

L3Harris Technologies was established in 2019 through the merger of Harris Corporation and L3 Technologies.²⁸⁰ The company describes itself as an agile global aerospace and defence technology innovator, delivering end-to-end solutions that meet customers' mission-critical needs.²⁸¹ L3Harris Technologies provides critical support and services for the Trident II (D5) system. In July 2023, L3Harris completed its acquisition of Aerojet Rocketdyne, one of the members of Northrop Grumman's nation-wide team that is building the new Sentinel. In the financial year ending December 31, 2022, L3Harris generated revenues of \$17.1 billion.²⁸²

Contact

1025 W. NASA Boulevard
Melbourne, FL 32919, USA
United States

Website: <https://www.l3harris.com/>

X: @L3HarrisTech

LinkedIn: <https://www.linkedin.com/company/l3harris-technologies>

NUCLEAR WEAPONS

L3Harris subsidiary Interstate Electronics Corporation was awarded a five-year contract in 2021 for flight test instrumentation support and services related to the Trident II (D5) nuclear missile.²⁸³ The potential value of the contract is \$292.1 million.²⁸⁴

L3Harris' new subsidiary Aerojet Rocketdyne builds solid boost propulsion systems and has powered every U.S. intercontinental ballistic missile (ICBM) ever fielded, including Trident II D5 missiles and the Minuteman III.²⁸⁵ Aerojet Rocketdyne is also part of the team put together by Northrop Grumman to build the Sentinel, the new U.S. Intercontinental Ballistic Missile (ICBM), for which it is developing a large solid rocket motor and the post-boost propulsion system.²⁸⁶

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All financing and investment relationships with L3Harris' new subsidiary Aerojet Rocketdyne are listed as well, including any loans that matured before July 2023. All figures are in USD millions.

TABLE 18: FINANCING AND INVESTMENT RELATIONSHIPS WITH L3HARRIS TECHNOLOGIES

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Allspring Global Investments	United States			\$364	
Ally Financial	United States		\$52		
Alpine Associates Management	United States			\$110	
Ameriprise Financial	United States			\$232	
AQR Capital Management	United States			\$24	
Balyasny Asset Management	United States			\$251	
Bank of America	United States		\$1,673	\$258	\$406
Bank of New York Mellon	United States			\$212	
Barclays	United Kingdom		\$257	\$155	
BlackRock	United States			\$3,939	
Calamos Investments	United States			\$33	
California Public Employees' Retirement System (CalPERS)	United States			\$254	
Capital Group	United States			\$2,740	
Capital One Financial	United States		\$46		
Carlson Capital	United States			\$56	
Cathay General Bancorp	United States		\$134		

Charles Schwab	United States			\$258	
CIBC	Canada			\$176	
Citadel	United States			\$228	
Citigroup	United States		\$551		
Citizens Financial Group	United States		\$46		
Deutsche Bank	Germany		\$208		
Diamond Hill Investment Group	United States			\$232	
Dimensional Fund Advisors	United States			\$305	
Farallon Capital Management	United States			\$53	
Fidelity Investments	United States			\$699	
Fifth Third Bancorp	United States		\$142		
First Abu Dhabi Bank	United Arab Emirates		\$175		
Franklin Resources	United States			\$451	
Geode Capital Holdings	United States			\$799	
Goldman Sachs	United States			\$203	
Government Pension Fund Global (GFPG)	Norway			\$333	
Government Pension Investment Fund (GPIF)	Japan			\$288	
HSBC	United Kingdom		\$362		
Invesco	United States			\$236	
Janus Henderson	United Kingdom			\$566	
JPMorgan Chase	United States		\$1,233		\$406
KeyCorp	United States		\$46		
Kryger Capital	United Kingdom			\$103	
Legal & General	United Kingdom			\$236	
Magnetar Capital Partners	United States			\$93	
MetLife	United States	\$66			
Mitsubishi UFJ Financial	Japan		\$267		
Mizuho Financial	Japan		\$947		\$406
Morgan Stanley	United States		\$484	\$197	
National Pension Service	South Korea			\$315	
Northern Trust	United States		\$337	\$256	
Northhill Capital	United Kingdom			\$468	
Nuance Investments	United States			\$63	
Opus Corporate Finance LLP	United Kingdom		\$37		
Owl Creek Asset Management	United States			\$27	
Pentwater Capital Management	United States			\$198	
Principal Financial Group	United States			\$25	
PSquared Asset Management	Switzerland			\$56	
Raymond James Financial	United States			\$178	
Regions Financial	United States		\$46		
Royal Bank of Canada	Canada		\$151		
Scotiabank	Canada		\$812		\$406
SMBC Group	Japan		\$1,067		\$406
State Street	United States			\$1,933	
Steel Partners Holdings	United States			\$155	

Sun Life Financial	Canada			\$266	
T. Rowe Price	United States			\$2,010	
TIAA	United States	\$78			
Toronto-Dominion Bank	Canada		\$1,027		\$406
Truist Financial	United States		\$142		
US Bancorp	United States		\$843		\$406
Vanguard	United States			\$3,948	
Virtus Investment Partners	United States			\$107	
Water Island Capital	United States			\$63	
Wellington Management	United States			\$668	
Wells Fargo	United States		\$843	\$969	\$406
White Mountains Insurance	Bermuda	\$49			
Zions Bancorporation	United States		\$46		
Grand total		\$193	\$11,974	\$25,786	\$3,250

13. Leidos (United States)

COMPANY PROFILE

Leidos is a U.S.-based company active in defence, intelligence, civil, and health markets.²⁸⁷ Its defence sector activities include “enterprise and mission IT, large-scale intelligence systems, command and control, geospatial and data analytics, cybersecurity, logistics, training, and intelligence analysis and operations support”.²⁸⁸ In the financial year ending 31 December 2022, Leidos generated revenues of \$14.4. billion.²⁸⁹

Contact

Leidos Holdings Inc.
1750 Presidents Street
Reston, VA 20190
United States

Website: <https://www.leidos.com>

X: @LeidosInc

LinkedIn: <https://www.linkedin.com/company/leidos>

NUCLEAR WEAPONS

Leidos is part of the Consolidated Nuclear Security (CNS), LLC joint venture that manages and operates the Pantex Plant and the Y-12 National Security Complex, where U.S. nuclear weapons are assembled.²⁹⁰ Under the contract, potentially valued at \$48.9 billion, the joint venture is “fully responsible for high-hazard enriched uranium, special nuclear material (SNM), high-explosive and nuclear weapon assembly/disassembly functions”.²⁹¹ The National Nuclear Security Administration (NNSA) ended the contract deal with CNS in 2020 for failing to meet safety and security standards.²⁹²

Nevertheless, in October 2022, the contract held by CNS was formally extended with up to five years for the Y-12 National Security Complex and up to three years for the Pantex Plant,²⁹³ as the NNSA is yet to find a new manager for both sites.

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 19: FINANCING AND INVESTMENT RELATIONSHIPS WITH LEIDOS

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Allianz	Germany	\$26			
Alyeska Investment Group	United States			\$123	
Aristotle Capital Management	United States	\$26			
Baird	United States	\$143			
Bank of America	United States		\$901		\$463
BlackRock	United States			\$1,436	
BMO Financial Group	Canada		\$427		\$156
California Public Employees' Retirement System (CalPERS)	United States	\$27		\$72	
Capital One Financial	United States		\$320		\$408
Charles Schwab	United States			\$101	
Citigroup	United States		\$493		\$463
Dimensional Fund Advisors	United States			\$162	
Fidelity Investments	United States			\$113	
Fifth Third Bancorp	United States		\$107		\$156
First Trust Advisors	United States			\$205	
Franklin Resources	United States	\$20			
Geode Capital Holdings	United States			\$268	
Goldman Sachs	United States		\$280		\$378

Government Pension Fund Global (GFPG)	Norway			\$164	
Government Pension Investment Fund (GPIF)	Japan			\$124	
Guggenheim Capital	United States	\$20			
Invesco	United States			\$243	
JPMorgan Chase	United States		\$493	\$154	\$408
Legal & General	United Kingdom			\$79	
Macquarie Group	Australia	\$28			
MassMutual Holdings	United States	\$27			
Millennium Management	United States			\$116	
Mitsubishi UFJ Financial	Japan		\$493		\$463
Mizuho Financial	Japan		\$273		\$133
Northern Trust	United States		\$173	\$74	
Orix Corporation	Japan			\$351	
PNC Financial Services	United States		\$427		\$186
Prudential Financial (US)	United States	\$43			
Regions Financial	United States		\$107		\$156
Royal Bank of Canada	Canada	\$21	\$107		
Scotiabank	Canada		\$620		\$408
SMBC Group	Japan		\$281		\$275
State Bank of India	India		\$83		
State Street	United States			\$479	
Sun Life Financial	Canada			\$254	
The Hartford	United States	\$44			
Toronto-Dominion Bank	Canada		\$107		\$156
US Bancorp	United States		\$320		\$408
Vanguard	United States	\$61		\$1,364	
Victory Capital	United States			\$439	
Wellington Management	United States			\$388	
Wells Fargo	United States		\$426		\$133
GRAND TOTAL		\$485	\$6,440	\$6,708	\$4,750

14. Leonardo (Italy)

COMPANY PROFILE

Leonardo, based in Italy, develops products and services in the fields of aerospace, defence and security.²⁹⁴ Leonardo has a 25% stake in the MBDA joint venture, which produces missiles for the French nuclear arsenal.²⁹⁵ In the financial year ending 31 December 2022, Leonardo generated revenues of €14.7 billion.²⁹⁶

Contact

Leonardo SpA
Registered Head Office:
Piazza Monte Grappa n. 4,
00195 Roma
Italy

Website: Aerospace, Defence and Security | Leonardo
X: @Leonardo_live
LinkedIn: Leonardo | LinkedIn

NUCLEAR WEAPONS

MBDA, in which Leonardo has a 25% stake, is the prime contractor for ASMPA nuclear missiles for the French arsenal.²⁹⁷ MBDA is also involved in developing the new ASN4G replacement for the ASMPA.²⁹⁸ The new weapon is scheduled to enter service in 2035 with range exceeding 1,000km, double that of the ASMPA,²⁹⁹ and will incorporate new hypersonic technologies.³⁰⁰

Leonardo also provides the integrated electric propulsion components for the U.S. Navy's Columbia-class submarine, for which it was awarded contracts valued at over \$1 billion and \$3 billion in April 2023 and January 2024 respectively.³⁰¹

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 20: FINANCING AND INVESTMENT RELATIONSHIPS WITH LEONARDO

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Banca Monte dei Paschi di Siena	Italy		\$175		
Banca Passadore & C.	Italy		\$175		
Banca Popolare di Sondrio	Italy		\$246		
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain		\$286		
Banco BPM	Italy		\$621		
Bank of America	United States		\$410		\$335
Bank of China	China		\$226		
Barclays	United Kingdom		\$316		\$42
BlackRock	United States			\$78	
BNP Paribas	France		\$744		
BPER Banca	Italy		\$480		
Cassa Depositi e Prestiti	Italy		\$221		
Citigroup	United States		\$382		\$42
Commerzbank	Germany		\$340		
Crédit Agricole	France		\$791		\$42
Crédit Mutuel	France		\$226		
Deutsche Bank	Germany		\$226		
Dimensional Fund Advisors	United States			\$161	
EFG International	Switzerland		\$51		
European Investment Bank	Luxembourg		\$604		
Fifth Third Bancorp	United States		\$38		

Goldman Sachs	United States		\$30	\$51	\$335
Government Pension Fund Global (GFP)	Norway			\$97	
Groupe BPCE	France	\$18	\$254		
HSBC	United Kingdom		\$286		
Intesa Sanpaolo	Italy		\$768		\$42
Invesco	United States			\$144	
JPMorgan Chase	United States		\$290		\$335
Mediobanca Banca di Credito Finanziario	Italy		\$226		
Mitsubishi UFJ Financial	Japan		\$404		\$42
Morgan Stanley	United States		\$30		\$42
NatWest	United Kingdom		\$226		
PNC Financial Services	United States		\$38		
Regions Financial	United States		\$38		
Santander	Spain		\$286		
SMBC Group	Japan		\$481		
Société Générale	France		\$456		
T. Rowe Price	United States			\$59	
UBS	Switzerland		\$30		\$42
UniCredit	Italy		\$796		\$42
US Bancorp	United States		\$40		
Vanguard	United States			\$155	
Wells Fargo	United States		\$38		
GRAND TOTAL		\$18	\$11,271	\$745	\$1,340

15. Lockheed Martin (United States)

COMPANY PROFILE

Lockheed Martin is a U.S.-based company that focuses on “research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services.”³⁰² In the financial year ending 31 December 2022, Lockheed Martin reported net sales over \$65 billion.³⁰³

Contact

Lockheed Martin
6801 Rockledge Drive,
Bethesda, Maryland 20817-1877
United States

Website: Leading Aerospace and Defense |
Lockheed Martin
X: @LockheedMartin
LinkedIn: Lockheed Martin | LinkedIn

NUCLEAR WEAPONS

Lockheed Martin is producing command and control systems and, as part of the Northrop Grumman team, is responsible for missile payload integration for the LGM-35 Sentinel, the new U.S. Ground Based Strategic Deterrent.³⁰⁴ In October 2023, Lockheed Martin was also awarded an \$996 million contract to develop a reentry vehicle for the Sentinel.³⁰⁵

Lockheed Martin has been the principal designer, manufacturer and sustainer of Minuteman III re-entry systems since the 1960s and anticipates continuing through 2030.³⁰⁶ The company has several outstanding contracts for this work, including a ten year contract, valued at \$879 million³⁰⁷, and a \$320.6 million contract, both awarded in 2019.³⁰⁸

Lockheed Martin is also contracted to design and develop a fully functional prototype for the Airborne Launch Control System Replacement (ALCS-R) program, under a \$94.3 million contract.³⁰⁹ The contract states that “ALCS-R will deliver an affordable total system replacement of the legacy ALCS to support the Minuteman III intercontinental ballistic missile weapon system through estimated 2036 and provide a solution to meet the survivable launch platform – airborne fire control requirements for the ground based strategic deterrent weapon system through 2075”.³¹⁰

The U.S. Navy is also planning to use the Lockheed Martin C-130J-30 Hercules aircraft for nuclear command and communications, specifically in a Take Charge And Move Out (TACAMO) role.³¹¹ In April 2023, it awarded Lockheed Martin a \$70.5 million contract modification to study the aircraft’s readiness for the for the TACAMO program.³¹²

Lockheed Martin is responsible for the construction of the Trident II (D5) nuclear missiles for both the UK and the U.S.³¹³ It has several outstanding contracts related to Trident production, valued at more than \$8.9 billion, some of which planned to continue through at least 2028.³¹⁴

In addition, some contracts, like a \$65.3 million contract, awarded in 2019 and completed in December 2023, were arranged by the U.S. Department of Defense, but are for services to “provide the United Kingdom (UK) with engineering and technical support services and deliverable materials for the Trident II Fleet Ballistic Missile System”, and are paid for by the UK Government.³¹⁵

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 21: FINANCING AND INVESTMENT RELATIONSHIPS WITH LOCKHEED MARTIN

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Academy Securities	United States				\$15
Ameriprise Financial	United States			\$1,068	
Amerivet Securities Inc	United States				\$7
ANZ	Australia		\$265		
Bancroft Capital (PA)	United States				\$4
Bank of America	United States		\$2,314	\$1,120	\$728
Bank of New York Mellon	United States		\$425		\$132

Barclays	United Kingdom		\$565		\$498
BlackRock	United States			\$5,778	
Blaylock Beal Van	United States				\$7
Cabrera Capital	United States				\$4
Capital Group	United States			\$4,909	
CastleOak Securities	United States				\$15
Charles Schwab	United States			\$2,573	
Citigroup	United States		\$2,314		\$784
Crédit Agricole	France		\$1,449		\$704
Crédit Mutuel	France		\$100		
Drexel Hamilton	United States				\$4
Fidelity Investments	United States			\$2,861	
Fifth Third Bancorp	United States		\$265		\$72
Franklin Resources	United States			\$809	
Geode Capital Holdings	United States			\$2,049	
Goldman Sachs	United States		\$669		\$859
Government Pension Investment Fund (GPIF)	Japan			\$627	
Great Pacific Securities	United States				\$4
Jarden	New Zealand				\$72
JPMorgan Chase	United States		\$2,196		\$914
Legal & General	United Kingdom			\$556	
Lloyds Banking Group	United Kingdom		\$579		\$112
MFR	United States				\$12
Mischler Financial Group	United States				\$11
Mitsubishi UFJ Financial	Japan		\$350		
Mizuho Financial	Japan		\$2,314		\$544
Morgan Stanley	United States		\$350	\$1,639	\$803
Northern Trust	United States		\$225	\$683	
Penserra Capital Management	United States				\$12
Penserra Securities	United States				\$4
PNC Financial Services	United States		\$290		\$112
Prudential Financial (US)	United States		\$94		
R. Seelaus & Co	United States				\$8
Riyad Bank	Saudi Arabia		\$682		
Royal Bank of Canada	Canada		\$425		\$132
SAR Holdings	United States				\$7
Shank Williams Cisneros & Co	United States				\$8
SMBC Group	Japan		\$565		\$384
State Street	United States		\$100	\$17,449	
TIAA	United States		\$155		
Toronto-Dominion Bank	Canada		\$565		\$178
Two Sigma Investments	United States			\$592	
UBS	Switzerland			\$719	
UniCredit	Italy		\$690		\$178
US Bancorp	United States		\$794		\$178
Vanguard	United States			\$10,098	
Wellington Management	United States			\$1,398	
Wells Fargo	United States		\$1,012	\$1,181	\$797
GRAND TOTAL			\$249	\$19,500	\$56,110
					\$8,300

16. Northrop Grumman (United States)

COMPANY PROFILE

Northrop Grumman, is an aerospace, defence and security company, which conducts most of its business with the U.S. Department of Defence and intelligence community.³¹⁶ In the financial year ending 31 December 2021, Northrop Grumman reported \$36,602 million in sales.³¹⁷

In February 2021, Veritas Capital, combining its business with Peraton, completed its acquisition of Northrop Grumman's IT and Mission Support Services Business.³¹⁸ As a result, Peraton is now the recipient of a \$6.7 million contract for work on the Minuteman III system, previously held by Northrop Grumman³¹⁹, and has replaced Northrop Grumman as one of the subcontractors in the management and operation of Sandia National Laboratory with National Technology and Engineering Solutions of Sandia (NTES) as primary contractor.³²⁰

Contact

Northrop Grumman Corporation
2980 Fairview Park Drive
Falls Church, VA 22042
United States

Website: <http://www.northropgrumman.com/>
X: @NGCNews | @NorthropGrumman
LinkedIn: Northrop Grumman | LinkedIn

NUCLEAR WEAPONS

Northrop Grumman is building the LGM-35A Sentinel, the new intercontinental ballistic missile system for the U.S., under a \$13.3 billion nine-year contract awarded in 2020.³²¹

Northrop Grumman subsidiary ATK Launch Systems is part of the Consolidated Nuclear Security (CNS), LLC joint venture that since 2013 manages and operates the Pantex Plant and the Y-12 National Security Complex, where U.S. nuclear weapons are assembled.³²² Under the contract, potentially valued at \$48.9 billion, the joint venture is "fully responsible for high-hazard enriched uranium, special nuclear material (SNM), high-explosive and nuclear weapon assembly/disassembly functions".³²³ The National Nuclear Security Administration (NNSA) ended the contract deal with CNS in 2020 for failing to meet safety and security standards.³²⁴ Nevertheless, in October 2022, the contract held by CNS was formally extended with up to

five years for the Y-12 National Security Complex and up to three years for the Pantex Plant,³²⁵ as the NNSA is yet to find a new manager for both sites.

In November 2023, Northrop Grumman Space & Mission Systems Corp completed a \$1.7 billion contract for Minuteman III sustainment support, which had been running since 1999.³²⁶

By acquiring Orbital ATK in 2018, Northrop Grumman took over the contracts of Orbital ATK and its subsidiary ATK Launch Systems. Orbital ATK was responsible for refurbishing all three solid propellant stages of the Minuteman III Intercontinental Ballistic Missile (ICBM) under the plan to keep the missiles operational until at least 2030.³²⁷ Northrop Grumman also has two outstanding contracts from 2021 for work on the Minuteman III system, with a potential total value of \$6.2 billion.³²⁸

ATK Launch Systems was also awarded a \$86.4 million contract in 2018 for procurement of motor and component test, evaluation, engineering support, and disposal for all stages of Minuteman and Peacekeeper systems, which will run through 2026.³²⁹

Northrop Grumman produces propulsion systems for the Trident II (D5) missiles.³³⁰ Northrop has several outstanding contracts from both the U.S. and UK for work on the Trident missiles. These include two contracts awarded in 2015, valued at \$211.5 million and \$309.8 million³³¹ and a four-year \$276.1 million contract awarded in 2020³³² for the underwater launcher systems. The U.S. Department of Defense awarded Northrop Grumman another seven-year contract in March 2019 to work on the common missile compartment used for Trident missiles by both new UK Dreadnought and U.S. Columbia class submarines. The contract has a potential value of \$391.6 million.³³³

Under an additional contract awarded in June 2022, valued at \$455.5 million, Northrop Grumman will perform shipyard field operations, program management, systems engineering, documentation, logistics and hardware production activities in support of the Columbia and Dreadnought Fleet Ballistic Missile Program.³³⁴

Northrop Grumman is also integrating a Radar Aided Targeting System (RATS) into the B-2 Spirit Stealth Bomber, which "allows the B-2 to fully employ the B-61 mod 12 nuclear bomb".³³⁵

FINANCIERS

The following table lists financing or investment relationships for the period 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 22: FINANCING AND INVESTMENT RELATIONSHIPS WITH NORTHROP GRUMMAN

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Academy Securities	United States				\$16
Ameriprise Financial	United States			\$771	
ANZ	Australia		\$118		
Bank of America	United States		\$551	\$2,053	\$218
Bank of New York Mellon	United States		\$118		\$21
BlackRock	United States			\$3,505	
Blaylock Beal Van	United States				\$8
BNP Paribas	France		\$118		\$288
Capital Group	United States			\$7,242	
Charles Schwab	United States			\$343	
Citigroup	United States		\$1,350		
Drexel Hamilton	United States				\$8
Fidelity Investments	United States			\$2,157	
First Abu Dhabi Bank	United Arab Emirates		\$118		
Franklin Resources	United States			\$893	
Geode Capital Holdings	United States			\$1,263	
Goldman Sachs	United States		\$118		\$150
Government Pension Investment Fund (GPIF)	Japan			\$387	
Guardian Life Insurance Company of America	United States	\$76			
Jarden	New Zealand				\$21
JPMorgan Chase	United States		\$551	\$1,524	\$300
Legal & General	United Kingdom			\$367	
Macquarie Group	Australia			\$450	
Mischler Financial Group	United States				\$8
Mitsubishi UFJ Financial	Japan		\$118		
Mizuho Financial	Japan		\$306		\$300
Morgan Stanley	United States		\$118	\$1,372	\$150
National Pension Service	South Korea			\$416	
Northern Trust	United States			\$384	
Northwestern Mutual	United States	\$106			
Power Corporation of Canada	Canada			\$520	
Sanders Capital	United States			\$999	
SAR Holdings	United States				\$8
Scotiabank	Canada		\$118		\$21
Shank Williams Cisneros & Co	United States				\$8
SMBC Group	Japan		\$118		\$81
State Farm	United States	\$71			

State Street	United States		\$118	\$6,446	
Sun Life Financial	Canada			\$1,896	
T. Rowe Price	United States			\$659	
Toronto-Dominion Bank	Canada		\$118		\$81
UBS	Switzerland		\$118		\$150
UniCredit	Italy		\$551		\$21
US Bancorp	United States		\$118		\$81
Vanguard	United States			\$5,495	
Wellington Management	United States			\$2,650	
Wells Fargo	United States		\$1,656		\$478
GRAND TOTAL		\$253	\$6,500	\$41,791	\$2,414

17. Peraton Inc (United States)

COMPANY PROFILE

Peraton is a U.S.-based national security and technology company, and one of the portfolio companies of private equity investment firm Veritas Capital.³³⁶ Peraton acquired Northrop Grumman's IT and Mission Support Services Business and government services company Perspecta in February and May 2021 respectively.³³⁷ The new company now offers services to federal government agencies across the intelligence, space, cyber, defense, citizen security, health, and state and local markets.³³⁸ In 2022, Peraton reported over \$7 billion in annual revenue.³³⁹

Contact

Peraton
1875 Explorer Street
Reston, VA 20190
United States

Website: <https://www.peraton.com/>

X: @PeratonCorp

LinkedIn: <https://www.linkedin.com/company/peraton>

NUCLEAR WEAPONS

As a result of its acquisition of Northrop Grumman's IT and Mission Support Services Business, Peraton is now the recipient of a \$6.7 million contract for Missile Applications Software Support to the Minuteman III system, previously held by Northrop Grumman³⁴⁰, and has replaced Northrop Grumman as one of the subcontractors in the management and operation of Sandia National Laboratory, with National Technology and Engineering Solutions of Sandia (NTES) as primary contractor.³⁴¹ Sandia National Laboratory is directly involved in the nuclear weapon modernisation programmes of at least the W88 Alt 37 warhead³⁴² and the new W39/Mk7 program³⁴³ ((both used for arming the submarine launched Trident II (D5) missiles)), the W87-1 warhead for the U.S. Ground Based Strategic Deterrent³⁴⁴, the W80-4 warheads for the Long Range Standoff missiles³⁴⁵, and the new B61-12 gravity bomb^{346, 347}

Peraton also holds a \$360 million contract running until 2039 to provide Nuclear Safety Cross-Check Analysis (NSCCA) and Nuclear Safety Analysis and Technical Evaluation (NSATE) support for the Minuteman III.³⁴⁸

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 23: FINANCING OR INVESTMENT RELATIONSHIPS WITH PERATON

INSTITUTION	COUNTRY	BOND HOLDING	LOANS
Alter Domus	Luxembourg		\$205
Apple Financial Holdings	United States		\$24
Banco de Sabadell	Spain		\$10
Bank of America	United States		\$709
Bank of China	China		\$29
Barclays	United Kingdom		\$1,286
BayernLB	Germany		\$60
BMO Financial Group	Canada		\$18
California State Teachers' Retirement System (CalSTRS)	United States	\$10	
Capital One Financial	United States		\$247
Cathay General Bancorp	United States		\$4
Chang Hwa Commercial Bank	Taiwan		\$10
Citizens Financial Group	United States		\$266
Crédit Mutuel	France		\$10
Fifth Third Bancorp	United States		\$265
First Bancorp	United States		\$4

FNB Corporation	United States		\$35
Goldman Sachs	United States		\$875
Hua Nan Financial	Taiwan		\$10
Hull Street CLO	Cayman Islands		\$2
Jefferies Financial Group	United States		\$18
JPMorgan Chase	United States		\$1,799
KKR Group	United States		\$1,840
Lloyds Banking Group	United Kingdom		\$121
Macquarie Group	Australia		\$1,290
Mega Financial	Taiwan		\$10
Mitsubishi UFJ Financial	Japan		\$497
Mizuho Financial	Japan		\$509
Northwestern Mutual	United States		\$616
People's United Financial	United States		\$34
PNC Financial Services	United States		\$265
Regions Financial	United States		\$246
Royal Bank of Canada	Canada		\$1,507
Santander	Spain		\$284
Scotiabank	Canada		\$265
Silvermore CLO	Cayman Islands		\$2
SMBC Group	Japan		\$121
State Bank of India	India		\$68
Stifel Financial	United States		\$15
Sun Life Financial	Canada		\$482
Taiwan Business Bank	Taiwan		\$8
Taiwan Cooperative Financial	Taiwan		\$12
Taiwan Financial Holding	Taiwan		\$18
Toronto-Dominion Bank	Canada		\$265
UBS	Switzerland		\$1,111
United Bankshares	United States		\$27
US Bancorp	United States		\$246
Veritas Capital Fund Management	United States		\$274
Wells Fargo	United States		\$266
GRAND TOTAL		\$10	\$16,283

18. Rolls-Royce (United Kingdom)

COMPANY PROFILE

Rolls-Royce is a British company operating in the aerospace, defence and power systems markets.³⁴⁹ For the year 2022, Rolls-Royce reported revenues of £12.6 billion.³⁵⁰

Contact

Rolls-Royce
Kings Place
90 York Way
London N1 GFX
England

Website: <https://www.rolls-royce.com/>

X: @RollsRoyce

LinkedIn: <https://nl.linkedin.com/company/rolls-royce>

NUCLEAR WEAPONS

Rolls Royce produces key components for the new Dreadnought submarines for the UK nuclear weapons system.³⁵¹ In 2019, the UK government awarded Rolls-Royce Submarines with a contract worth nearly £480 million for nuclear propulsion power plants.³⁵² Rolls-Royce is also part of the Dreadnought Alliance, a joint management team between the Submarine Delivery Agency (SDA) of the British Ministry of Defence, BAE Systems and Rolls-Royce.³⁵³ In May 2022, the Ministry of Defense announced it had awarded additional contracts for the Dreadnought programme of over £2 billion to Rolls-Royce and BAE Systems, as an initial investment within a planned overall total of £10 billion for the whole delivery phase.³⁵⁴

FINANCIERS

The following table lists financing and investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 24: FINANCING AND INVESTMENT RELATIONSHIPS WITH ROLLS-ROYCE

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING
Abrams Capital Management	United States			\$223
Aegon	Netherlands	\$38		
Allianz	Germany	\$305		
Allstate	United States	\$31		
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain		\$62	
Bank of America	United States		\$320	
Bank of China	China		\$213	
Barclays	United Kingdom		\$512	
BayernLB	Germany		\$570	
Bessemer Group	United States			\$188
BlackRock	United States	\$38		\$1,076
BNP Paribas	France		\$2,349	
Brandes Investment Partners	United States			\$281
Capital Group	United States	\$22		\$470
Causeway Capital Holdings	United States			\$1,216
Citigroup	United States		\$1,058	
Commerzbank	Germany		\$618	
Commonwealth Bank of Australia	Australia		\$213	
Crédit Agricole	France		\$1,058	
Dai-ichi Life	Japan	\$25		
DBS	Singapore		\$320	
Deutsche Bank	Germany		\$589	
European Investment Bank	Luxembourg		\$798	

Exor	Netherlands			\$464
Fidelity International	United States			\$448
First Abu Dhabi Bank	United Arab Emirates		\$213	
Franklin Resources	United States			\$153
Goldman Sachs	United States		\$575	
Government Pension Fund Global (GFPG)	Norway			\$185
Groupe BPCE	France	\$22		\$471
HSBC	United Kingdom		\$1,365	
JPMorgan Chase	United States		\$888	
Legal & General	United Kingdom			\$259
Lloyds Banking Group	United Kingdom		\$786	
M&G	United Kingdom	\$27		\$134
Mitsubishi UFJ Financial	Japan		\$512	
Mizuho Financial	Japan		\$696	
Morgan Stanley	United States	\$29		
NatWest	United Kingdom		\$320	
Orbis Group	Bermuda			\$133
PFA Group	Denmark	\$26		
Royal Bank of Canada	Canada		\$276	
Royal London Group	United Kingdom	\$55		
Ruane, Cunniff & Goldfarb	United States			\$187
Santander	Spain		\$951	
Schroders	United Kingdom			\$143
Skandinaviska Enskilda Banken	Sweden		\$782	
SMBC Group	Japan		\$512	
Société Générale	France		\$888	
Standard Chartered	United Kingdom		\$844	
State Street	United States			\$227
Sun Life Financial	Canada			\$466
T. Rowe Price	United States			\$328
Toronto-Dominion Bank	Canada		\$406	
UBS	Switzerland		\$550	
UniCredit	Italy		\$406	
Van Eck Associates Corporation	United States	\$38		
Vanguard	United States			\$520
Wellington Management	United States	\$64		
GRAND TOTAL		\$721	\$19,651	\$7,570

19. Rostec (Russian Federation)

COMPANY PROFILE

Rostec is a Russian state-owned company, involved in aircraft engineering, engine manufacture, arms production, medical equipment, and biotech among others.³⁵⁵ The company reported 179.2 billion rubles in net profit in 2019 (the last date for which figures are available).³⁵⁶ Since Russia's invasion in Ukraine, U.S. agencies, in coordination with other G7 countries, have imposed sanctions on entities critical to Russia's defense industrial base, including Rostec.³⁵⁷ As a result, all entities owned 50 % or more by Rostec are blocked. Rostec has also been sanctioned by Australia, Canada, the European Union (EU), New Zealand, Switzerland and the UK.

Contact

Rostec
24 Usacheva Street,
Moscow,
Russian Federation 119048

Website: <https://rostec.ru/en/>

X: @Rostec_Russia

LinkedIn: <https://www.linkedin.com/company/state-corporate-rostechnologii->

NUCLEAR WEAPONS

Rostec produces the Iskander-M missile system.³⁵⁸ SpecChemistry JSC, one of the Rostec entities, produces over 80% of necessary components for Russian missiles.³⁵⁹ Another entity of Rostec, United Aircraft Corporation (UAC) is also producing the Tupolev Tu-160M strategic missile-carrying bomber.³⁶⁰ This upgraded version of the supersonic TU-160 bomber can carry both conventional and nuclear warheads³⁶¹, and is expected to serve as a key component of Russia's nuclear triad.³⁶²

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 25: FINANCING AND INVESTMENT RELATIONSHIPS WITH ROSTEC

INSTITUTION	COUNTRY	LOANS
VTB Group	Russia	\$3,000
GRAND TOTAL		\$3,000

20. RTX Corporation (formerly Raytheon Technologies Corporation) (United States)

COMPANY PROFILE

In July 2023, Raytheon Technologies Corporation, a company which had been the result of a 2020 merger between Raytheon and United Technologies³⁶³, formally rebranded as “RTX Corporation”.³⁶⁴ RTX produces aviation, space and defence systems.³⁶⁵ The company is involved in the production of the LGM-35A Sentinel and the Long Range Standoff (LRSO) weapons system as well as the sustainment of the Minuteman programme for the U.S. arsenal. RTX reported sales of \$67.1 billion in 2022.³⁶⁶

Contact

Raytheon Technologies Corporation
1000 Wilson Blvd.
Arlington, VA 22209
United States

Website: Home | RTX
X: @RaytheonTech | @RTX_News
LinkedIn: <https://www.linkedin.com/company/rtx>

NUCLEAR WEAPONS

In July 2021, RTX received a \$2 billion, 6-year contract from the U.S. Air Force Nuclear Weapons Center at Eglin Air Force Base for continued development and manufacture of the Long Range Standoff (LRSO) weapons system.³⁶⁷

Collins Aerospace, an RTX unit, will build the secondary launch platform-airborne system for the LGM-35A Sentinel, the new U.S. Ground Based Strategic Deterrent.³⁶⁸ This key component for nuclear weapons command and control also works with the existing Minuteman III system.³⁶⁹

In February 2022, Collins Aerospace was also awarded a \$98.9 million contract for the modernization of the Very-Low Frequency (VLF) communications system for nuclear weapons command and control.³⁷⁰

In October 2023, RTX completed a \$79 billion, 10-year contract for logistic support, installation, and sustainment of Minuteman MEECN (Minimum Essential Emergency Communication Network) programme and the Minuteman MEECN programme upgrade.³⁷¹

In 2022, RTX also received a £160 million contract to train the crew of the UK Dreadnought nuclear-armed submarine at HM Naval Base Clyde.³⁷²

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 26: FINANCING AND INVESTMENT RELATIONSHIPS WITH RTX CORPORATION

INSTITUTION	COUNTRY	LOANS	SHAREHOLDING	UNDERWRITING
Academy Securities	United States			\$74
Ameriprise Financial	United States		\$891	
Bancroft Capital (PA)	United States			\$20
Bank of America	United States	\$1,727	\$2,363	\$1,040
Bank of New York Mellon	United States	\$150		\$72
Barclays	United Kingdom	\$150		\$285
BlackRock	United States		\$8,087	
Blaylock Beal Van	United States			\$50
BMO Financial Group	Canada	\$150		\$72
BNP Paribas	France	\$850		\$1,040
Capital Group	United States		\$11,646	
CastleOak Securities	United States			\$70
Charles Schwab	United States		\$1,077	

Citigroup	United States	\$1,727		\$1,174
CL King & Associates	United States			\$24
Crédit Agricole	France			\$285
DBS	Singapore	\$150		
Deutsche Bank	Germany	\$850		\$1,174
Dimensional Fund Advisors	United States		\$658	
Dodge & Cox	United States		\$3,201	
Equitable Holdings	United States		\$745	
Fidelity Investments	United States		\$891	
Fisher Investments	United States		\$909	
Franklin Resources	United States		\$2,873	
Geode Capital Holdings	United States		\$2,622	
Goldman Sachs	United States	\$850		\$1,174
Government Pension Fund Global (GFPG)	Norway		\$3,126	
Government Pension Investment Fund (GPIF)	Japan		\$858	
Invesco	United States		\$848	
Jarden	New Zealand			\$72
JPMorgan Chase	United States	\$850	\$2,785	\$1,040
Legal & General	United Kingdom		\$760	
Loop Capital	United States			\$24
MFR	United States			\$44
Mischler Financial Group	United States			\$46
Mitsubishi UFJ Financial	Japan			\$246
Mizuho Financial	Japan			\$285
Morgan Stanley	United States	\$850	\$2,636	\$1,384
Northern Trust	United States		\$833	
Pensioenfonds Detailhandel	Netherlands		\$7	
R. Seelaus & Co	United States			\$46
Riyad Bank	Saudi Arabia	\$700		
Royal Bank of Canada	Canada			\$285
Sanders Capital	United States		\$814	
SAR Holdings	United States			\$20
Scotiabank	Canada			\$72
Shank Williams Cisneros & Co	United States			\$85
SMBC Group	Japan			\$285
State Street	United States		\$12,181	
Sun Life Financial	Canada		\$614	
TIAA	United States		\$1,195	
UBS	Switzerland		\$1,071	\$72
UniCredit	Italy			\$285
US Bancorp	United States			\$72
Vanguard	United States		\$12,218	
Wellington Management	United States		\$3,849	
Wells Fargo	United States		\$1,044	\$285
GRAND TOTAL		\$9,000	\$80,804	\$11,200

21. Safran (France)

COMPANY PROFILE

Safran, based in France, is a high-technology company operating in the aviation (propulsion, equipment and interiors), defense and space markets.³⁷³ Safran is a 50% owner of ArianeGroup, which has contracts for French nuclear weapon production.³⁷⁴ In the financial year ending 31 December 2022 Safran reported revenues of €19.5 billion.³⁷⁵

Contact

Safran
2, Boulevard du Général Martial Valin
75724 Paris Cedex 15
France

Website: <https://www.safran-group.com/>
X: @SAFRAN
LinkedIn: <https://www.linkedin.com/company/safran>

NUCLEAR WEAPONS

ArianeGroup is responsible for the ongoing maintenance of the French M51 submarine launched ballistic missiles.³⁷⁶ ArianeGroup states that its role in the M51 production

“covers upstream research, design, development and production of the missiles, the land-based operating infrastructure and the command and control system on board the submarines. ArianeGroup is also responsible for the system support in service as well as end-of-life disposal”.³⁷⁷ According to the French 2024 Defense budget, 2024 funding is mainly reserved for the continuation of the development and production work of M51.3, as well as preparatory work for M51.4, with ArianeGroup as the prime contractor.³⁷⁸

Safran’s subsidiary, Safran Ceramics, is involved in the design, development, manufacture and sale of solid propulsion systems and related equipment for all types of rockets and tactical and cruise missiles for air, sea and ground forces, through a joint venture with MBDA called Roxel.³⁷⁹ Roxel is also involved in ASMP/ ASMP-A missile production, providing boosters and additional devices.³⁸⁰

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

Mitsubishi UFJ Financial	Japan		\$526		\$557
Ontario Teachers' Pension Plan	Canada			\$414	
Power Corporation of Canada	Canada	\$24			
Royal Bank of Canada	Canada			\$397	
Santander	Spain		\$526		\$557
SMBC Group	Japan				\$557
Société Générale	France				\$557
Standard Chartered	United Kingdom				\$557
T. Rowe Price	United States			\$361	
TIAA	United States	\$20			
Unum Group	United States	\$20			
Vanguard	United States			\$1,631	
Victory Capital	United States	\$20			
GRAND TOTAL		\$376	\$3,301	\$19,248	\$5,116

TABLE 27: FINANCING AND INVESTMENT RELATIONSHIPS WITH SAFRAN

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
Artisan Partners	United States			\$1,085	
Aviva	United Kingdom	\$40			
Bank of America	United States				\$315
BlackRock	United States			\$2,561	
Capital Group	United States			\$8,167	
Children's Investment Fund Management	United Kingdom			\$3,043	
Crédit Agricole	France		\$526	\$519	
Crédit Mutuel	France				\$557
Deutsche Bank	Germany				\$573
European Investment Bank	Luxembourg		\$1,197		
Fidelity Investments	United States			\$1,071	
Groupe BPCE	France		\$526		\$315
HSBC	United Kingdom				\$573
Lazard	Bermuda	\$108			
Macquarie Group	Australia	\$50			
MassMutual Holdings	United States	\$63			
MetLife	United States	\$30			

22. Textron (United States)

COMPANY PROFILE

Textron is a U.S.-based multi-industry company engaged in aircraft, military, industrial and finance businesses.³⁸¹ Textron brands include Cessna, Beechcraft, Bell, Artic Cat and more.³⁸² The company produces key components for the U.S. Minuteman missiles and is involved in the production of the LGM-35A Sentinel, the new U.S. Intercontinental Ballistic Missile (ICBM). In the financial year ending 31 December 2022, Textron reported revenues of \$12.9 billion³⁸³

Contact

Textron World Headquarters
40 Westminster Street
Providence, RI 02903
United States

Website: <https://www.textron.com/>
X: @Textron
LinkedIn: Textron | LinkedIn

NUCLEAR WEAPONS

Textron Systems was awarded a contract in 2014 for multiprobe antennas for the Minuteman missiles. The contract has a \$66.1 million potential value and is expected to continue until at least July 2024.³⁸⁴

Textron also has a contract for Mod 5F midsections for the Minuteman Missiles. Initially awarded in 2014, the contract is expected to continue until at least March 2024 with an estimated total value of \$39.9 million.³⁸⁵

Textron Systems will be involved in developing the missile payload integration for the LGM-35A Sentinel, the new U.S. Ground Based Strategic Deterrent.³⁸⁶

FINANCIERS

The following table lists financing or investment relationships for between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 28: FINANCING AND INVESTMENT RELATIONSHIPS WITH TEXTRON

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING
Allianz	Germany	\$24		
American Financial Group	United States	\$40		
Ameriprise Financial	United States			\$109
AQR Capital Management	United States			\$121
Baird	United States	\$20		
Bank of America	United States		\$248	
Bank of China	China		\$43	
Bank of New York Mellon	United States		\$58	
BlackRock	United States			\$909
Charles Schwab	United States			\$114
Citigroup	United States		\$248	
Dimensional Fund Advisors	United States			\$188
Export-Import Bank of the United States	United States		\$350	
Fidelity Investments	United States			\$175
Franklin Resources	United States	\$128		
Gabelli Funds	United States			\$186
Geode Capital Holdings	United States			\$294
Goldman Sachs	United States		\$205	\$87
Government Pension Investment Fund (GPIF)	Japan			\$90
Groupe BPCE	France	\$29		

Invesco	United States			\$468
Jackson Financial	United States	\$18		
JPMorgan Chase	United States		\$235	\$319
Legal & General	United Kingdom			\$84
LSV Asset Management	United States			\$206
Millennium Management	United States			\$81
Mitsubishi UFJ Financial	Japan		\$248	
Morgan Stanley	United States			\$91
National Western Life Group	United States	\$19		
Northern Trust	United States		\$163	\$80
Orix Corporation	Japan			\$465
PNC Financial Services	United States		\$528	
Power Corporation of Canada	Canada	\$48		
Primecap Management	United States			\$333
SMBC Group	Japan		\$85	
State Street	United States			\$604
T. Rowe Price	United States			\$1,395
The Hartford	United States	\$56		
TIAA	United States	\$62		
Toronto-Dominion Bank	Canada			\$81
US Bancorp	United States		\$205	
Vanguard	United States	\$19		\$1,596
Victory Capital	United States			\$442
Wells Fargo	United States		\$85	
GRAND TOTAL		\$462	\$2,700	\$8,516

23. Thales (France)

COMPANY PROFILE

Thales is a French-headquartered company engaged in digital identity and security, defence and security, aerospace, space, and transport.³⁸⁷ The French state (26.06%) and aircraft manufacturer Dassault Aviation (24.99%) are the main shareholders of Thales.³⁸⁸ The company is involved in the French ASMPA mid-life upgrade and the M51 missile adaptation for French submarines. In the financial year ending 31 December 2021, Thales generated revenues of € 16.2 billion.³⁸⁹

Thales has a 35% shareholding in Naval Group, a French-law Public Limited Company which, on 31 December 2022, was, in addition to Thales' share, owned for 62.25% by the French State, 1,82% by the Group's employees and former employees through the company employee mutual fund and 0,92% self-managed.³⁹⁰

Contact

Thales Headquarters
Tour Carpe Diem
31 Place des Corolles – CS 20001
92098 Paris La Defense Cedex
France

Website: www.thalesgroup.com

X: [@thalesgroup](https://twitter.com/thalesgroup)

LinkedIn: <https://www.linkedin.com/company/thales>

NUCLEAR WEAPONS

Thales states it “does not design, produce or sell nuclear weapons”.³⁹¹ The company adds it is one of the “140+ direct suppliers on the French nuclear missile program, making electronic systems in line with our main areas of expertise, that are not specific to the nuclear nature of the missile”.³⁹²

According to the French Ministry of Defence, however, Thales is one of MBDA's five subcontractors in the French ASMPA mid-life upgrade.³⁹³ The ASMPA is a medium-range air-to-ground nuclear armed cruise missile, and part of the French nuclear arsenal.³⁹⁴

The French Ministry of Defence also lists Naval group, of which Thales has 35% shareholding, as the main contractor for the M51 missile adaptation for the French nuclear submarines.³⁹⁵ Naval Group is also currently developing a third-generation nuclear armed submarine for France.³⁹⁶ The programme is aimed at replacing the four *Le Triomphant* nuclear armed submarines, with delivery starting in 2035.³⁹⁷

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

Franklin Resources	United States			\$286	
Government Pension Fund Global (GFP)	Norway			\$378	
GQG Partners	United States			\$287	
Groupe BPCE	France		\$250	\$248	\$76
HSBC	United Kingdom		\$314		
JPMorgan Chase	United States		\$314		\$76
Mawer Investment Management	Canada			\$236	
Santander	Spain		\$314		
SMBC Group	Japan		\$250		
Société Générale	France		\$314		
Standard Chartered	United Kingdom		\$250		
Sun Life Financial	Canada			\$205	
UniCredit	Italy		\$314		\$76
Vanguard	United States			\$426	
Wellington Management	United States			\$190	
GRAND TOTAL			\$22	\$5,304	\$3,606
					\$535

TABLE 29: FINANCING AND INVESTMENT RELATIONSHIPS WITH THALES

INSTITUTION	COUNTRY	BOND HOLDING	LOANS	SHAREHOLDING	UNDERWRITING
ANZ	Australia		\$250		
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain		\$314		\$76
Barclays	United Kingdom		\$250		
BlackRock	United States			\$479	
BNP Paribas	France		\$314		
Capital Group	United States			\$707	
Citigroup	United States		\$250		
Commerzbank	Germany		\$314		\$76
Crédit Agricole	France	\$22	\$662		\$76
Crédit Mutuel	France		\$314		
Deutsche Bank	Germany		\$314		\$76
First Trust Advisors	United States			\$165	

24. Walchandnagar Industries (India)

COMPANY PROFILE

Walchandnagar Industries Limited (WIL), based in India, is a heavy engineering and high-tech manufacturing company with activities in the areas of nuclear power, aerospace, missile, defence, oil & gas, steam generation plants, independent power projects, turnkey cement, and sugar plants.³⁹⁸ In the financial year ending 31 March 2023, WIL reported a loss of INR 195.8 million.³⁹⁹

Contact

Walchandnagar Industries Ltd.
3 Walchand Terraces,
Tardeo Road,
Mumbai – 400 034,
India.

Website: <https://www.walchand.com/>

NUCLEAR WEAPONS

Walchandnagar Industries Limited (WIL) produces the launch systems for India's Agni missiles.⁴⁰⁰ Walchandnagar also states it supplied "critical equipment" for India's first indigenous nuclear powered ballistic missile submarine, the INS Arihant.⁴⁰¹ India conducted two submerged unit trials of nuclear capable K-15 missiles in 2018.⁴⁰² Sources indicate that the Arihant will primarily serve as a training vessel and technology demonstrator and will not be deployed for nuclear deterrence patrols as additional SSBNs come online.⁴⁰³ A second SSBN, the INS Arighat, was launched in November 2017 and a third submarine, the S4, was reportedly launched in November 2021.⁴⁰⁴ India plans a total of four SSBNs, to be completed within the next decade.⁴⁰⁵

Walchandnagar reports continued development in the missile sector, as well as for the Indian Navy's strategic submarine programme.⁴⁰⁶

FINANCIERS

The following table lists financing or investment relationships between 1 January 2021 – 31 August 2023. All figures are in USD millions.

TABLE 30: FINANCING AND INVESTMENT RELATIONSHIPS WITH WALCHANDNAGAR INDUSTRIES

INSTITUTION	COUNTRY	LOANS	SHAREHOLDING
KKR Group	United States		\$8
Lalitabai Lalchand Charity ¹	India		\$0
GRAND TOTAL			\$8

1. Rounded figure. Lalitabai Lalchand Charity holds \$0.39 million in shares in Walchandnagar Industries

Financiers and Profiteers

There are a total of 287 financial institutions with substantial financing or investment relationships to at least one of the 24 nuclear weapon producing companies profiled in this report. Most of these banks, pension funds, insurers and asset managers are based in countries that either possess nuclear weapons of their own or otherwise rely on nuclear weapons in their security policies.

Governments award contracts to companies to build the key components for nuclear weapons and to manage and operate the facilities where nuclear weapons are produced. To secure those contracts, companies need to raise capital through loans or by issuing bonds. Many of the companies involved in nuclear weapon production are also publicly traded, so both individuals and institutions share profits (and losses).

The financial institutions listed in this report continue to seek profit from the maintenance, testing and modernizing of nuclear arsenals, in spite of the devastating consequences that would arise from any nuclear weapon use.

By actively choosing ethically, environmentally and socially responsible investment practices, the financial sector can positively influence corporate behaviour. Public exclusions by investors have a stigmatizing effect on the companies associated with nuclear weapon production and will increase the pressure felt by these companies to move away from this problematic industry.

The financial information included here comprises financial institutions participating in loans and underwriting deals since 1 January 2021, as well as those involved in loans which have been closed before that date but have not yet matured before 1 October 2022. When it comes to investments in shares or bonds of the weapons companies, a group-level threshold of at least 0.5% of the outstanding shares or bonds at most recent filing dates is applied per financial institution. The data was collected in August 2023, meaning the most recent filing date in many cases was June 30th, 2023.

Key findings

287 financial institutions finance 24 nuclear weapon producers

Between January 2021 and August 2023, 287 banks, pension funds, insurance companies, asset managers and other financial institutions had substantial financing or investments relations with one or more of the 24 nuclear weapon producing companies profiled in this report, down from 306 institutions in previously published results.

\$477 billion held in bonds and shares in 24 nuclear weapon producing companies

Investors held \$476,843 million in bonds and shares in the 24 companies involved in nuclear weapon production. This is an increase of \$15.7 billion since the last Don't Bank on the Bomb financial analysis.

\$343 billion in loans and underwriting provided to 24 nuclear weapon producing companies

During the analysed period, \$342,647 million was provided to the 24 nuclear weapon manufacturers in loans and underwriting, a growth of \$57.1 billion since the last Don't Bank on the Bomb financial analysis.

Total financing, countries of origin

There are a total of 287 institutions with financing or investment relationships to the nuclear weapon producing companies, from 28 countries. Most of these investments come from countries that either possess nuclear weapons of their own or otherwise endorse the use of nuclear weapons. With the exception of three financial institutions (from South Africa and New Zealand), none of the financiers come from countries that have joined the Treaty on the Prohibition of Nuclear Weapons (TPNW).

TABLE 31: FINANCIERS BY COUNTRY OF ORIGIN. ALL FIGURES IN USD MILLIONS

COUNTRY	TOTAL NUMBER OF FINANCIERS	TOTAL BONDS AND SHARES	TOTAL LOANS AND UNDERWRITING
Australia	6	\$914	\$5,321
Bahrain	1		\$58
Bermuda	3	\$1,757	
Canada	13	\$13,961	\$22,638
Cayman Islands	2		\$4
China	16	\$250	\$6,842
Denmark	2	\$26	\$329
France	7	\$4,886	\$35,547
Germany	7	\$1,123	\$15,953
India	12	\$471	\$814
Italy	9		\$8,889
Japan	7	\$5,003	\$41,326
Luxembourg	2		\$3,751
Netherlands	4	\$523	\$321
New Zealand	1		\$164
Norway	1	\$4,874	
Russia	1		\$3,000
Saudi Arabia	1		\$2,056
Singapore	1		\$2,304
South Africa	2	\$236	\$114
South Korea	1	\$776	
Spain	5	\$4,680	\$11,050
Sweden	1		\$1,296
Switzerland	3	\$2,761	\$4,023
Taiwan	6		\$68
United Arab Emirates	2	\$8	\$2,195
United Kingdom	17	\$14,209	\$21,279
United States	154	\$420,384	\$153,304
GRAND TOTAL	287	\$476,843	\$342,647

Top 10 financiers

The top 10 bond and shareholders are all based in the United States. Their combined investments in the 24 nuclear weapon producing companies totals \$327,150 million.

TABLE 32: TOP 10 BOND AND SHAREHOLDERS COMPARED. ALL FIGURES IN USD MILLIONS

INVESTOR	COUNTRY	2023	2022	CHANGE
Vanguard	United States	\$72,487	\$68,180	\$4,307
Capital Group	United States	\$62,548	\$51,292	\$11,256
State Street	United States	\$55,503	\$56,733	-\$1,230
BlackRock	United States	\$53,161	\$48,052	\$5,110
Wellington Management	United States	\$18,712	\$22,285	-\$3,573
Fidelity Investments	United States	\$15,297	\$12,024	\$3,273
Newport Group	United States	\$14,310	\$15,683	-\$1,373
Geode Capital Holdings	United States	\$13,865	\$12,511	\$1,354
Bank of America	United States	\$12,168	\$13,383	-\$1,215
Morgan Stanley	United States	\$9,098	\$8,317	\$781
GRAND TOTAL		\$327,150	\$308,460	\$18,690

The top 10 bond and shareholders, not including U.S. based investors, hold a combined investment of \$41,186 million.

TABLE 33: TOP 10 NON-U.S. BOND AND SHAREHOLDERS. ALL FIGURES IN USD MILLIONS

	COUNTRY	AMOUNT
Sun Life Financial	Canada	\$8,733
Children's Investment Fund Management	United Kingdom	\$5,592
Government Pension Fund Global (GFPG)	Norway	\$4,874
Sociedad Estatal de Participaciones Industriales	Spain	\$4,680
Government Pension Investment Fund (GPIF)	Japan	\$3,825
Legal & General	United Kingdom	\$3,602
Groupe BPCE	France	\$3,142
UBS	Switzerland	\$2,705
Royal Bank of Canada	Canada	\$2,289
Crédit Agricole	France	\$1,744
GRAND TOTAL		\$41,186

The top 10 lenders and underwriters provided \$179,661 million in loans and underwriting to the 24 nuclear weapon producing companies.

TABLE 34: TOP 10 LENDERS AND UNDERWRITERS COMPARED. ALL FIGURES IN USD MILLIONS

	COUNTRY	2023	2022	CHANGE
Citigroup	United States	\$28,097	\$27,251	\$846
Bank of America	United States	\$27,413	\$27,956	-\$543
JPMorgan Chase	United States	\$25,177	\$22,609	\$2,568
Wells Fargo	United States	\$19,805	\$17,807	\$1,998
Mizuho Financial	Japan	\$14,687	\$12,900	\$1,787
BNP Paribas	France	\$14,462	\$12,701	\$1,761
SMBC Group	Japan	\$13,558	\$10,308	\$3,250
Goldman Sachs	United States	\$12,991	\$10,701	\$2,289
Mitsubishi UFJ Financial	Japan	\$12,931	\$11,452	\$1,479
Deutsche Bank	Germany	\$10,540	\$11,443	-\$903
GRAND TOTAL		\$179,661	\$165,129	\$14,533

Types of financing compared

Overall bond holding value continued to decrease in 2023, with a drop of \$774 million compared to findings in 2022.

Total shareholding value, on the other hand, went up again in 2023, with an increase of \$16.4 billion compared to the previously published results.

TABLE 35: BOND- AND SHAREHOLDING COMPARED 2023-2020. ALL FIGURES IN USD MILLIONS

	2023	2022	2021	2020
Bondholding	\$5,975	\$6,749	\$7,820	\$9,180
Shareholding	\$470,868	\$454,413	\$345,919	\$413,340
GRAND TOTAL	\$476,843	\$461,162	\$353,739	\$422,520

Total loans increased in 2023 with \$83.3 billion compared to previously published findings. Total under-writing, on the other hand, decreased, with a \$26.1 billion drop.

TABLE 36: LOANS AND UNDERWRITING COMPARED 2023-2020. ALL FIGURES IN USD MILLIONS

	2023	2022	2021	2020
Loans	\$263,483	\$180,208	\$211,399	\$180,778
Underwriting	\$79,164	\$105,307	\$120,046	\$42,752
GRAND TOTAL	\$342,647	\$285,515	\$331,445	\$223,530

Shareholding

A look at the top 10 shareholders, all but one from the U.S. shows a \$18.8 billion growth in the total value of shares held in this group. Just like in previous years, the total value of shareholding increased compared to the previously published findings, by \$16.4 billion.

TABLE 37: TOP 10 SHAREHOLDERS COMPARED. ALL FIGURES IN USD MILLIONS

INSTITUTION	COUNTRY	2023	2022	CHANGE
Vanguard	United States	\$71,796	\$67,298	\$4,498
Capital Group	United States	\$62,526	\$51,292	\$11,233
State Street	United States	\$55,492	\$56,721	-\$1,229
BlackRock	United States	\$53,123	\$47,997	\$5,126
Wellington Management	United States	\$18,592	\$22,229	-\$3,637
Fidelity Investments	United States	\$15,297	\$12,024	\$3,273
Newport Group	United States	\$14,310	\$15,683	-\$1,373
Geode Capital Holdings	United States	\$13,865	\$12,511	\$1,354
Bank of America	United States	\$12,168	\$13,383	-\$1,215
Morgan Stanley	United States	\$9,069	\$8,317	\$752
GRAND TOTAL		\$326,238	\$307,456	\$18,782

Bondholding

Bondholding values of the top 10 investors increased by \$140 million, while overall bond holding fell by \$774 million to \$5.9 billion.

TABLE 38: TOP 10 BONDHOLDERS COMPARED. ALL FIGURES IN USD MILLIONS

INSTITUTION	INVESTOR PARENT COUNTRY	2023	2022	CHANGE
Vanguard	United States	\$691	\$881.12	-\$190.46
Franklin Resources	United States	\$548	\$106.09	\$442.04
TIAA	United States	\$434	\$499.03	-\$65.00
Allianz	Germany	\$405	\$165.88	\$239.17
State Farm	United States	\$378	\$449.17	-\$71.00
Prudential Financial (US)	United States	\$330	\$362.08	-\$32.21
Baird	United States	\$276	\$225.19	\$50.75
Lord, Abbett & Co	United States	\$165	\$164.78	\$0.16
Northwestern Mutual	United States	\$161	\$386.95	-\$225.95
Manulife Financial	Canada	\$160	\$167.37	-\$7.35
GRAND TOTAL		\$3,548	\$3,407.65	\$140

Loans

Total loans provided to the nuclear weapon producing companies has increased by \$83.3 billion, compared to previously published findings. The top 10 lenders show a \$34.7 billion increase.

TABLE 39: TOP 10 LENDERS COMPARED. ALL FIGURES IN USD MILLIONS

INSTITUTION	COUNTRY	2023	2022	CHANGE
Citigroup	United States	\$22,792	\$18,773	\$4,019
Bank of America	United States	\$19,903	\$16,026	\$3,877
JPMorgan Chase	United States	\$18,047	\$12,880	\$5,167
Wells Fargo	United States	\$14,049	\$11,324	\$2,724
BNP Paribas	France	\$11,255	\$7,212	\$4,043
Mizuho Financial	Japan	\$10,807	\$8,323	\$2,483
Mitsubishi UFJ Financial	Japan	\$10,591	\$8,033	\$2,559
SMBC Group	Japan	\$9,356	\$6,232	\$3,124
Crédit Agricole	United States	\$8,401	\$4,989	\$3,412
Goldman Sachs	United States	\$7,681	\$4,360	\$3,321
GRAND TOTAL		\$132,883	\$98,153	\$34,730

Issuances

The value of bond issuances fell from \$105.3 billion to \$79.2 billion, compared to the last Don't Bank on the Bomb financial analysis.

TABLE 40: TOP 10 UNDERWRITERS COMPARED. ALL FIGURES IN USD MILLIONS

INSTITUTION	COUNTRY	2023	2022	CHANGE
Bank of America	United States	\$7,510	11,931 \$	-\$4,421
JPMorgan Chase	United States	\$7,130	9,729 \$	-\$2,599
Wells Fargo	United States	\$5,756	6,482 \$	-\$726
Goldman Sachs	United States	\$5,309	6,341 \$	-\$1,032
Citigroup	United States	\$5,305	8,478 \$	-\$3,173
Morgan Stanley	United States	\$5,212	7,195 \$	-\$1,983
SMBC Group	Japan	\$4,202	4,076 \$	\$126
Mizuho Financial	Japan	\$3,880	4,577 \$	-\$697
Deutsche Bank	Germany	\$3,796	6,035 \$	-\$2,238
BNP Paribas	France	\$3,207	5,489 \$	-\$2,282
GRAND TOTAL		\$51,308	70,333 \$	-\$19,025

Total financing

This selection of financial institutions is limited by a reporting threshold. Only share and bond holdings larger than 0.5% of the total number of outstanding shares of the nuclear weapon producing companies are listed.

Total share and bond holding

INSTITUTION	COUNTRY	AIRBUS	BAE SYSTEMS	BHARAT DYNAMICS LTD	BOEING	CHINA AEROSPACE SCIENCE & TECHNOLOGY	FLUOR	GENERAL DYNAMICS	HONEYWELL	HUNTINGTON INGALLS INDUSTRIES (HII)	JACOBS SOLUTIONS	L3HARRIS TECHNOLOGIES	LEIDOS	LEONARDO	LOCKHEED MARTIN	NORTHROP GRUMMAN	PERATON	ROLLS-ROYCE	RTX	SAFRAN	TEXTRON	THALES	WALCHANDNAGAR INDUSTRIES	GRAND TOTAL
Abrams Capital Management	United States																	\$223						\$223
Aditya Birla Capital	India			\$8																				\$8
Aegon	Netherlands										\$14							\$38						\$52
Affiliated Managers Group	United States		\$1,055																					\$1,055
AGF Management	Canada										\$83													\$83
Allianz	Germany									\$51			\$26					\$305			\$24			\$405
Allspring Global Investments	United States										\$433	\$364												\$797
Allstate	United States		\$84															\$31						\$115
Alpine Associates Management	United States											\$110												\$110
Alyeska Investment Group	United States												\$123											\$123
American Century Investments	United States									\$207	\$204													\$411
American Financial Group	United States																				\$40			\$40
American National Insurance	United States						\$14																	\$14
Ameriprise Financial	United States		\$388						\$1,366			\$232			\$1,068	\$771		\$891			\$109			\$4,825
AQR Capital Management	United States									\$179		\$24										\$121		\$323
Aristotle Capital Management	United States							\$700	\$1,041	\$20			\$26											\$1,786
Artisan Partners	United States		\$436																				\$1,085	\$1,521
Auto-Owners Insurance	United States						\$15																	\$15
Aviva	United Kingdom										\$19										\$40			\$59
Aware Super	Australia		\$196																					\$196
Baird	United States									\$96	\$17		\$143									\$20		\$276
Balyasny Asset Management	United States											\$251												\$251
Bank of America	United States				\$1,091			\$1,778	\$3,402	\$104		\$258			\$1,120	\$2,053			\$2,363					\$12,168
Bank of New York Mellon	United States		\$393				\$139		\$655	\$57		\$212												\$1,458
Barclays	United Kingdom		\$1,313									\$155												\$1,468
Bessemer Group	United States																	\$188						\$188
BlackRock	United States	\$4,132	\$4,088		\$5,973		\$458	\$2,406	\$6,783	\$745	\$689	\$3,939	\$1,436	\$78	\$5,778	\$3,505		\$1,114	\$8,087	\$2,561	\$909	\$479		\$53,161
Boston Private	United States						\$57																	\$57
Brandes Investment Partners	United States																	\$281						\$281
Calamos Investments	United States											\$33												\$33
California Public Employees' Retirement System (CalPERS)	United States		\$46							\$36		\$254	\$99											\$435
California State Teachers' Retirement System (CalSTRS)	United States																\$10							\$10
Canada Pension Plan Investment Board	Canada	\$682																						\$682
Canara Bank	India			\$15																				\$15
Capital Group	United States	\$10,497	\$5,449		\$6,213			\$1,801	\$1,315	\$619	\$752	\$2,740			\$4,909	\$7,242		\$492	\$11,646	\$8,167		\$707		\$62,548
Carlson Capital	United States											\$56												\$56
Cartenna Capital	United States						\$35																	\$35
Causeway Capital Holdings	United States																	\$1,216						\$1,216
Charles Schwab	United States						\$36		\$731	\$81	\$123	\$258	\$101		\$2,573	\$343			\$1,077		\$114			\$5,437
Children's Investment Fund Management	United Kingdom	\$2,549																		\$3,043				\$5,592
China Southern Asset Management (CSAM)	China					\$21																		\$21

China Structural Reform Fund Corporation Limited	China					\$97																	\$97
CI Financial	Canada									\$114													\$114
CIBC	Canada										\$176												\$176
Cincinnati Financial	United States					\$15																	\$15
Citadel	United States					\$81					\$228												\$308
Crédit Agricole	France	\$1,204															\$519	\$22					\$1,744
D.E. Shaw & Co.	United States					\$47																	\$47
Dai-ichi Life	Japan															\$25							\$25
Deka Group	Germany	\$718																					\$718
Diamond Hill Investment Group	United States										\$232												\$232
Dimensional Fund Advisors	United States			\$7		\$72		\$106	\$125	\$305	\$162	\$161					\$658	\$188					\$1,785
Dodge & Cox	United States																\$3,201						\$3,201
Empyrean Capital Partners	United States								\$102														\$102
Equitable Holdings	United States					\$137			\$10								\$745						\$892
Exor	Netherlands															\$464							\$464
Farallon Capital Management	United States										\$53												\$53
Fidelity International	United States															\$448							\$448
Fidelity Investments	United States	\$1,410	\$854		\$3,760	\$332	\$407	\$569		\$699	\$113		\$2,861	\$2,157			\$891	\$1,071	\$175				\$15,297
Findlay Park Partners	United Kingdom									\$190													\$190
First Eagle Investment Management	United States		\$590																				\$590
First Seafront Fund Management	China					\$26																	\$26
First Trust Advisors	United States										\$205										\$165		\$370
Fisher Investments	United States				\$983												\$909						\$1,891
Focus Financial Partners	United States									\$149													\$149
Franklin Resources	United States		\$30		\$370	\$36	\$382	\$1,121		\$451	\$20		\$809	\$893		\$153	\$2,873	\$128	\$286				\$7,552
Fullgoal Fund Management	China					\$29																	\$29
Gabelli Funds	United States																				\$186		\$186
Geode Capital Holdings	United States		\$204		\$2,159	\$83	\$935	\$2,666	\$206	\$316	\$799	\$268		\$2,049	\$1,263		\$2,622	\$294					\$13,865
Goldman Sachs	United States										\$203	\$51									\$87		\$342
Government Pension Fund Global (GPPG)	Norway						\$593				\$333	\$164	\$97			\$185	\$3,126			\$378			\$4,874
Government Pension Investment Fund (GPIF)	Japan						\$323	\$936	\$85	\$107	\$288	\$124		\$627	\$387		\$858	\$90					\$3,825
GQG Partners	United States																				\$287		\$287
Groupe BPCE	France				\$2,354								\$18			\$492			\$29	\$248			\$3,142
Guardian Life Insurance Company of America	United States								\$11					\$76									\$87
Guggenheim Capital	United States										\$20												\$20
HDFC Bank	India			\$240																			\$240
Hotchkis & Wiley Capital Management	United States									\$142													\$142
Hubei Juyuan Technology Investment	China					\$56																	\$56
Invesco	United States	\$1,035	\$1,640	\$8			\$302	\$2,120	\$327	\$203	\$236	\$243	\$144				\$848	\$468					\$7,573
Invest AD	United Arab Emirates			\$8																			\$8
Jackson Financial	United States									\$15											\$18		\$33
Janus Henderson	United Kingdom						\$548				\$566												\$1,115
JPMorgan Chase	United States						\$1,321	\$1,551			\$154			\$1,524			\$2,785	\$319					\$7,652
Kotak Mahindra Bank	India			\$40																			\$40
Kryger Capital	United Kingdom										\$103												\$103
Lalitabai Lalchand Charity	India																				\$0		\$0
Lazard	Bermuda					\$43	\$944											\$108					\$1,096
Legal & General	United Kingdom		\$388				\$822	\$51		\$236	\$79		\$556	\$367		\$259	\$760	\$84					\$3,602
Life Insurance Corporation of India	India			\$47																			\$47
Lord, Abbett & Co	United States					\$53		\$73	\$38														\$165
LSV Asset Management	United States							\$154												\$206			\$359
M&G	United Kingdom		\$261													\$160							\$421

Macquarie Group	Australia		\$78								\$28			\$450				\$50				\$606
Magnetar Capital Partners	United States									\$93												\$93
Manulife Financial	Canada	\$49							\$111													\$160
MassMutual Holdings	United States	\$60									\$27							\$63				\$150
Masters Capital Management	United States					\$30																\$30
Mawer Investment Management	Canada		\$271																	\$236		\$506
Max Financial Services	India			\$70																		\$70
MetLife	United States		\$30						\$18		\$66							\$30				\$144
Millennium Management	United States					\$62						\$116								\$81		\$259
Minnesota Mutual Companies	United States								\$10													\$10
Morgan Stanley	United States				\$904	\$86	\$1,907	\$237		\$197			\$1,639	\$1,372		\$29	\$2,636		\$91			\$9,098
National Pension Service	South Korea								\$46		\$315			\$416								\$776
National Western Life Group	United States																			\$19		\$19
Nationwide Mutual Insurance	United States		\$30							\$92												\$122
Neuberger Berman	United States									\$93												\$93
New York Life Insurance	United States								\$12													\$12
Newport Group	United States				\$7,299		\$3,537	\$3,475														\$14,310
Ninety One	South Africa									\$236												\$236
Northern Trust	United States				\$696	\$48	\$853	\$54	\$87	\$256	\$74		\$683	\$384			\$833		\$80			\$4,048
Northhill Capital	United Kingdom										\$468											\$468
Northwestern Mutual	United States						\$55							\$106								\$161
Nuance Investments	United States										\$63											\$63
Ontario Teachers' Pension Plan	Canada																	\$414				\$414
Orbis Group	Bermuda		\$391													\$133						\$524
Orix Corporation	Japan					\$337					\$351									\$465		\$1,153
Owl Creek Asset Management	United States										\$27											\$27
Passionate Investment Management	India			\$26																		\$26
Pendal Group	Australia								\$112													\$112
Pensioenfonds Detailhandel	Netherlands																\$7					\$7
Pentwater Capital Management	United States										\$198											\$198
PFA Group	Denmark															\$26						\$26
Point72	United States					\$39																\$39
Power Corporation of Canada	Canada													\$520				\$24	\$48			\$592
Primecap Management	United States	\$966								\$755										\$333		\$2,054
Principal Financial Group	United States										\$25											\$25
Prudential Financial (US)	United States		\$131				\$62				\$43		\$94									\$330
PSquared Asset Management	Switzerland										\$56											\$56
Raven's Wing Asset Management	United States						\$6,086															\$6,086
Raymond James Financial	United States										\$178											\$178
Renaissance Technologies	United States					\$37																\$37
Royal Bank of Canada	Canada					\$544	\$1,327				\$21							\$397				\$2,289
Royal London Group	United Kingdom															\$55						\$55
Ruane, Cunniff & Goldfarb	United States									\$351						\$187						\$538
Rubric Capital Management	United States					\$101																\$101
Sanders Capital	United States					\$861							\$999			\$814						\$2,674
Schroders	United Kingdom															\$143						\$143
SEI	United States								\$65													\$65
Select Equity Partners	United States									\$522												\$522
Silchester International Investors	United Kingdom		\$993																			\$993
Smith Capital Investors	United States									\$9												\$9
Sociedad Estatal de Participaciones Industriales	Spain	\$4,680																				\$4,680
Sound Shore Management	United States								\$83													\$83
Southern Farm Bureau Life Insurance	United States									\$11												\$11

State Farm	United States		\$87				\$56		\$165						\$71								\$378	
State Street	United States		\$319		\$5,578		\$145	\$2,137	\$6,429	\$682	\$894	\$1,933	\$479		\$17,449	\$6,446		\$227	\$12,181		\$604		\$55,503	
Steel Partners Holdings	United States											\$155											\$155	
Sun Life Financial	Canada							\$1,671	\$3,275		\$86	\$266	\$254			\$1,896		\$466	\$614			\$205	\$8,733	
Sundarm Finance Group	India			\$9																			\$9	
T. Rowe Price	United States							\$495	\$1,148	\$248		\$2,010		\$59		\$659		\$328		\$361	\$1,395		\$6,703	
The Hartford	United States		\$26										\$44									\$56	\$126	
Third Point	United States										\$161												\$161	
Thornburg Investment Management	United States									\$18													\$18	
Thrivent Financial	United States						\$50																\$50	
TIAA	United States	\$631	\$68		\$1,280		\$44		\$1,017	\$52		\$78			\$155				\$1,195	\$20	\$62		\$4,600	
Toronto-Dominion Bank	Canada									\$42	\$89											\$81	\$212	
Two Sigma Investments	United States						\$61		\$628						\$592								\$1,281	
UBS	Switzerland								\$915						\$719				\$1,071				\$2,705	
UBS SDIC Fund Management Co	China				\$21																		\$21	
Unum Group	United States		\$30																	\$20			\$50	
Van Eck Associates Corporation	United States						\$37											\$38					\$75	
Vanguard	United States	\$2,448	\$1,285	\$17	\$10,270		\$422	\$4,775	\$12,743	\$1,280	\$1,716	\$3,948	\$1,425	\$155	\$10,098	\$5,495		\$520	\$12,218	\$1,631	\$1,614	\$426	\$72,487	
Victory Capital	United States						\$52						\$439							\$20	\$442		\$953	
Virtus Investment Partners	United States									\$17		\$107											\$123	
Water Island Capital	United States											\$63											\$63	
Wellington Management	United States	\$956	\$650				\$520	\$3,142	\$4,235			\$668	\$388		\$1,398	\$2,650		\$64	\$3,849		\$190		\$18,712	
Wells Fargo	United States							\$1,347				\$969			\$1,181				\$1,044				\$4,542	
Westchester	United States									\$117													\$117	
White Mountains Insurance	Bermuda		\$88									\$49											\$137	
White Oak Capital Management	India			\$15																			\$15	
Woodline Partners	United States									\$85													\$85	
Grand total		\$32,016	\$21,894	\$511	\$48,929	\$250	\$3,585	\$36,543	\$63,570	\$7,146	\$8,726	\$25,979	\$7,193	\$763	\$56,359	\$42,044	\$10	\$8,291	\$80,804	\$19,624	\$8,978	\$3,628	\$0	\$476,843

TABLE 41: TOTAL SHARE-AND BOND HOLDING ALL FIGURES IN USD MILLIONS

Total loans and underwriting

INSTITUTION	COUNTRY	AIRBUS	BAE SYSTEMS	BECHTEL	BOEING	CHINA AEROSPACE SCIENCE & TECHNOLOGY	FLUOR	GENERAL DYNAMICS	HONEYWELL	HUNTINGTON INGALLS INDUSTRIES (HII)	JACOBS SOLUTIONS	L3HARRIS TECHNOLOGIES	LEIDOS	LEONARDO	LOCKHEED MARTIN	NORTHROP GRUMMAN	PERATON	ROLLS-ROYCE	ROSTEC	RTX	SAFRAN	TEXTRON	THALES	WALCHANDNAGAR INDUSTRIES LTD	GRAND TOTAL
Academy Securities	United States				\$142			\$45	\$184		\$3				\$15	\$16				\$74					\$479
Ally Financial	United States											\$52													\$52
Alter Domus	Luxembourg																\$205								\$205
Amerivet Securities Inc	United States														\$7										\$7
ANZ	Australia	\$143	\$91	\$225	\$482			\$422	\$558						\$265	\$118							\$250		\$2,553
Apple Financial Holdings	United States																\$24								\$24
Arab Banking Corporation (Bank ABC)	Bahrain				\$58																				\$58
Banca Monte dei Paschi di Siena	Italy													\$175											\$175
Banca Passadore & C.	Italy													\$175											\$175
Banca Popolare di Sondrio	Italy													\$246											\$246
Banco Bilbao Vizcaya Argentaria (BBVA)	Spain	\$498			\$1,308			\$692	\$1,035		\$134			\$286				\$62					\$391		\$4,406
Banco BPM	Italy													\$621											\$621
Banco de Sabadell	Spain																\$10								\$10
Bancroft Capital (PA)	United States														\$4										\$23
Bank of America	United States	\$424	\$91	\$1,136	\$4,526		\$1,515	\$2,681	\$2,957	\$801	\$924	\$2,080	\$1,364	\$745	\$3,042	\$770	\$709	\$320		\$2,767	\$315	\$248			\$27,413
Bank of China	China	\$424			\$317				\$558					\$226			\$29	\$213					\$43		\$1,810
Bank of New York Mellon	United States				\$58			\$150							\$556	\$138				\$221		\$58			\$1,182
Barclays	United Kingdom	\$498	\$91		\$1,519				\$1,032		\$136	\$257		\$358	\$1,062		\$1,286	\$512		\$435			\$250		\$7,436
BayernLB	Germany	\$321			\$58				\$56								\$60	\$570							\$1,064
Blaylock Beal Van	United States							\$30							\$7	\$8				\$50					\$96
BMO Financial Group	Canada				\$300		\$497				\$178		\$583				\$18			\$221					\$1,798
BNP Paribas	France	\$498	\$91	\$1,222	\$3,137		\$1,515		\$1,156		\$1,141			\$744		\$406		\$2,349		\$1,890			\$314		\$14,462
BPER Banca	Italy													\$480											\$480
Cabrera Capital	United States														\$4										\$4
Caisse des Dépôts et Consignations	France	\$143																							\$143
Capital One Financial	United States							\$150		\$255		\$46	\$728				\$247								\$1,427
Cassa Depositi e Prestiti	Italy													\$221											\$221
CastleOak Securities	United States														\$15					\$70					\$85
Cathay General Bancorp	United States											\$134					\$4								\$138
Chang Hwa Commercial Bank	Taiwan																\$10								\$10
China Merchants Bank	China					\$1,908																			\$1,908
CIBC	Canada			\$225					\$558																\$783
CITIC	China					\$1,225																			\$1,225
Citigroup	United States	\$640	\$763	\$1,136	\$8,815		\$1,395	\$150	\$4,362			\$551	\$956	\$424	\$3,098	\$1,350		\$1,058		\$2,901		\$248	\$250		\$28,097
Citizens Financial Group	United States										\$167	\$46					\$266								\$478
CL King & Associates	United States																			\$24					\$24
Comerica	United States						\$487			\$133	\$3														\$623
Commerzbank	Germany	\$400	\$91		\$2,011									\$340				\$618					\$391		\$3,849
Commonwealth Bank of Australia	Australia																	\$213							\$213
Crédit Agricole	France	\$720	\$91	\$723	\$2,726				\$624					\$833	\$2,153			\$1,058		\$285	\$526		\$739		\$10,478
Crédit Mutuel	France	\$321	\$91	\$225				\$150						\$226	\$100		\$10				\$557		\$314		\$1,992
CSC Financial	China					\$303																			\$303
Danske Bank	Denmark								\$329																\$329
DBS	Singapore	\$321			\$931				\$582									\$320		\$150					\$2,304

Deutsche Bank	Germany	\$577	\$91		\$3,177			\$2,686		\$208		\$226				\$589		\$2,024	\$573		\$391		\$10,540
Donghai Securities	China					\$13																	\$13
Drexel Hamilton	United States						\$30						\$4	\$8									\$42
DZ Bank	Germany	\$321																					\$321
EFG International	Switzerland											\$51											\$51
European Investment Bank	Luxembourg	\$947										\$604				\$798			\$1,197				\$3,546
Export-Import Bank of the United States	United States																			\$350			\$350
Fifth Third Bancorp	United States					\$264	\$150	\$133	\$142	\$263	\$38	\$337		\$265									\$1,593
First Abu Dhabi Bank	United Arab Emirates		\$901		\$365		\$422		\$175					\$118	\$213								\$2,195
First Bancorp	United States													\$4									\$4
First Capital Securities	China					\$13																	\$13
First Horizon	United States								\$350														\$350
FNB Corporation	United States														\$35								\$35
Fuyo General Lease	Japan						\$150																\$150
Goldman Sachs	United States	\$321	\$91		\$3,109	\$247	\$150	\$2,576			\$658	\$365	\$1,528	\$268	\$875	\$575		\$2,024		\$205			\$12,991
Great Pacific Securities	United States												\$4										\$4
Groupe BPCE	France	\$498			\$195							\$254							\$841	\$326			\$2,114
Hancock Whitney	United States								\$298														\$298
HSBC	United Kingdom	\$498		\$225				\$684		\$361	\$362		\$286			\$1,365		\$573	\$314				\$4,669
Hua Nan Financial	Taiwan														\$10								\$10
Hubei Bank	China					\$13																	\$13
Hull Street CLO	Cayman Islands														\$2								\$2
Huntington Bancshares	United States									\$3													\$3
ICICI Bank	India				\$181																		\$181
Industrial and Commercial Bank of China	China	\$424			\$241			\$684		\$181													\$1,530
ING Group	Netherlands	\$321																					\$321
Intesa Sanpaolo	Italy			\$429	\$221			\$56				\$810											\$1,516
Jarden	New Zealand												\$72	\$21				\$72					\$164
Jefferies Financial Group	United States														\$18								\$18
JPMorgan Chase	United States	\$498	\$91	\$654	\$5,789		\$1,401	\$3,116	\$1,081	\$219	\$1,640	\$901	\$625	\$3,110	\$851	\$1,799	\$888	\$1,890		\$235	\$391		\$25,177
KeyCorp	United States										\$46												\$46
KfW	Germany	\$178																					\$178
KKR Group	United States								\$373						\$1,840						\$8		\$2,221
La Banque Postale	France	\$143																					\$143
La Caixa Group	Spain				\$111																		\$111
Legend Holdings	China					\$13																	\$13
Lloyds Banking Group	United Kingdom	\$424	\$91		\$482			\$847						\$691	\$121	\$786							\$3,441
Lone Star Funds	United States	\$79																					\$79
Loop Capital	United States				\$142													\$24					\$166
Macquarie Group	Australia														\$1,290								\$1,290
Mediobanca Banca di Credito Finanziario	Italy											\$226											\$226
Mega Financial	Taiwan														\$10								\$10
MFR	United States												\$12					\$44					\$55
Mischler Financial Group	United States												\$11	\$8				\$46					\$65
Mitsubishi UFJ Financial	Japan	\$394	\$1,172	\$723	\$2,068	\$787	\$1,244	\$1,097	\$530	\$194	\$267	\$956	\$445	\$350	\$118	\$497	\$512	\$246	\$1,083	\$248			\$12,931
Mizuho Financial	Japan	\$577	\$91		\$3,177		\$1,221	\$2,108	\$801		\$1,353	\$406		\$2,858	\$606	\$509	\$696	\$285					\$14,687
Morgan Stanley	United States	\$711	\$91		\$3,109			\$1,698		\$369	\$484		\$72	\$1,152	\$268			\$2,234					\$10,187
NatWest	United Kingdom	\$394	\$91					\$914		\$180			\$226				\$320						\$2,123
Northern Trust	United States		\$811		\$547			\$422	\$582	\$103	\$337	\$173		\$225						\$163			\$3,362
Northwestern Mutual	United States														\$616								\$616
Opus Corporate Finance LLP	United Kingdom									\$37													\$37
Penserra Capital Management	United States												\$12										\$12
Penserra Securities	United States												\$4										\$4
People's United Financial	United States														\$34								\$34
PNC Financial Services	United States			\$429	\$372			\$1,162	\$255	\$437		\$613	\$38	\$401	\$265					\$528			\$4,499

Conclusion

Nuclear weapons producers and their financiers continue to profit from the misguided assertion that nuclear weapons make the world a safer place. Against the backdrop of undiminished risks of nuclear escalation, states keep pursuing expensive modernization programs to expand their nuclear forces.

At the same time, a new global alliance is determined to challenge these narratives, undertake meaningful efforts towards redress to those harmed by nuclear weapons, and create an environment for their elimination. Increasingly, the financial community is playing a key role in this alliance, by actively promoting sustainable and ethical investment trends that uphold and strengthen the norm against these inhumane weapons.

Any use of nuclear weapons would have catastrophic consequences. Even a “limited” nuclear war could put one billion people at risk of starvation. Financial sector actors that choose to avoid the companies associated with existential risks can help put an end to these weapons of mass destruction.

Annex: major nuclear weapon systems

Most nuclear armed countries have several major nuclear weapons systems in place. The United Kingdom is an exception, as it uses the same basic Trident missile delivery system as the United States, and only intends to fire these missiles from submarines. Others have air-launched or ground-launched systems as well. Some ground-launched systems, including some Chinese systems, are designed to also be mobile.

The following is a snapshot of the various nuclear weapon systems, and the companies involved. Only those systems for which a clear connection to specific companies was found, are included in this list. Additional information can be found in the full report.

Agni series (India)

India has a series of differently ranged Agni nuclear capable ballistic missiles in its arsenal. The Agni I became operational in 2007 and has a range of 700+ km.⁴⁰⁷ The medium-range Agni II (2000+ km) and the intermediate range Agni III (3200+ km) also appear to be operational.⁴⁰⁸ India's Strategic Forces Command has additionally been conducting test flights of the Agni-P (1000+ km)⁴⁰⁹, the Agni IV (3500+ km)⁴¹⁰ and the Agni V (5000+ km)⁴¹¹. The Agni VI (6000+ km) is currently still under development.⁴¹² Bharat Dynamics Limited is involved in the Agni missile programme.⁴¹³ Walchandnagar Industries produces the launch systems for the Agni series.⁴¹⁴

Prithvi II (India)

The Prithvi-II is a short range (350 km) ballistic missile used as a nuclear delivery vehicle in the Indian nuclear arsenal.⁴¹⁵ Bharat Dynamics Limited is the main contractor for this system.⁴¹⁶

ASMPA (France)

The ASMPA is a medium-range air-to-ground nuclear armed missile that has been operational since 2009.⁴¹⁷ In

2016, MBDA France commenced work on design and development of the mid-life upgrade of the ASMPA, the ASMPA-R, to extend life through 2030.⁴¹⁸ MBDA is a joint venture between BAE Systems (37.5%), Airbus (37.5%) and Leonardo (25%).⁴¹⁹ Thales is listed by the French Ministry of Defense as one of MBDA's five subcontractors in the ASMPA mid-life upgrade.⁴²⁰ A Safran subsidiary, Herakles, is also part of a joint venture with MBDA called Roxel⁴²¹, which is involved in ASMP/ ASMP-A missile production, providing boosters and additional devices.⁴²²

ASN4G (France)

MBDA (a joint venture between BAE Systems (37.5%), Airbus (37.5%) and Leonardo (25%)) is also contracted by the French government for airborne component work related to development of the ASMPA-successor ASN4G.⁴²³ The new weapon is scheduled to enter service in 2035 with range exceeding 1,000km, double that of the ASMPA,⁴²⁴ and will incorporate new hypersonic technologies.⁴²⁵ Like the ASMPA, the missiles will be developed with the capacity for submarine launch, for which the manufacturers concerned are mainly ArianeGroup, Naval Group, Safran, TechnicAtome and Thales.⁴²⁶

M51 (France)

The M51 is a submarine launched ballistic missile, currently available in two versions: the M51.1 and M51.2.⁴²⁷ Preliminary work on the third version began in 2014, and the French Ministry of Defence 2024 budget states that the M51.3 entered production in 2019.⁴²⁸ Preparatory work for a fourth version, the M51.4, commenced in 2022.⁴²⁹ The M51.3 version is due to enter service around 2025.⁴³⁰ According to the French 2024 Defense budget, 2024 funding is mainly reserved for the continuation of the development and production work of M51.3, as well as further preparatory work for the M51.4, with ArianeGroup, a joint venture between Airbus and Safran, as the prime contractor.⁴³¹ Naval Group, of which Thales has 35% shareholding, is listed as the main contractor for the M51 missile adaptation for the French nuclear submarines.⁴³²

B61 (United States)

The B61 is a nuclear gravity bomb, dropped from airplanes and currently deployed at U.S. and NATO bases.⁴³³ There are an estimated 100 B61 bombs stationed in five European countries (Kleine Brogel AB in Belgium, Büchel AB in Germany, Aviano AB and Ghedi AB in Italy, Volkel AB in the Netherlands, and Incirlik AB in Turkey).⁴³⁴ The B61-12 will consolidate and replace earlier B61 weapon

designs.⁴³⁵ Full-scale production thereof started in 2022 and is expected to be completed by 2026.⁴³⁶ There is currently no publicly available information that specifies the exact time period for the B61-12 delivery to Europe. A report that their arrival was sped up to December 2022 was denied by the US Department of Defense.⁴³⁷ In addition, according to experts, United Kingdom airbase Lakenheath will reportedly again become a storage location for the U.S. nuclear bombs⁴³⁸. This modernisation is expected to cost around \$8.25 billion, not including the modification of nuclear capable aircraft.⁴³⁹ Boeing is producing the guided tail-kit assembly.⁴⁴⁰ Most of the U.S. nuclear complex is involved in producing the weapons. Design and engineering take place at the Los Alamos and Sandia national laboratories.⁴⁴¹ The first production unit was completed at Pantex.⁴⁴² The Y-12 complex is where uranium (and other) components are manufactured⁴⁴³, and the firing, safing and use control components are produced at the Kansas City National Security Campus.⁴⁴⁴ Honeywell International operates the Kansas City and Sandia facilities.⁴⁴⁵ In October 2023, the U.S. Department of defense announced its plans to build a new B61 nuclear gravity bomb, which will be known as the B61-13.⁴⁴⁶ It will be designed for delivery by the future B-21 strategic bomber, and, until it is retired, possibly also the B-2.⁴⁴⁷

Minuteman III (United States)

There are 400 Minuteman III Intercontinental Ballistic Missiles (ICBMs) currently deployed in the U.S. arsenal, and they are expected to stay active until 2030.⁴⁴⁸ These missiles can carry the W78 and W87 warheads.⁴⁴⁹ BAE Systems is the prime contractor for the ICBM system engineering/technical assistance support, training, and development.⁴⁵⁰ L3 Harris subsidiary, Aerojet Rocketdyne, was the original equipment manufacturer for solid rocket motors (SRM) and the post-boost propulsion system for the Minuteman.⁴⁵¹ Boeing is contracted for engineering and other services through 2024.⁴⁵² Honeywell builds the internal guidance instruments.⁴⁵³ Textron builds the multiprobe antenna and Mod5F midsections for the missiles.⁴⁵⁴ Lockheed Martin builds re-entry systems, and the new Airborne Launch Control System Replacement.⁴⁵⁵ Northrop Grumman is the prime contractor for sustaining Minuteman propulsion.⁴⁵⁶ Peraton performs software analysis and testing for the Minuteman System.⁴⁵⁷ RTX recently completed a contract to build the Minimum Essential Emergency Communication Network for the Missile System.⁴⁵⁸

LGM-35A Sentinel (United States)

The LGM-35A Sentinel will replace the Minuteman III Intercontinental Ballistic Missile System around 2030. The Sentinel prime contractor is Northrop Grumman.⁴⁵⁹ The U.S. Air Force will also replace the current warheads with the new W87-1 variant and is planning to produce new plutonium pits for these warheads at the Los Alamos National Laboratory and Savannah River Site.⁴⁶⁰ While the Sentinel programme was initially estimated to cost \$95.3 billion, Air Force spokespersons indicated in early 2024 a possible 37 percent cost increase, triggering additional legislative oversight.⁴⁶¹ 400 missiles are planned to go on alert by 2036.⁴⁶² The Northrop Grumman Sentinel nationwide team includes L3Harris subsidiary, Aerojet Rocketdyne.⁴⁶³ Aerojet Rocketdyne is developing the large solid rocket motor and the post-boost propulsion system.⁴⁶⁴ Bechtel will provide launch system design, construction, and integration during the next development phase of the Sentinel.⁴⁶⁵ General Dynamics is working on command and launch capabilities.⁴⁶⁶ Honeywell International will develop guidance and missile electronics.⁴⁶⁷ Lockheed Martin is handling missile payload integration.⁴⁶⁸ Collins Aerospace, a RTX unit, will also build components for command and control systems.⁴⁶⁹ Textron will develop missile payload integrations.⁴⁷⁰

AGM-86 Air-Launched Cruise Missile (United States)

The Air-Launched Cruise Missile (ALCM) is a long-range missile that is part of the U.S. strategic bomber force.⁴⁷¹ The B-52 airplane is able to carry up to 20 200 kT missiles.⁴⁷² The U.S. plans to keep the existing design in place until deploying its replacement, the Long Range Standoff (LRSO), around 2030.⁴⁷³ The LRSO will be carried by the B-52 but will also later arm the new B-21 Raider stealth bomber.⁴⁷⁴ Boeing builds these missiles.⁴⁷⁵

Long Range Standoff (United States)

The U.S. Air Force is planning on replacing the current stockpile of Air Launched Cruise Missiles with a new Long Range Standoff (LRSO) cruise missile.⁴⁷⁶ According to the U.S. Congressional Research Services, the U.S. Air Force plans to buy up to 1,100 LRSO missiles at a cost of around \$10.8 billion.⁴⁷⁷ The new missiles will be armed with the W80-4 warhead.⁴⁷⁸ Lawrence Livermore National Laboratory and Sandia National Laboratories are the primary facilities responsible for the new warhead design, and the new weapon is expected to be completed by 2027.⁴⁷⁹ Boeing is contracted to make sure the LRSO can be dropped by B-52H bombers.⁴⁸⁰ National Technology

and Engineering Solutions of Sandia (NTESS), a wholly owned subsidiary of Honeywell operates Sandia National Laboratory, where the warheads will be integrated to the missiles⁴⁸¹, with Peraton as a subcontractor.⁴⁸² RTX was contracted in 2021 for development and manufacture of the LRSO.⁴⁸³

Warhead assembly, plutonium and tritium production (United States)

At Pantex and the Oak Ridge Y-12 facility U.S. nuclear weapons are assembled or disassembled.⁴⁸⁴ Pantex stores thousands of plutonium pits, the heart of thermonuclear weapons, and is responsible for refurbishing existing warheads.⁴⁸⁵ The Y-12 site manufactures nuclear weapon components from uranium and lithium, and it is the only source for enriched uranium components for nuclear weapons.⁴⁸⁶ The facilities are managed and operated by Consolidated Nuclear Security (CNS).⁴⁸⁷ CNS comprises member companies Bechtel National; Leidos; ATK Launch Systems (a subsidiary of Northrop Grumman); and SOC, with Booz Allen Hamilton as a teaming subcontractor.⁴⁸⁸ The Savannah River Site is the only site in the U.S. nuclear weapon complex with capability to extract, recycle, purify and reload tritium, which must be periodically replaced in nuclear weapons.⁴⁸⁹ Plutonium pit production capabilities are also being developed at the site.⁴⁹⁰ The site is operated by Savannah River Nuclear Solutions (SRNS), a joint venture between Fluor and HII subsidiary, Newport News Nuclear.⁴⁹¹

Honeywell Federal Manufacturing & Technologies manages and operates the National Security Campus (NSC) (formerly Kansas City Plant), the National Nuclear Security Administration (NNSA) facility responsible for producing over 80% of the non-nuclear components for U.S. nuclear weapons.⁴⁹²

W78-1 and W80 warheads (United States)

The W78-1 warhead, which will be deployed on the LGM-35A Sentinel, and the W80 warhead, used on the Long Range Stand Off Missile, are the responsibility of the Lawrence Livermore National Laboratory and Sandia National Laboratories.⁴⁹³ The Lawrence Livermore lab is operated by Lawrence Livermore National Security⁴⁹⁴, which is comprised of Bechtel, the University of California, Battelle, the Texas A&M University System, BWX Technologies and Amantum⁴⁹⁵ Sandia National Laboratories is operated by National Technology and Engineering Solutions of Sandia, LLC, a wholly owned

subsidiary of Honeywell International.⁴⁹⁶ Los Alamos National Laboratory (LANL) is responsible for the nuclear design and engineering of warheads and has designed five of the seven nuclear warheads in the U.S. deployed stockpile.⁴⁹⁷ It is currently leading the life extension and alteration programs affecting the W88 warhead and the B61-12 bomb.⁴⁹⁸ Los Alamos is managed and operated by Triad National Security, made up of Battelle Memorial Institute, the Texas A&M University System and the University of California.⁴⁹⁹ Among its subcontractors are Fluor and Huntington Ingalls Industries (HII).⁵⁰⁰

W88 Alt 370 warheads (United States)

Los Alamos National Laboratory ((operated by Triad National Security with Fluor and Huntington Ingalls Industries (HII) as subcontractors)) and Sandia National Laboratory (operated by Honeywell) are the design and engineering laboratories for the W88 Alt 370.⁵⁰¹ The W88 is the nuclear warhead deployed on the Trident II (D5) missiles.⁵⁰² The conventional high explosives and final assembly of the complete warhead takes place at the Pantex Plant⁵⁰³ ((operated by Bechtel National, Inc., Leidos, ATK Launch Systems (a subsidiary of Northrop Grumman), SOC LLC and Booz Allen Hamilton)).⁵⁰⁴ The gas transfer and the arming, fuzing, and firing subsystem is produced at the National Security Campus (NSC) (formerly Kansas City Plant), operated by Honeywell International.⁵⁰⁵ The NNSA estimates that the costs for the W88 Alt 370 program will be around \$2.8 billion.⁵⁰⁶

Trident II (D5) (United States & United Kingdom)

The submarine-launched Trident II (D5) ballistic missile is currently aboard U.S. Ohio-class and British Vanguard-class submarines.⁵⁰⁷ In 1963, the UK and US agreed to share procurement for key components for their nuclear missiles.⁵⁰⁸ The U.S. has more than 530 D5 missiles and it plans to spend around \$1 billion per year to keep them available for the future Columbia class submarines.⁵⁰⁹ Three warhead types are currently deployed on the Trident: the W76-1, the W76-2 and the W88.⁵¹⁰ The U.S. is also planning to build a new warhead, the W93, to be deployed on the Trident missiles.⁵¹¹ The UK is parallelly engaged in a project for new nuclear warheads for their arsenal.⁵¹² The UK announcement to parliament came several days after the agreement to work closely with the U.S. in developing these weapons was published in major media outlets.⁵¹³ L3Harris subsidiary, Aerojet Rocketdyne, manufactures Post Boost Control System Gas Generator Units for the Trident II D5 program.⁵¹⁴ L3Harris is also

responsible for flight test instrumentation and support.⁵¹⁵ BAE Systems is contracted by the U.S. government for technical engineering services on the U.S. and UK Trident II D5 strategic weapon systems.⁵¹⁶ General Dynamics supports Trident life extension.⁵¹⁷ Lockheed Martin developed and produced the missiles, and also provides engineering and technical support services as well as related materials.⁵¹⁸

Iskander (Russian Federation)

The Iskander is a short range ballistic missile with a range of at least 350km.⁵¹⁹ It is deployed in several locations around Russia.⁵²⁰ In March 2023, Russian President Vladimir Putin announced Russia would be constructing a nuclear storage facility for tactical nuclear weapons in Belarus, for which the Iskanders could be a potential carrier.⁵²¹ Rostec produces this missile.⁵²²

DF- 26 (China)

The DF-26 is an intermediate-range, dual-capable, ballistic missile in China's nuclear arsenal.⁵²³ It has a range of approximately 4,000km, and is one of the most widely deployed in China.⁵²⁴ China Aerospace Science and Technology Corporation (CASC) is the manufacturer of the DF-26.⁵²⁵

Endnotes

1 Alicia Sanders-Zakre, Susi Snyder and Magritte Gordaneer (2023) 'Wasted: 2022 Global Nuclear Weapons Spending'. *ICAN*. Available at: [Wasted: 2022 Global Nuclear Weapons Spending - ICAN \(icanw.org\)](#).

2 Gina Gambetta, 'Inclusion of financial sector in CSDDD proves political sticking point', *Responsible Investor*, 31 October 2023. Available at: [Inclusion of financial sector in CSDDD proves political sticking point \(responsible-investor.com\)](#).

3 Gina Gambetta, 'European financial institutions call for social investment framework', *Responsible Investor*, 12 October 2023. Available at: [European financial institutions call for social investment framework \(responsible-investor.com\)](#). See also Gina Gambetta & Fiona McNally, 'French and German investor groups continuing work on social taxonomy', *Responsible Investor*, 20 July 2023. Available at: [French and German investor groups continuing work on social taxonomy \(responsible-investor.com\)](#).

4 'Final Report on Social Taxonomy', *Platform on Sustainable Finance (2022)*, p. 71. Available at: [Platform on Sustainable Finance's report on social taxonomy \(europa.eu\)](#).

5 Nick Ritchie and Mikhail Kupriyanov 'Understanding the humanitarian consequences and risks of nuclear weapons: New findings from recent scholarship', Federal Ministry of European and International Affairs, Republic of Austria (2023). Available at: [Understanding the Humanitarian Consequences and Risks of Nuclear Weapons.pdf \(bmeia.gv.at\)](#).

6 Alicia Sanders-Zakre, Susi Snyder and Magritte Gordaneer (2023) 'Wasted: 2022 Global Nuclear Weapons Spending'. *ICAN*. Available at: [Wasted: 2022 Global Nuclear Weapons Spending - ICAN \(icanw.org\)](#).

7 Lorenzo Scarazzato and Madison Lipson, 'Going private (equity): A new challenge to transparency in the arms industry', *Stockholm International Peace Research Institute*, 1 March 2023. Available at: [Going private \(equity\): A new challenge to transparency in the arms industry | SIPRI](#).

8 Ibid.

9 Kristie Pladson, 'Weapons lobby pushes for green label', *DW*, 24 March 2022. Available at: [Weapons lobby pushes for green label – DW – 03/24/2022](#).

10 Dominic Webb, 'UK government convened asset managers to discuss defense industry and ESG', *Responsible Investor*, 25 October 2023. Available at: [UK government convened asset managers to discuss defence industry and ESG \(responsible-investor.com\)](#).

11 Ibid.

12 Jelmer Mulder, 'Oproep aan pensioenfondsen om meer te investeren in wapenindustrie', *Trouw*, 28 January 2023. Available at: [Oproep aan pensioenfondsen om meer te investeren in wapenindustrie \(trouw.nl\)](#).

13 Matthew Martin, 'Citigroup CEO Jane Fraser Says the 'New S' in ESG Is Security', *Bloomberg*, 24 October 2023. Available at: [Citigroup CEO Jane Fraser Says the 'New S' in ESG Is Security - Bloomberg](#).

14 See, for example, Djaja Ottenhof, 'Dutch pension funds reluctant to invest in government-led defence industry fund', *IPE*, 19 April 2023. Available at: [Dutch pension funds reluctant to invest in government-led defence industry fund | News | IPE](#).

15 Gina Gambetta, 'Inclusion of financial sector in CSDDD proves political sticking point', *Responsible Investor*, 31 October 2023. Available at: [Inclusion of financial sector in CSDDD proves political sticking point \(responsible-investor.com\)](#).

16 'Inclusion of the financial sector in the scope of the EU Corporate Sustainability Due Diligence Directive (CSDDD) is key to us as responsible investors', Open letter from Nordic investors to the Danish and Swedish governments in the context of the trilogue negotiations on the EU Corporate Sustainability Due Diligence Directive (CSDDD), 6 November 2023. Available at: [Nordic Investors Statement EU Corporate Sustainability Due Diligence Directive_1e93xDa.pdf \(business-humanrights.org\)](#)

17 Gina Gambetta, 'European financial institutions call for social investment framework', *Responsible Investor*, 12 October 2023. Available at: [European financial institutions call for social investment framework \(responsible-investor.com\)](#). See also Gina Gambetta & Fiona McNally, 'French and German investor groups continuing work on social taxonomy', *Responsible Investor*, 20 July 2023. Available at: [French and German investor groups continuing work on social taxonomy \(responsible-investor.com\)](#).

18 'Final Report on Social Taxonomy', *Platform on Sustainable Finance (2022)*, p. 71. Available at: [Platform on Sustainable Finance's report on social taxonomy \(europa.eu\)](#).

19 Gina Gambetta, 'CSDDD informal agreement: A mixed bag on financial sector requirements', *Responsible Investor*, 14 December 2023. Available at: [CSDDD informal agreement: A mixed bag on financial sector requirements \(responsible-investor.com\)](#).

20 Ibid.

21 Nick Ritchie and Mikhail Kupriyanov 'Understanding the humanitarian consequences and risks of nuclear weapons: New findings from recent scholarship', Federal Ministry of European and International Affairs, Republic of Austria (2023). Available at: [Understanding the Humanitarian Consequences and Risks of Nuclear Weapons.pdf \(bmeia.gv.at\)](#).

22 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-6 – F-7. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

23 *L3HARRIS COMPLETES AEROJET ROCKETDYNE ACQUISITION*. L3Harris, 28 July 2023. Available at: [L3Harris Completes Aerojet Rocketdyne Acquisition | L3Harris® Fast Forward](#).

24 *Groupe REEL takes over CNIM Systèmes Industriels*. Groupe REEL, 28 September 2022. Available at: [Communiqué de presse CNIM EN.pdf \(cnim-groupe.com\)](#).

25 'Our Responsibility', *Groupe REEL (2023)*, p. 28. Available at: [reel_our_responsibility_2023_report.pdf \(reelinternational.com\)](#).

26 Nick Wakeman, 'Former Peraton business gets new CEO, name', *Washington Technology*, 14 December 2021. Available at: [Former Peraton business gets new CEO, name - Washington Technology; Portfolio \(2024\) | Veritas Capital](#). Available at: [Veritas Capital](#).

27 *Contracts for October 2, 2020 (2020) U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2370617/> (Accessed: 23 January 2024); *CONTRACT to ANALEX CORPORATION* | USAspending, 1 October 2020. Available at: [CONTRACT to ANALEX CORPORATION | USAspending](#) (Accessed: 23 January 2024).

28 *Amentum Launches as Independent Professional and Technical Services Company Serving the U.S. Federal Government, Select Allied Governments*,

and Commercial Markets, Amentum, 4 February 2020. Available at: <https://www.amentum.com/2020/02/04/amentum-launches-as-independent-professional-and-technical-services-company-serving-the-u-s-federal-government-select-allied-governments-and-commercial-markets/>.

29 Team (no date) | Lawrence Livermore National Security, LLC Available at: <https://www.llnslc.com/#team> (Accessed: 19 December 2023).

30 Supporting Our Nation's Weapons Defense System with Advanced Conduct of Operations and Best-in-Class Operational Readiness at Los Alamos National Laboratory (LANL). Amentum, 1 April 2020. Available at: <https://www.amentum.com/project/supporting-our-nations-weapons-defense-system-with-advanced-conduct-of-operations-at-los-alamos-national-labs/>.

31 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), pp. F-15 – F16 and F-6 – F7. Available at: https://www.energy.gov/sites/default/files/2023/11/f48/fy24ssmp_final_november_2023_0.pdf (energy.gov).

32 Amentum Awarded \$22 Million Contract for Research, Development, Testing and Evaluation Services at NSWC Crane. Amentum, 8 December 2020. Available at: <https://www.amentum.com/2020/12/08/amentum-awarded-22-million-contract-for-research-development-testing-and-evaluation-services-at-nswc-crane/>;

CONTRACT to AMENTUM SERVICES, INC. | USAspending, 18 September 2020. Available at: [CONTRACT to AMENTUM SERVICES, INC. | USAspending](https://www.usaspending.gov/award/CONT_AWD_FA942222C0004_9700_-NONE_-NONE) (Accessed: 19 December 2023).

33 Nuclear Operations & Processing (2022) | Amentum. Available at: <https://www.amentum.com/nuclear-operations-processing/>

34 Amentum Launches as Independent Professional and Technical Services Company Serving the U.S. Federal Government, Select Allied Governments, and Commercial Markets. Amentum, 4 February 2020. Available at: <https://www.amentum.com/2020/02/04/amentum-launches-as-independent-professional-and-technical-services-company-serving-the-u-s-federal-government-select-allied-governments-and-commercial-markets/>.

35 Amentum Announces Agreement to Merge with Jacobs' Critical Mission Solutions and Cyber and Intelligence Businesses. Amentum, 20 November 2023. Available at: [Amentum Announces Agreement to Merge with Jacobs' Critical Mission Solutions and Cyber and Intelligence Businesses | Amentum](https://www.amentum.com/2023/11/20/amentum-announces-agreement-to-merge-with-jacobs-critical-mission-solutions-and-cyber-and-intelligence-businesses/).

36 'Amentum-Jacobs merger narrows field of Pantex management hopefuls', *Exchange Monitor*, 21 November 2023. Available at: [Amentum-Jacobs merger narrows field of Pantex management hopefuls - ExchangeMonitor](https://www.exchangemonitor.com/news/amentum-jacobs-merger-narrows-field-of-pantex-management-hopefuls).

37 NNSA cancels Y-12, Pantex contract award, to hold new competitions for separate site management contracts. National Security Administration, 16 May 2022. Available at: <https://www.energy.gov/nnsa/articles/nnsa-cancels-y-12-pantex-contract-award-hold-new-competitions-separate-site>.

38 Missions we support (2023) | Arcfield. Available at: [MISSIONS | Arcfield](https://www.arcfield.com/missions-we-support).

39 Nick Wakeman, 'Former Peraton business gets new CEO, name', *Washington Technology*, 14 December 2021. Available at: [Former Peraton business gets new CEO, name - Washington Technology](https://www.washingtontechnology.com/news/former-peraton-business-gets-new-ceo-name-washington-technology/); *Portfolio* (2024) | Veritas Capital. Available at: [Veritas Capital](https://www.veritascapital.com/veritas-capital).

40 Contracts for October 2, 2020 (2020) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2370617/> (Accessed: 23 January 2024); CONTRACT to ANALEX CORPORATION | USAspending, 1 October 2020. Available at: [CONTRACT to ANALEX CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_FA820413C0010_9700_-NONE_-NONE) (Accessed: 23 January 2024).

41 Contracts for July 18, 2022 (2022) U.S. Department of Defense. Available at:

<https://www.defense.gov/News/Contracts/Contract/Article/3096893/> (Accessed: 20 December 2023).

42 CONTRACT to ATLANTIC COMMTECH CORPORATION | USAspending, 18 July 2022. Available at: https://www.usaspending.gov/award/CONT_AWD_FA942222C0004_9700_-NONE_-NONE (Accessed: 20 December 2023).

43 'US planning to station nuclear weapons in UK amid threat from Russia – report', *The Guardian*, 27 January 2024. Available at: [US planning to station nuclear weapons in UK amid threat from Russia – report | UK news | The Guardian](https://www.theguardian.com/world/2024/jan/27/us-planning-to-station-nuclear-weapons-in-uk-amid-threat-from-russia-report).

Matt Korda & Hans Kristensen, 'Increasing Evidence That The US Air Force's Nuclear Mission May Be Returning To UK Soil', *Federation of American Scientists Blogs*, 28 August 2023. Available at: [Increasing Evidence that the US Air Force's Nuclear Mission May Be Returning to UK Soil - Federation of American Scientists \(fas.org\)](https://www.fas.org/blogs/security/2023/08/increasing-evidence-that-the-us-air-force-s-nuclear-mission-may-be-returning-to-uk-soil). See also Hans Kristensen, 'Lakenheath Air Base Added To Nuclear Weapons Storage Site Upgrades', *Federation of American Scientists Blogs*, 11 April 2022. Available at: <https://www.fas.org/blogs/security/2022/04/lakenheath-air-base-added-to-nuclear-weapons-storage-site-upgrades/>.

44 CONTRACT to ATLANTIC COMMTECH CORPORATION | USAspending, 18 July 2022. Available at: https://www.usaspending.gov/award/CONT_AWD_FA942222C0004_9700_-NONE_-NONE (Accessed: 20 December 2023).

45 Contracts for September 9, 2016 (2016) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/939786/> (Accessed: 20 December 2023);

CONTRACT to ATLANTIC COMMTECH CORPORATION | USAspending, 12 September 2016. Available at: https://www.usaspending.gov/award/CONT_AWD_FA942222C0004_9700_-NONE_-NONE (Accessed: 20 December 2023).

46 SUBMARINE SUSTAINMENT (FMSP) (2024) | Babcock. Available at: [Submarine sustainment \(FMSP\) - Babcock International](https://www.babcockinternational.com/news/submarine-sustainment-fmsp-2024); *Vanguard Class Life Extension Programme (2024)* | Babcock. Available at: [Vanguard Class Life Extension Programme - Babcock International](https://www.babcockinternational.com/news/vanguard-class-life-extension-programme-2024).

47 Future Maritime Support Programme. Babcock International, 1 October 2021. Available at: <https://www.babcockinternational.com/news/new-contract-for-naval-base-support-announced/>.

48 Q3 Trading Statement 2017, Babcock International, 28 February 2017. Available at: <https://www.babcockinternational.com/news/q3-trading-statement-2017/>.

49 Babcock awarded multimillion pound missile tube contract extension by Electric Boat, Babcock International, 2 June 2020. Available at: <https://www.babcockinternational.com/news/babcock-awarded-multimillion-pound-missile-tube-contract-extension-by-electric-boat/>.

50 Babcock signs £750 million contract to deliver future submarine capability at Devonport. Babcock, 10 November 2023. Available at: [Babcock signs £750 million contract to deliver future submarine capability at Devonport - Babcock International](https://www.babcockinternational.com/news/babcock-signs-750-million-contract-to-deliver-future-submarine-capability-at-devonport).

51 Babcock increases support on UK's Dreadnought programme. Babcock, 28 November 2023. Available at: [Babcock increases support on UK's Dreadnought programme - Babcock International](https://www.babcockinternational.com/news/babcock-increases-support-on-uk-s-dreadnought-programme).

52 CONTRACT to BANDA GROUP INTERNATIONAL, LLC. | USAspending, 16 January 2019. Available at: [CONTRACT to BANDA GROUP INTERNATIONAL, LLC | USAspending](https://www.usaspending.gov/award/CONT_AWD_FA820413C0010_9700_-NONE_-NONE) (Accessed: 20 December 2023).

53 Ibid.

54 Technical & Management Services in Support of Defense Nuclear Safety (2023) | Banda Group International. Available at: [Technical And Management Services In Support Of The Chief Of Nuclear Safety - Banda Group International \(bandagroupintl.com\)](https://www.bandagroupintl.com/technical-and-management-services-in-support-of-the-chief-of-nuclear-safety).

55 National Laboratory Management and Operations (2022) | Battelle. Available at: <https://www.battelle.org/laboratory-management>.

56 About Us (2023) | Battelle. Available at: <https://www.battelle.org/about-us>

57 About (2023) | Consolidated Nuclear Security, LLC. Available at: <https://cns-llc.us/about>.

58 Contract No. DE-NA0001942 (2011) Energy.gov, section B-H, pp. 4-9. Available at: <https://www.energy.gov/sites/prod/files/2018/02/f48/2014-03-25%2520Basic%2520Contract%5B1%5D.pdf> (Accessed: 20 December 2023).

59 Ibid, p. 16.

60 About Us (2023) | Draper. Available at: <https://www.draper.com/about>

61 Nine Decades of Innovation (2023) | Draper. Available at: [History Timeline | Draper](https://www.draper.com/history-timeline).

62 Trident II MARK 6 MOD 1 Guidance System (2023) | Draper. Available at: <https://www.draper.com/explore-solutions/trident-ii-mark-6-mod-1-guidance-system>.

63 Contracts for September 30, 2019 (2019) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1975222/> (Accessed: 20 December 2023).

64 CONTRACT to CHARLES STARK DRAPER LABORATORY, INC., THE. | USAspending, 30 August 2023. Available at: [CONTRACT to CHARLES STARK DRAPER LABORATORY, INC., THE | USAspending](https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE) (Accessed: 20 December 2023); *Contracts for August 30, 2023 (2023) U.S. Department of Defense*. Available at: [Contracts for August 30, 2023 \(2023\) U.S. Department of Defense](https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE) (Accessed: 20 December 2023); *Contracts for September 29, 2023 (2023) U.S. Department of Defense*. Available at: [Contracts for August 30, 2023 \(2023\) U.S. Department of Defense](https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE) (Accessed: 20 December 2023); (Accessed: 20 December 2023);

CONTRACT to CHARLES STARK DRAPER LABORATORY, INC., THE. | USAspending, 15 February 2019. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE (Accessed: 20 December 2023); *Contracts for February 15, 2019 (2019) U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1759513/> (Accessed: 20 December 2023);

Contracts for February 21, 2020 (2020) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2091020/> (Accessed: 20 December 2023); CONTRACT to CHARLES STARK DRAPER LABORATORY, INC., THE. | USAspending, 26 February 2021. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE (Accessed: 20 December 2023);

Contracts for February 26, 2021 (2021) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2518088/> (Accessed: 20 December 2023); *Contracts for February 10, 2022 (2022) U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2931057/> (Accessed: 20 December 2023).

Contracts for April 6, 2023 (2023) U.S. Department of Defense. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE (Accessed: 24 January 2024). CONTRACT to CHARLES STARK DRAPER LABORATORY, INC., THE. |

USAspending, 1 October 2023. Available at: [CONTRACT to CHARLES STARK DRAPER LABORATORY, INC., THE | USAspending](https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE) (Accessed: 24 January 2024); *Contracts for September, 29, 2023 (2023) U.S. Department of Defense*. Available at: [Contracts for September, 29, 2023 \(2023\) U.S. Department of Defense](https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE) (Accessed: 24 January 2024);

65 Overall Information (2017) | China National Nuclear Corporation (CNNC), Expo 2017. Available at: http://www.chinadaily.com.cn/m/2017expochinaen/2017-06/05/content_29622565.htm (Accessed: 20 December 2023).

66 Ibid.

67 DOE's NNSA signs \$600 million contract to build its first exascale supercomputer. Department of Energy, 13 August 2019. Available at: [DOE's NNSA signs \\$600 million contract to build its first exascale supercomputer | Department of Energy](https://www.energy.gov/nnsa/signs-600-million-contract-to-build-its-first-exascale-supercomputer).

68 El Capitan: Preparing for NNSA's first exascale machine (no date) | Lawrence Livermore National Laboratory (LLNL). Available at: [El Capitan: Preparing for NNSA's first exascale machine | Advanced Simulation and Computing \(llnl.gov\)](https://www.llnl.gov/el-capitan-preparing-for-nnsa-s-first-exascale-machine) (Accessed: 20 December 2023).

69 Ibid.

70 DOE's NNSA signs \$600 million contract to build its first exascale supercomputer. Department of Energy, 13 August 2019. Available at: [DOE's NNSA signs \\$600 million contract to build its first exascale supercomputer | Department of Energy](https://www.energy.gov/nnsa/signs-600-million-contract-to-build-its-first-exascale-supercomputer).

71 DOE/NNSA, Lab announce partnership with Cray to develop NNSA's first exascale supercomputer. Lawrence Livermore National Laboratory (LLNL), 13 August 2019. Available at: [DOE/NNSA, Lab announce partnership with Cray to develop NNSA's first exascale supercomputer | Lawrence Livermore National Laboratory \(llnl.gov\)](https://www.llnl.gov/doe-nnsa-lab-announce-partnership-with-cray-to-develop-nnsa-s-first-exascale-supercomputer).

72 'Our Responsibility', *Groupe REEL* (2023), p. 28. Available at: [reel_our_responsibility_2023_report.pdf \(reelinternational.com\)](https://www.reelinternational.com/reel-our-responsibility-2023-report.pdf).

73 *Groupe REEL takes over CNIM Systèmes Industriels*. Groupe REEL, 28 September 2022. Available at: [Communiqué de presse CNIM EN.pdf \(cnim-groupe.com\)](https://www.cnim-groupe.com/communiqu%C3%A9-de-presse-cnim-en).

74 'Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2023), *RÉPUBLIQUE FRANÇAISE* (2023), p. 29. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

75 *Defence (2021) | REEL*. Available at: [Defence projects, handling equipment : our services - REEL \(reelinternational.com\)](https://www.reelinternational.com/defence-projects-handling-equipment-our-services-reel).

76 About (2023) | HDT Global. Available at: [About | HDT Global](https://www.hdtglobal.com/about).

77 HDT GLOBAL ANNOUNCES ACQUISITION BY NEXUS CAPITAL MANAGEMENT. HDT Global, 18 May 2021. Available at: [HDT Global Announces Acquisition by Nexus Capital Management | HDT Global](https://www.hdtglobal.com/news/hdt-global-announces-acquisition-by-nexus-capital-management).

78 CONTRACT to HDT EXPEDITIONARY SYSTEMS, INC. | USAspending, 22 May 2013. Available at: https://www.usaspending.gov/award/CONT_AWD_FA820413C0010_9700_-NONE_-NONE (Accessed: 20 December 2023); *Contracts for May 27, 2016 (2016) U.S. Department of Defense*. Available at: [Contracts for May 27, 2016 \(2016\) U.S. Department of Defense](https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE) (Accessed: 20 December 2023);

Contracts for June 15, 2020 (2020) U.S. Department of Defense. Available at: [Contracts for June 15, 2020 \(2020\) U.S. Department of Defense](https://www.usaspending.gov/award/CONT_AWD_N0003019C0008_9700_-NONE_-NONE) (Accessed: 20 December 2023).

79 HDT GLOBAL AWARDED CONTRACT TO SUPPORT NORTHROP GRUMMAN IN U.S. AIR FORCE GROUND BASED STRATEGIC DETERRENT (GBSD) PROGRAM (news story), HDT Global, 22 February 2022. Available at: <https://www.hdtglobal.com/2022/02/22/hdt-global-awarded-contract-to-support-northrop-grumman-in-u-s-air-force-ground-based-strategic-deterrent-gbsd-program/>.

80 *About Kratos Defense & Security Solutions (2023)* | Kratos. Available at: [About Kratos Defense & Security Solutions | Kratos](#).

81 *Kratos Receives Contract Award to Support Northrop Grumman in U.S. Air Force Ground Based Strategic Deterrent (GBSD) Program*. Kratos, 8 December 2020. Available at: [Kratos Receives Contract Award to Support Northrop Grumman in U.S. Air Force Ground Based Strategic Deterrent \(GBSD\) Program | Kratos Defense & Security Solutions, Inc; Hypersonic and Ballistic Systems \(2023\) | Kratos](#). Available at: [Ground Support Equipment | Kratos \(kratosdefense.com\)](#).

82 *About L&T Group (2023)* | Larsen & Toubro. Available at: [About L&T Group | L&T Corporate | L&T India \(larsentoubro.com\)](#); *Our Businesses (2023)* | Larsen & Toubro. Available at: <https://www.larsentoubro.com/corporate/our-businesses/>.

83 'INTEGRATED REPORT 2020-21', *Larsen & Toubro (2022)*, p. 88. Available at: [L&T Integrated Report 2020-21 | Sustainable progress for a better world \(windows.net\)](#); 'INTEGRATED ANNUAL REPORT 2022-23', *Larsen & Toubro (2023)*, p. 2. Available at: [L&T Integrated Annual Report 2022-2023 \(larsentoubro.com\)](#).

84 *New Construction - Defence Shipbuilding (2023)* | Shipbuilding | L&T India. Web archive of 27 March 2023. Available at: <https://web.archive.org/web/20230327014941/https://www.lntshipbuilding.com/products-services/new-construction-defence-shipbuilding/>.

85 *Talegaon, Maharashtra (2023)* | Larsen & Toubro. Available at: <https://www.larsentoubro.com/corporate/about-lt-group/facilities/india/talegaon-maharashtra/>.

86 'Defence Shipbuilding. End-to end Solutions', *Larsen & Toubro*, p. 4. Available at: <https://corpwebstorage.blob.core.windows.net/media/42123/defence-shipbuilding-main-brochure.pdf>; 'Seven seas. One solution', *L&T Shipbuilding (2013)*. Available at: [Shipbuilding brochure for E-mail.cdr \(lntshipbuilding.com\)](#).

87 *Arihant Class Submarine - Naval Technology* (no date). Available at: <https://www.naval-technology.com/projects/arihant-class/> (Accessed: 10 October 2022); *Arihant Advanced Technology Vessel (ATV) – Armament (no date)* | GlobalSecurity.org. Available at: [Arihant Advanced Technology Vessel \(ATV\) - Armament \(globalsecurity.org\)](#) (Accessed: 22 January 2024).

88 Hans M. Kristensen and Matt Korda (2022) 'Indian nuclear weapons, 2022', *Bulletin of the Atomic Scientists*, 78:4, 224-236, p. 231. DOI: 10.1080/00963402.2022.2087385.

89 Gady, Franz-Stefan, 'India Test Fires Short-Range Ballistic Missiles From Submerged Sub', *The Diplomat*, 22 August 2018. Available at: <https://thediplomat.com/2018/08/india-test-fires-short-range-ballistic-missiles-from-submerged-sub/>.

90 Hans Kristensen and Matt Korda, 'World Nuclear Forces', SIPRI Yearbook 2023, *Oxford University Press* (2023), p. 298.

91 Richard Sterk. 'India Levels Up in Nuclear Submarines'. *Defense Security Monitor*, 1 May 2023. Available at: <https://dsm.forecastinternational.com/2023/05/01/india-levels-up-in-undersea-nuclear-submarines/>.

92 *About Us (2023)* | Merrick & Company. Available at: <https://www.merrick.com/about-us/>.

93 *Merrick-SMSI JV Team to Perform Project Planning and Engineering Services for Premier National Security Science Laboratory* (news story). Merrick, 10 July 2018. Available at: <https://www.merrick.com/merrick-jv-team-to-perform-project-planning-and-engineering-services/>; *About Us (no date)* | Triad National Security, LLC. Available at: [Home \(triadns.org\)](#) (Accessed: 21 December 2023); 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-15 – F16. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

94 *Merrick Opens South Carolina Office In Support of the Savannah River Site*. Merrick, 21 August 2019. Available at: <https://www.merrick.com/merrick-opens-south-carolina-office-in-support-of-the-savannah-river-site/>; *Merrick Expands South Carolina Office*. Merrick, 8 January 2023. Available at: <https://www.merrick.com/merrick-expands-south-carolina-office/>.

95 'Shaping the Way our World Moves: 2023 Annual Report', *Moog(2023)*, p. 4. Available at: [2023_Moog_Annual_Report.pdf](#).

96 *CONTRACT to MOOG INC.* | USAspending; 11 June 2020. Available at: https://www.usaspending.gov/award/CONT_IDV_FA821420D0001_9700 (Accessed: 3 January 2024).

97 *Thrust Vector Control Systems (2023)* | Moog. Available at: [Thrust Vector Control Systems \(moog.com\)](#).

98 'Missile Systems: Equipping those who defende freedom', *Moog (2023)*. Available at: [moog-missile-systems-brochure.pdf](#). See, for example, PAX & ICAN (2023) 'Moving Away from Mass Destruction: 109 exclusions of nuclear weapon producers, pp. 28 and 53. Available at: [PAX_Rapport_DBotB_Moving_Away.pdf \(paxforpeace.nl\)](#).

99 *Who we are (no date)* | N3B Los Alamos. Available at: [About Us | N3B - Los Alamos \(n3b-la.com\)](#) (Accessed: 3 January 2024).

100 *Environmental Remediation and Waste Management (no date)* | N3B - Los Alamos. Available at: <https://n3b-la.com/> (Accessed: 3 January 2024).

101 *Submarines (2020)* | Naval Group. Available at: [Submarines | Naval Group \(naval-group.com\)](#).

102 Ibid; Nicolas Fiorenza, 'France launches SNLE 3G SSBN programme', *Janes*, 22 February 2021. Available at: [France launches SNLE 3G SSBN programme \(janes.com\)](#).

103 'Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2023), *RÉPUBLIQUE FRANÇAISE (2023)*, p. 29. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

104 *Corporate overview (2024)* | Parsons. Available at: [Investor Relations - Parsons](#).

105 *Parsons Joins Northrop Grumman's GBSD Effort*. Parsons Corporation, 16 September 2019. Available at: [Parsons Joins Northrop Grumman's GBSD Effort](#).

106 Ibid.

107 *About SOC (2024)* | SOC. Available at: [SOC | About \(soc-usa.com\)](#).

108 *Safeguards, Security, and Emergency Services at NNSA U.S. Nuclear Sites Pantex and Y-12 (2024)* | SOC. Available at: [Safeguards, Security, and Emergency Services at NNSA U.S. Nuclear Sites Pantex and Y-12 \(soc-usa.com\)](#);

About (2024) | Consolidated Nuclear Security, LLC. Available at: [About | Consolidated Nuclear Security, LLC \(cns-llc.us\)](#).

109 *About Us (2023)* | Strategic Management Solutions LLC. Available at: [ABOUT US - Strategic Management Solutions LLC \(smsi.us\)](#).

110 Ibid. See also Ross Wilkers, 'New \$22B Los Alamos management contract awarded', *Washington Technology*, 8 June 2018. Available at: <https://washingtontechnology.com/2018/06/new-22b-los-alamos-management-contract-awarded/347794/>.

111 *Projects (2023)* | Strategic Management Solutions LLC. Available at: <https://smsi.us/projects>.

112 *About (no date)* | Systems, Planning & Analysis. Available at: [About | Systems Planning and Analysis, Inc. \(spa.com\)](#) (Accessed: 4 January 2024).

113 *CONTRACT to SYSTEMS PLANNING AND ANALYSIS, INC.* | USAspending, 1 April 2020. Available at: [CONTRACT to SYSTEMS PLANNING AND ANALYSIS, INC. | USAspending](#) (Accessed: 4 January 2023); *Contracts for October 1, 2020 (2020) U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2369073/> (Accessed: 4 January 2024).

CONTRACT to SYSTEMS PLANNING AND ANALYSIS, INC. | USAspending, 1 October 2018. Available at: [CONTRACT to SYSTEMS PLANNING AND ANALYSIS, INC. | USAspending](#) (Accessed: 4 January 2023); *Contracts for November 1, 2022 (2022) U.S. Department of Defense*. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 4 January 2024).

114 *CONTRACT to SYSTEMS PLANNING AND ANALYSIS, INC.* | USAspending, 1 October 2020. Available at: [CONTRACT to SYSTEMS PLANNING AND ANALYSIS, INC. | USAspending](#) (Accessed: 4 January 2023); *Contracts for March 27, 2020 (2020) U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2129070/> (Accessed: 4 January 2024); *Contracts for September, 29, 2023 (2023) U.S. Department of Defense*. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 24 January 2024).

115 *Programme SNLE 3G (2019)* | TechnicAtome. Available at: [SNLE 3G - TechnicAtome](#); 'Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces', *RÉPUBLIQUE FRANÇAISE (2023)*, p. 40. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

116 Ibid; Nicolas Fiorenza, 'France launches SNLE 3G SSBN programme', *Janes*, 22 February 2021. Available at: [France launches SNLE 3G SSBN programme \(janes.com\)](#).

117 *Programme Laser Mégajoule (2019)* | TechnicAtome. Available at: [Laser Mégajoule \(LMJ\) - TechnicAtome](#).

118 *ABOUT US (no date)* | VOLAT. Available at: [About company \(mzkt.by\)](#) (Accessed: 4 January 2024).

119 *CHASSIS FOR THE TOPOLO (no date)* | VOLAT. Available at: <https://www.mzkt.by/en/about/history/1915/> (Accessed: 4 January 2024).

120 *ABOUT US (no date)* | VOLAT. Available at: <https://www.mzkt.by/en/about/> (Accessed: 4 January 2024).

121 *Company Profile (no date)* | ArianeGroup. Available at: [Company profile - ArianeGroup](#) (Accessed: 4 January 2024).

122 'Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces', *RÉPUBLIQUE FRANÇAISE (2023)*, p. 36. Available at:

<https://www.budget.gouv.fr/documentation/file-download/21423>.

123 *About (2024)* | Consolidated Nuclear Security. Available at: [About | Consolidated Nuclear Security, LLC \(cns-llc.us\)](#).

124 *NNSA Production Office contract (2014) Energy.gov*. Available at: <https://www.energy.gov/nnsa/nnsa-production-office-contract> (Accessed: 4 January 2024).

125 *LAWRENCE LIVERMORE NATIONAL SECURITY, LLC (no date)* | LAWRENCE LIVERMORE NATIONAL SECURITY, LLC. Available at: [LAWRENCE LIVERMORE NATIONAL SECURITY, LLC \(llnslc.com\)](#) (Accessed: 4 January 2024).

126 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-6 – F-7. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

127 *About Us (2024)* | MBDA. Available at: [About Us | MBDA Systems \(mbda-systems.com\)](#).

128 'Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2023: Équipement des forces' (2023), *RÉPUBLIQUE FRANÇAISE (2023)*, pp. 31 and 34. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

129 *About Sandia (2024)* | Sandia National Laboratories. Available at: <https://www.sandia.gov/about/>.

130 'W88 Alteration 370 Program' (2023). *National Nuclear Security Administration*. Available at: [W88-ALT370_1123.pdf \(energy.gov\)](#).

131 'W39/Mk7 Acquisition Program' (2023). *National Nuclear Security Administration*. Available at: [W93_1123.pdf \(energy.gov\)](#).

132 'W87-1 Modification Program' (2019). *National Nuclear Security Administration*. Available at: [2019-03-08-FACTSHEET-W87-1.pdf \(energy.gov\)](#).

133 'W80-4 Life Extension Program'(2023). *National Nuclear Security Administration*. Available at: [W80-4_1123.pdf \(energy.gov\)](#).

134 'B61-12 Life Extension Program' (2023). *National Nuclear Security Administration*. Available at: [B61-12_042023.pdf \(energy.gov\)](#).

135 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-26 – F-27. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

136 *Roxel (2023)* | MBDA. Available at: <https://www.mbda-systems.com/polska/about-us/mbda-worldwide/roxel-2/>.

137 Market segments: propulsion systems (2022) | Roxel. Available at: <https://www.roxelgroup.com/en/market-segments/>.

138 *About SRNS (2023)* | SAVANNAH RIVER NUCLEAR SOLUTIONS. Available at: <https://www.savannahrivernuclearsolutions.com/about/parent.htm>.

139 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-54 - F-56. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

140 *Home (no date)* | Triad National Security LLC. Available at: [Home \(triadns.org\)](#) (Accessed: 4 January 2024).

141 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-15 - F-17. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

142 *Airbus in Europe (2023)* | AIRBUS. Available at: <https://www.airbus.com/en/our-worldwide-presence/airbus-in-europe>.

143 *Who we are (2023)* | Airbus. Available at: [Who we are | Airbus](#).

144 'Report of the Board of Directors 2022', *Airbus (2023)*, p. 10. Available at: [Report of the Board of Directors 2022 \(airbus.com\)](#).

145 *About us. Company profile (no date)* | ArianeGroup. Available at: [Company profile - ArianeGroup](#) (Accessed: 11 October 2023).

146 *About Us (2023)* | MBDA Systems. Available at: <https://www.mbda-systems.com/about-us/>.

147 'Airbus Annual Report 2022 : Financial Statements 2022', *Airbus (2023)*, p. 4. Available at: [HD-export \(airbus.com\)](#).

148 'Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2023: Équipement des forces' (2023), *RÉPUBLIQUE FRANÇAISE (2023)*, p. 31. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>; *ASMPA (2023)* | MBDA Missile Systems. Available at: <https://www.mbda-systems.com/product/asmpa/>.

149 Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2023), *RÉPUBLIQUE FRANÇAISE (2023)*, p. 34. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

150 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', Bulletin of the Atomic Scientists, 79:4, 272-281, p. 276. DOI: <https://doi.org/10.1080/00963402.2023.2223088>; 'The ASN4G Hypersonic Missile for the Rafale Fighter Will Replace the ASMP-A Missile by 2035', *Defense Express*, 15 March 2023. Available at: [The ASN4G Hypersonic Missile for the Rafale Fighter Will Replace the ASMP-A Missile by 2035 | Defense Express \(defence-ua.com\)](#).

151 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', Bulletin of the Atomic Scientists, 79:4, 272-281, p. 276. DOI: <https://doi.org/10.1080/00963402.2023.2223088>; 'RAPPORT D'INFORMATION DÉPOSÉ en application de l'article 145 du Règlement PAR LA COMISION DE LA DÉFENSE NATIONALE ET DES FORCES ARMÉES portant recueil d'auditions de la commission sur la dissuasion nucléaire', *ASSEMBLÉE NATIONALE (2023)*. Available at: [Rapport d'information n°1112 - 16e législature - Assemblée nationale \(assemblee-nationale.fr\)](#).

152 'Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces', *RÉPUBLIQUE FRANÇAISE (2023)*, p. 36. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

153 *M51 (no date)* | ArianeGroup. Available at: <https://www.ariane.group/en/defense/m51/> (Accessed: 11 October 2023).

154 *Our history (no date)* | ArianeGroup. Available at: [Our History - ArianeGroup](#) (Accessed: 11 October 2023);

Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', Bulletin of the Atomic Scientists, 79:4, 272-281, p. 275. DOI: <https://doi.org/10.1080/00963402.2023.2223088>;

155 *What we do (2023)* | BAE Systems. Available at: [What we do | BAE Systems | International](#).

156 *About Us (2023)* | MBDA Missile Systems. Available at: <https://www.mbda-systems.com/about-us/>.

157 'Annual Report 2022. BAE Systems plc' (2023), *BAE Systems plc*, p. 5. Available at: [bae-ar-complete-2021.pdf \(baesystems.com\)](#).

158 'Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces', *RÉPUBLIQUE FRANÇAISE (2023)*, p. 31. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>; *ASMPA (2023)* | MBDA Missile Systems. Available at: <https://www.mbda-systems.com/product/asmpa/>.

159 Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2023), *RÉPUBLIQUE FRANÇAISE (2023)*, p. 34. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

160 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', Bulletin of the Atomic Scientists, 79:4, 272-281, p. 276. DOI: <https://doi.org/10.1080/00963402.2023.2223088>; 'The ASN4G Hypersonic Missile for the Rafale Fighter Will Replace the ASMP-A Missile by 2035', *Defense Express*, 15 March 2023. Available at: [The ASN4G Hypersonic Missile for the Rafale Fighter Will Replace the ASMP-A Missile by 2035 | Defense Express \(defence-ua.com\)](#).

161 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', Bulletin of the Atomic Scientists, 79:4, 272-281, p. 276. DOI: <https://doi.org/10.1080/00963402.2023.2223088>;

'RAPPORT D'INFORMATION DÉPOSÉ en application de l'article 145 du Règlement PAR LA COMISION DE LA DÉFENSE NATIONALE ET DES FORCES ARMÉES portant recueil d'auditions de la commission sur la dissuasion nucléaire', *ASSEMBLÉE NATIONALE (2023)*. Available at: [Rapport d'information n°1112 - 16e législature - Assemblée nationale \(assemblee-nationale.fr\)](#).

162 *CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC.* | USAspending, 1 August 2013. Available at: https://www.usaspending.gov/award/CONT_AWD_FA821413C0001_9700_-NONE_-NONE. (Accessed: 16 October 2023); *Contracts for July 31, 2014 (2014)* U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 16 October 2023); *Contracts for July 31, 2014 (2014)* U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 16 October 2023); *Contracts for January 31, 2023 (2023)* U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/3284067/> (Accessed: 26 October 2023).

163 *BAE Systems wins contract to continue sustaining U.S. intercontinental ballistic missiles*. BAE Systems, 27 June 2022. Available at: <https://www.baesystems.com/en-us/article/bae-systems-wins-contract-to-continue-sustaining-us-intercontinental-ballistic-missiles>; *IDV to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC.* | USAspending, 24 June 2022. Available at: [IDV to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC. | USAspending](#) (Accessed: 16 October 2023); *Contracts for June 24, 2022 (2022)* U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 16 October 2023).

164 *Contracts for January 31, 2023 (2023)* U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/3284067/> (Accessed: 26 October 2023).

165 *CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC.* | USAspending, 1 August 2013. Available at: [CONTRACT to BAE SYSTEMS](#)

[TECHNOLOGY SOLUTIONS & SERVICES INC. | USAspending](#) (Accessed: 24 January 2024).

166 *CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC.* | USAspending, 1 October 2021. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003022C6001_9700_-NONE_-NONE. (Accessed: 16 October 2023); *Contracts for September 30, 2021 (2022)* U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 16 October 2023); *Contracts for September 18, 2023 (2023)* U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 16 October 2023); *Contracts for November 15, 2023 (2023)* U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 24 January 2024); *BAE Systems has been awarded a five-year Systems Engineering and Integration Support Services contract to continue supporting the U.S. Navy Strategic Systems Programs (SSP) office*, BAE Systems, 27 October 2021. Available at: [BAE Systems awarded \\$478 million U.S. Navy contract for systems engineering and integration services | BAE Systems](#). *CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC.* | USAspending, 1 October 2022. Available at: [CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC. | USAspending](#) (Accessed: 16 October 2023); *Contracts for October 21, 2022 (2022)* U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/3196439/> (Accessed: 16 October 2023); *CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC.* | USAspending, 1 October 2023. Available at: [CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC. | USAspending](#) (Accessed: 24 January 2024); *Contracts for September 21, 2023 (2023)* U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 24 January 2024).

167 *Alliance partners (2024)* | Dreadnought Alliance. Available at: [Alliance partners - Dreadnought Alliance](#).

168 *Dreadnought (2023)* | BAE Systems. Available at: [Dreadnought | BAE Systems](#).

169 *More than £2 billion to boost UK submarine programme*. Government of the United Kingdom, 9 may 2022. Available at: <https://www.gov.uk/government/news/more-than-2-billion-to-boost-uk-submarine-programme>.

170 'Bechtel Report 2021. Partners in Progress', *Bechtel (2021)*. Available at: [2021 Annual Report - FINAL \(bechtel.com\)](#).

171 *U.S. National Laboratories, New Mexico and California, USA (2023)* | Bechtel. Available at: <https://www.bechtel.com/projects/us-national-laboratories/>.

172 'Bechtel Report 2021. Partners in Progress', *Bechtel (2021)*. Available at: [2021-About-Bechtel.pdf](#).

173 *Company adds Bechtel and Kratos Defense and Security Solutions to its nationwide team*. Northrop Grumman, 25 February 2020. Available at: [Northrop Grumman Expands its Ground Based Strategic Deterrent Nationwide Team | Northrop Grumman; Modernizing the Nation's Aging Intercontinental Ballistic Missile \(ICBM\) System \(2023\) | Bechtel. Available at: \[Sentinel | Bechtel\]\(#\).](#)

174 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-6 - F-7. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

175 *CONTRACT to LAWRENCE LIVERMORE NATIONAL SECURITY LIMITED LIABILITY COMPANY.* | USAspending, 9 May 2007. Available at: https://www.usaspending.gov/award/CONT_AWD_DEAC5207NA27344_8900_-NONE_-NONE. (Accessed: 19 October 2023).

176 *NNSA Production Office contract (2014)* Energy.gov. Available at: <https://www.energy.gov/nnsa/nnsa-production-office-contract> (Accessed: 19 October 2023); *U.S. Nuclear Security Enterprise (2023)* | Bechtel. Available at: <https://www.bechtel.com/projects/us-nuclear-security-enterprise/>;

CONTRACT to CONSOLIDATED NUCLEAR SECURITY LLC | USAspending, 8 January 2013. Available at: https://www.usaspending.gov/award/CONT_AWD_DENA0001942_8900_-NONE_-NONE. (Accessed: 19 October 2023).

177 *Contract No. DE-NA0001942 (2014)* Energy.gov. Section J, Appendix A, Page 1. Available at: <https://www.energy.gov/nnsa/downloads/contract-no-de-na0001942> (Accessed: 19 October 2023).

178 'Back to square one for \$28B nuclear management contract', *Washington Technology*, 17 May 2022. Available at: [Back to square one for \\$28B nuclear management contract - Washington Technology](#); 'FY2019 Performance Evaluation Summary' (2020), *National Nuclear Security Administration*. Available at: <https://www.energy.gov/sites/prod/files/2020/06/f76/CNS%20FY2019%20PES%20%2012%20Jun%202020.pdf>.

179 *NNSA announces contract extension to Consolidated Nuclear Security for the management and operation of the Y-12 National Security Complex and the Pantex Plant*. Energy.gov, 3 October 2022. Available at: <https://www.energy.gov/nnsa/articles/nnsa-announces-contract-extension-consolidated-nuclear-security-management-and>.

180 *Company Profile (2022)* | BHARAT DYNAMICS LIMITED INDIA. Available at: <https://bdl-india.in/company-profile>.

181 *NSE - National Stock Exchange of India Ltd. (2023)*. Available at: [Bharat Dynamics Limited Share Price Today, Stock Price, Live NSE News, Quotes, Tips - NSE India](#) (Accessed: 20 October 2023); *Company Profile (2022)* | BHARAT DYNAMICS LIMITED INDIA. Available at: <https://bdl-india.in/company-profile>.

182 'BDL-2022-23 Q4 financial results', *Bharat Dynamics Limited (2023)*. Annexure II. Available at: [BDL 2022-23 Q4 Financial Results.pdf \(bdl-india.in\)](#).

183 *Company Profile (2023)* | BHARAT DYNAMICS LIMITED INDIA. Available at: <https://bdl-india.in/company-profile>.

184 'Nuclear capable Prithvi-2 missile successfully testfired at night', *The Economic Times*, last updated: 20 November 2019. Available at: <https://economictimes.indiatimes.com/news/defence/nuclear-capable-prithvi-2-missile-successfully-testfired-at-night/articleshow/72147446.cms>; 'India successfully tests nuclear-capable Agni-V ballistic missile | All you need to know', *INDIA TODAY*, updated: 8 October 2021. Available at: [India successfully tests nuclear-capable Agni-V ballistic missile | All you need to know - India Today](#); '52nd Annual Report 2021-22', *Bharat Dynamics Limited (2022)*, p. 7. Available at: <https://bdl-india.in/sites/default/files/Annual%20Report%202021-22.pdf>;

CORPORATE PRESENTATION, *BHARAT DYNAMICS LIMITED (2022)*, p. 3. Available at: [Intimation of Investors Meeting & Investor Presentation 14.12.2022.pdf \(bdl-india.in\)](#).

185 *Commercial (no date)* | Boeing. Available at: [Commercial \(boeing.com\)](#) (Accessed: 21 October 2023); *Defense (no date)* | Boeing. Available at: [Boeing: Digitally Advanced & Integrated Warfighter Solutions](#) (Accessed: 21 October 2023); *Space (no date)* | Boeing. Available at: [Boeing: Space Overview](#) (Accessed: 21 October 2023).

186 'The Boeing Company 2022 Annual Report. Today, Tomorrow and Beyond', *Boeing (2023)*, p. 53. Available at: [boeing-2022-annual-reportVF.pdf \(q4cdn.com\)](#).

187 *CONTRACT to BOEING COMPANY, THE* | USAspending, 17 May 2018. Available at: https://www.usaspending.gov/award/CONT_AWD_FA811919F0094_9700_FA811914D0003_9700 (Accessed: 26 October 2023); *Contracts for May 10, 2018* (2018) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1518141/> (Accessed: 26 October 2023).

188 *IDV to BOEING COMPANY, THE* | USAspending, 15 March 2019. Available at: [IDV to BOEING COMPANY, THE | USAspending](#) (Accessed: 26 October 2023); *Contracts for March 13, 2019* (2019) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1784315/> (Accessed: 26 October 2023).

189 Ibid.

190 *CONTRACT to BOEING COMPANY, THE* | USAspending, 2 July 2018. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1825952/> (Accessed: 26 October 2023); *Contracts for June 12, 2020* (2020) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2218996/> (Accessed: 26 October 2023); 'B61 Mod 12 Life Extension Program Tail Kit Assembly' - *FY18 AIRFORCE PROGRAMS*. Available at: <https://www.dote.osd.mil/Portals/97/pub/reports/FY2018/af/2018b61.pdf?ver=2019-08-21-155843-557> (Accessed: 26 October 2023);

IDV to BOEING COMPANY, THE | USAspending, 15 September 2021. Available at: [IDV to THE BOEING COMPANY | USAspending](#) (Accessed: 25 January 2024); *Contracts for September 14, 2021* (2021) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 225 January 2024);

191 *Strategic Deterrence Systems (no date)* | Boeing. Available at: [Boeing: Strategic Deterrence Systems](#) (Last Accessed: 26 October 2023).

192 *CONTRACT to BOEING COMPANY, THE* | USAspending, 14 January 2015. Available at: https://usaspending.gov/award/CONT_AWD_FA821415C0001_9700_-NONE_-NONE- (Accessed: 26 October 2023); *Contracts for January 8, 2015* (2015) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/606763/> (Accessed: 26 October 2023).

193 *IDV to BOEING COMPANY, THE* | USAspending, 17 September 2021. Available at: [IDV to BOEING COMPANY, THE | USAspending](#) (Accessed: 26 October 2023); *Contracts for September 17, 2021* (2021) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2780513/> (Accessed: 26 October 2023).

194 *IDV to BOEING COMPANY, THE* | USAspending, 2 February 2023. Available at: [IDV to THE BOEING COMPANY | USAspending](#) (Accessed: 1 November 2023); *Contracts for February 1, 2023* (2023) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 1 November 2023).

195 *IDV to BOEING COMPANY, THE* | USAspending, 2 May 2022. Available at: https://www.usaspending.gov/award/CONT_IDV_FA821422D0001_9700 (Accessed: 26 October 2023); *Contracts for April 29, 2022* (2022) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 26 October 2023).

196 *CONTRACT to BOEING COMPANY, THE* | USAspending, 14 December 2022. Available at: [CONTRACT to THE BOEING COMPANY | USAspending](#) (Accessed: 1 November 2023); *Contracts for December 14, 2022* (2022) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 1 November 2023).

197 *CONTRACT to BOEING COMPANY, THE* | USAspending, 1 October 2020. Available at: [CONTRACT to BOEING COMPANY, THE | USAspending](#) (Accessed: 8 February 2024);

Contracts for February 26, 2021 (2021) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2518088/> (Accessed: 28 September 2022); *Contracts for September 28, 2021* (2021) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 8 February 2024).

198 *Company profile (2018)* | China Aerospace Science and Technology Corporation. Available at: english.spacechina.com/n17138/n17229/index.html (Accessed: 1 November 2023).

199 Ibid.

200 *Top 100 for 2023 (2023)* | DefenseNews. Available at: [Top 100 | Defense News, News about defense programs, business, and technology.](#)

201 *Strategic Nuclear Missiles (2018)* | China Aerospace Science and Technology Corporation. Available at: english.spacechina.com/n17215/n17272/c2388530/content.html.

202 Hans M. Kristensen, Matt Korda, Eliana Johns & Mackenzie Knight (2024) 'Chinese nuclear weapons, 2024', *Bulletin of the Atomic Scientists*, 80:1, 49-72, p. 64. DOI: /1080/00963402.2023.2295206.

203 Ibid.

204 *Services (2023)* | Fluor. Available at: <https://www.fluor.com/services>.

205 'BUILDING A BETTER WORLD - THROUGH INNOVATIVE AND SUSTAINABLE PROFESSIONAL AND TECHNICAL SOLUTIONS', *Fluor (2023)*. Available at: [Fluor Corporate Profile](#).

206 'Future-Fit: 2022 Integrated Report', *Fluor (2023)*, pp. 7 and 34. Available at: [2022-Fluor-Integrated-Report.pdf \(q4cdn.com\)](#).

207 *Our Parent Companies (2010)* | SRNS. Available at: <https://www.savannahrivernuclearsolutions.com/about/parent.htm>.

208 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-54 - F-56. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

209 *Savannah River Nuclear Solutions, LLC Contract (no date)* Energy.gov. Available at: <https://www.energy.gov/srs/articles/savannah-river-nuclear-solutions-llc-contract> (Accessed: 3 November 2023).

210 *CONTRACT to SAVANNAH RIVER NUCLEAR SOLUTIONS, LLC*. | USAspending, 10 January 2008. Available at: https://www.usaspending.gov/award/CONT_AWD_DEAC0908SR22470_8900_-NONE_-NONE- (Accessed: 3 November 2023).

211 *U.S. Department of Energy Extends Fluor-led Savannah River Site Management and Operating Contract through September 2027*. FLUOR Newsroom, 29 September 2022. Available at: <https://newsroom.fluor.com/news-releases/news-details/2022/U.S.-Department-of-Energy-Extends-Fluor-led-Savannah-River-Site-Management-and-Operating-Contract-through-September-2027/default.aspx>.

212 The joint venture includes two integrated subcontractors: Huntington Ingalls Industries and Fluor, and three small business subcontractors: Longenecker & Associates, Merrick-SMSI and TechSource. See *About Us (no date)* | *Triad National Security, LLC*. Available at: <https://triadns.org/> (Accessed: 26 November 2022).

213 *About Us (no date)* | *Triad National Security, LLC*. Available at: [Home \(triadns.org\)](#) (Accessed: 7 December 2023);

214 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, p. F-15. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

215 *NNSA approves start of construction for plutonium pit production subproject at Los Alamos National Laboratory*. Energy.gov, 9 February 2023. Available at: [NNSA approves start of construction for plutonium pit production subproject at Los Alamos National Laboratory | Department of Energy](#).

216 *CONTRACT to TRIAD NATIONAL SECURITY, LLC*. | USAspending, 8 June 2018. Available at: https://www.usaspending.gov/award/CONT_AWD_89233218CNA000001_8900_-NONE_-NONE- (Accessed: 7 December 2023). See also *NNSA announces extension of terms for Los Alamos National Laboratory management and operating contract*. Energy.gov, 6 December 2022. Available at: [NNSA announces extension of terms for Los Alamos National Laboratory management and operating contract | Department of Energy](#).

217 *Innovation Spanning Every Sector (2023)* | General Dynamics. Available at: <https://www.gd.com/>.

218 Ibid.

219 'Annual Report 2022', *General Dynamics (2023)*, p. 34. Available at: https://s22.q4cdn.com/891946778/files/doc_financials/2022/ar/gd-2022-annual-report.pdf.

220 *Strategic Weapon Deterrence (2023)* | *General Dynamics Mission Systems*. Available at: <https://gdmissonsyste.ms.com/command-and-control/strategic-weapon-deterrence>.

221 *CONTRACT to ELECTRIC BOAT CORPORATION* | USAspending, 1 October 2022. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003023C6004_9700_-NONE_-NONE- (Accessed: 8 November 2023); *Contracts for October 14, 2022* (2022) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/3189269/> (Accessed: 8 November 2022).

222 *CONTRACT to GENERAL DYNAMICS MISSION SYSTEMS, INC.* | USAspending, 22 Augustus 2019. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003019C0009_9700_-NONE_-NONE- (Accessed: 8 November 2023); *Contracts for August 22, 2019* (2019) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1941859/> (Accessed: 8 November 2023).

223 *CONTRACT to GENERAL DYNAMICS MISSION SYSTEMS, INC.* | USAspending, 1 October 2019. Available at: https://usaspending.gov/award/CONT_AWD_N0003020C0005_9700_-NONE_-NONE- (Accessed: 8 November 2023); *Contracts for December 16, 2019* (2019) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2041268/> (Accessed: 8 November 2023); *CONTRACT to GENERAL DYNAMICS MISSION SYSTEMS, INC.* | USAspending, 14 July 2022. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003022C1003_9700_-NONE_-NONE- (Accessed: 8 November 2023); *Contracts for July 14, 2022* (2022) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/3093802/> (Accessed: 8 November 2023); *CONTRACT to GENERAL DYNAMICS MISSION SYSTEMS, INC.* | USAspending, 16 November 2021. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003022C1005_9700_-NONE_-NONE- (Accessed: 8 November 2023); *Contracts for February 17, 2022* (2022) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/3442962/> (Accessed: 8 November 2023); *Contracts for June 28, 2023* (2023) U.S. Department of Defense. Available at: (Accessed: 25 January 2024).

224 *Contracts for September 21, 2017* (2017) U.S. Department of Defense.

Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 22 January 2024); *CONTRACT to ELECTRIC BOAT CORPORATION* | USAspending, 21 September 2017. Available at: [CONTRACT to ELECTRIC BOAT CORPORATION | USAspending](#) (Accessed: 22 January 2024).

225 'Nuclear Deterrent Systems, Modernization, Production, & Sustainment', *General Dynamics Mission Systems (2023)*. Available at: <https://gdmissonsyste.ms.com/-/media/general-dynamics/maritime-and-strategic-systems/pdf/strategic-weapon-deterrence-icbm-datasheet.ashx>; Mehta, Aaron,'Northrop teams with Lockheed on ICBM replacement. Here's who else is involved', *Defense News*, 16 September 2019. Available at: <https://www.defensenews.com/digital-show-dailies/afa-air-space/2019/09/16/northrop-teams-with-lockheed-on-icbm-replacement-heres-who-else-is-involved/> .

226 *What we do (2023)* | *Honeywell*. Available at: <https://www.honeywell.com/us/en/company/about-us> .

227 '2022 Annual Report. The Future is What We Make it', *Honeywell (2023)*, p. 52. Available at: [bcad5ff0-8046-496c-aea3-af0024981dccc \(honeywell.com\)](#).

228 Mehta, Aaron,'Northrop teams with Lockheed on ICBM replacement. Here's who else is involved', *Defense News*, 16 September 2019. Available at: <https://www.defensenews.com/digital-show-dailies/afa-air-space/2019/09/16/northrop-teams-with-lockheed-on-icbm-replacement-heres-who-else-is-involved/>; 'Our Sentinel (GBSD) nationwide team will involve over 10,000 people across the United States directly working on this vital national security program', *Northrop Grumman (2021)*. Available at: [Northrop Grumman GBSD Nationwide Team](#).

229 *Solicitation # FA8214-17-R-PIGA- GovTribе (2016)* GovTribе. Available at: [PIGA Floaт FA8214-17-R-PIGA \(govtribe.com\)](#) (Accessed: 9 November 2023).

230 *CONTRACT to HONEYWELL INTERNATIONAL INC.* | USAspending, 21 March 2022. Available at: https://www.usaspending.gov/award/CONT_AWD_FA821422C0002_9700_-NONE_-NONE- (Accessed: 9 November 2023); *Contracts for March 21, 2022* (2022) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 8 November 2023).

231 *FEDERAL SOLUTIONS - PERFORMANCE YOU CAN TRUST (2023)* | Honeywell Aerospace. Available at: [Federal Solutions \(honeywell.com\)](#).

232 Ibid.

233 *Honeywell Exits Savannah River Nuclear Solutions Joint Venture*. Honeywell, 3 July 2023. Available at: <https://www.honeywell.com/us/en/press/2023/07/honeywell-exits-savannah-river-nuclear-solutions-joint-venture>.

234 *Nuclear Security Mission (2023)* | *Kansas City National Security Campus*. Available at: <https://kcncs.doe.gov/missions/nuclear-security-mission> .

235 *Kansas City National Security Campus contract (2017)* Energy.gov. Available at: <https://www.energy.gov/nnsa/kansas-city-national-security-campus-contract> (Accessed: 9 November 2023).

236 'W88 Alteration 370 Program' (2023). *National Nuclear Security Administration*. Available at: <https://www.energy.gov/nnsa/articles/w88-alteration-370-fact-sheet>.

237 'W80-4 Life Extension Program' (2022). *National Nuclear Security Administration*. Available at: <https://www.energy.gov/nnsa/articles/w80-4-life-extension-program-lep-fact-sheet>.

238 'B61-12 Life Extension Program' (2023). *National Nuclear Security Administration*. Available at: <https://www.energy.gov/sites/default/files/2023-04/B61-12%20042023.pdf>.

239 *CONTRACT to HONEYWELL INTERNATIONAL INC.* | USAspending, 9 July 2015. Available at: [CONTRACT to HONEYWELL INTERNATIONAL INC. | USAspending](#) (Accessed: 9 November 2023).

240 'W88 Alteration 370 Program' (2023). *National Nuclear Security Administration*. Available at: [W88-ALT370_1123.pdf \(energy.gov\)](#).

241 'W39/Mk7 Acquisition Program' (2023). *National Nuclear Security Administration*. Available at: [W93_1123.pdf \(energy.gov\)](#).

242 'W87-1 Modification Program' (2019). *National Nuclear Security Administration*. Available at: [2019-03-08-FACTSHEET-W87-1.pdf \(energy.gov\)](#).

243 'W80-4 Life Extension Program'(2023). *National Nuclear Security Administration*. Available at: [W80-4_1123.pdf \(energy.gov\)](#).

244 'B61-12 Life Extension Program' (2023). *National Nuclear Security Administration*. Available at: [B61-12_042023.pdf \(energy.gov\)](#).

245 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-26 – F-27. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

246 'W76-1 Life Extension Program' (2019). *National Nuclear Security Administration*. Available at: [https://www.energy.gov/sites/prod/files/2019/02/f59/02-13-2019-Factsheet-W76-1%20LEP.pdf](#).

247 *CONTRACT to NATIONAL TECHNOLOGY & ENGINEERING SOLUTIONS OF SANDIA, LLC* | USAspending, 18 January 2017. Available at: [CONTRACT to | USAspending](#) (Accessed: 9 November 2023); *About Sandia (2022)* | *Sandia National Laboratories*. Available at: [About Sandia – Sandia National Laboratories](#).

248 Universities Research Association, Inc., (URA), is a consortium of over 90 leading research-oriented universities, primarily in the United States, and in Canada, Italy, Japan, and the United Kingdom. See *Sandia National Lab (2023)* | *URA*. Available at: [https://ura-hq.org/programs/sandia-national-lab/](#).

249 *Sandia National Laboratories contract (2017) Energy.gov*, Section J, Appendix D, page 4. Available at: [Sandia National Laboratories Contract | Department of Energy](#) (Accessed: 11 December 2023).

250 *NNSA announces exercise of terms for Nevada National Security Site management and operating contract*. NNSA, 17 August 2022. Available at: [https://www.energy.gov/nnsa/articles/nnsa-announces-exercise-terms-nevada-national-security-site-management-and-operating](#).

251 'FY 2023 - DOE/NNSA Strategic Performance Evaluation and Measurement Plan (PEMP)', *Energy.gov (2022)*, p. 6. Available at: [https://www.energy.gov/nnsa/articles/fy2023-strategic-performance-evaluation-and-measurement-plan-mission-support-test](#).

252 Ibid.

253 *CONTRACT to MISSION SUPPORT AND TEST SERVICES LLC* | USAspending, 1 August 2017. Available at: [CONTRACT to MISSION SUPPORT AND TEST SERVICES LLC | USAspending](#) (Accessed: 9 November 2023).

254 *Who We Are (2023)* | *Huntington Ingalls Industries*. Available at: [https://huntingtoningalls.com/who-we-are/](#).

255 Ibid.

256 'Delivering to an all-domain advantage. 2022 Annual report', *Huntington Ingalls Industries (2023)*, p. 4 and 38. Available at: [HII_2022_Annual-Report.pdf \(q4cdn.com\)](#).

257 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, p. F-15. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

258 *NNSA approves start of construction for plutonium pit production subproject at Los Alamos National Laboratory*. Energy.gov, 9 February 2023. Available at: [NNSA approves start of construction for plutonium pit production subproject at Los Alamos National Laboratory | Department of Energy](#).

259 The joint venture includes two integrated subcontractors: Huntington Ingalls Industries and Fluor, and three small business subcontractors: Longenecker & Associates, Merrick-SMSI and TechSource. See *About Us (no date)* | *Triad National Security, LLC*. Available at: [https://triadns.org/](#) (Accessed: 26 November 2022).

260 *About Us (no date)* | *Triad National Security, LLC*. Available at: [Home \(triadns.org\)](#) (Accessed: 7 December 2023); *Huntington Ingalls Industries to Support New Management Contract at Los Alamos National Laboratory*. Huntington Ingalls Newsroom, 10 July 2018. Available at: [https://newsroom.huntingtoningalls.com/releases/huntington-ingalls-industries-to-support-new-management-contract-at-los-alamos-national-laboratory](#).

261 *CONTRACT to TRIAD NATIONAL SECURITY, LLC* | USAspending, 8 June 2018. Available at: [https://www.usaspending.gov/award/CONT_AWD_89233218CNA000001_8900_-NONE_-NONE-](#) (Accessed: 7 December 2023). See also *NNSA announces extension of terms for Los Alamos National Laboratory management and operating contract*. Energy.gov, 6 December 2022. Available at: [NNSA announces extension of terms for Los Alamos National Laboratory management and operating contract | Department of Energy](#).

262 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. 4-20 - 4-21. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

263 *Nevada National Security Site Contract (2017) Energy.gov*. Available at: [Nevada National Security Site Contract | Department of Energy](#) (Accessed: 7 December 2023).

264 *Welcome to the Mission Support and Test Services (MSTS) Transition Web Site (2023)* | *Jacobs Technology*. Available at: [Mission Support and Test Services \(MSTS\): Welcome \(jacobstechnology.com\)](#).

265 *CONTRACT to MISSION SUPPORT AND TEST SERVICES LLC*. | USAspending, 1 August 2017. Available at: [CONTRACT to MISSION SUPPORT AND TEST SERVICES LLC | USAspending](#) (Accessed: 7 December 2023).

266 *Our parent companies (2023)* | *About SRNS*. Available at: [SRNS - Our Parent Companies \(savannahrivernuclearsolutions.com\)](#).

267 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-54 - F-56. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

268 *CONTRACT to SAVANNAH RIVER NUCLEAR SOLUTIONS LLC*. | USAspending, 10 January 2008. Available at: [CONTRACT to SAVANNAH RIVER NUCLEAR SOLUTIONS LLC | USAspending](#) (Accessed: 7 December 2023).

269 *U.S. Department of Energy Extends Fluor-led Savannah River Site Management and Operating Contract through September 2027*. FLUOR News Release, 29 September 2022. Available at [https://newsroom.fluor.com/news-releases/news-details/2022/U.S.-Department-of-Energy-Extends-Fluor-led-Savannah-River-Site-Management-and-Operating-Contract-through-September-2027/default.aspx](#) (Accessed: 7 December 2023).

270 *Jacobs to Implement New Holding Company Structure*. Jacobs, 19 August 2022. Available at: [Jacobs to Implement New Holding Company Structure | Jacobs](#).

271 'Jacobs 2023 Factsheet', *Jacobs Engineering (2023)*. Available at: [Jacobs Company Fact Sheet](#).

272 *Jacobs Completes CH2M Acquisition, Creating \$15 Billion Professional Services Leader Focused on Delivering Innovative Solutions for a More Connected, Sustainable World*. Jacobs, 18 December 2017. Available at: [Investor Relations | Jacobs - Jacobs Completes CH2M Acquisition, Creating \\$15 Billion Professional Services Leader Focused on Delivering Innovative Solutions for a More Connected, Sustainable World](#).

273 *Jacobs to Spin-off and Merge its Critical Mission Solutions and Cyber & Intelligence Government Services Businesses with Amentum, Creating an Independent, Publicly Traded Company*. Jacobs, 20 November 2023. Available at: [Jacobs to Spin-off and Merge its Critical Mission Solutions and Cyber & Intelligence Government Services Businesses with Amentum, Creating an Independent, Publicly Traded Company | Jacobs](#).

274 *Team (no date)* | *Lawrence Livermore National Security, LLC* Available at: [https://www.llnslc.com/#team](#) (Accessed: 7 December 2023); *Supporting Our Nation's Weapons Defense System with Advanced Conduct of Operations and Best-in-Class Operational Readiness at Los Alamos National Laboratory (LANL)*. Amentum, 1 April 2020. Available at: [https://www.amentum.com/project/supporting-our-nations-weapons-defense-system-with-advanced-conduct-of-operations-at-los-alamos-national-labs/](#).

275 '2022 Integrated Annual Report. Accelerating the future', *Jacobs (2023)*, p.1. Available at: [2022 Jacobs Integrated Annual Report \(q4cdn.com\)](#).

276 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. 4-20 - 4-21. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

277 *Nevada National Security Site Contract (2017) Energy.gov*. Available at: [Nevada National Security Site Contract | Department of Energy](#) (Accessed: 7 December 2023).

278 *Welcome to the Mission Support and Test Services (MSTS) Transition Web Site (2023)* | *Jacobs Technology*. Available at: [Mission Support and Test Services \(MSTS\): Welcome \(jacobstechnology.com\)](#).

279 *CONTRACT to MISSION SUPPORT AND TEST SERVICES LLC*. | USAspending, 1 August 2017. Available at: [CONTRACT to MISSION SUPPORT AND TEST SERVICES LLC | USAspending](#) (Accessed: 7 December 2023).

280 *Our History (2023)* | *L3Harris™ Fast. Forward*. Available at: [https://www.l3harris.com/company/our-history](#).

281 Ibid.

282 '2022 Annual Report', *L3Harris Fast. Forward (2023)*, pp. 1 and 6. Available at: [L3Harris_2022AnnualReport_Web.pdf](#).

283 *Contracts for October 1, 2021 (2021) U.S. Department of Defense*. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/2796431/](#) (Accessed: 7 December 2023); *Contracts for September 29, 2023 (2023) U.S. Department of Defense*. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/3543791/](#) (Accessed: 26 January 2024).

284 *CONTRACT to INTERSTATE ELECTRONICS CORPORATION* | USAspending, 1 October 2021. Available at: [https://www.usaspending.gov/award/CONT_AWD_N0003022C2001_9700_-NONE_-NONE-](#) (Accessed: 7 December 2023);

285 *SOLID ROCKET MOTORS (2023)* | *L3Harris™ Fast. Forward*. Available at: [Solid Rocket Motors | L3Harris® Fast. Forward](#); *ICBM POST BOOST VEHICLES (2023)* | *L3Harris™ Fast. Forward*. Available at: [ICBM Post Boost Vehicles | L3Harris® Fast. Forward](#).

286 *LGM-35A SENTINEL (2023)* | *L3Harris™ Fast. Forward*. Available at: [LGM-35A Sentinel | L3Harris® Fast. Forward](#).

287 *Company (2023)* | *Leidos*. Available at: [https://www.leidos.com/company](#).

288 *Defense (2023)* | *Leidos*. Available at: [Defense Group | Leidos](#).

289 '2022 Annual Report', *Leidos (2023)*, p. 46. Available at: [LDOS_12_30_2022_FORM 10-K \(q4cdn.com\)](#).

290 *About (2023)* | *Consolidated Nuclear Security, LLC*. Available at: [https://cns-llc.us/about](#);

'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-47 – F-49 and F-61 – F-64. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

291 *Contract No. DE-NA0001942 (2018) Energy.gov*. Section J, Appendix A, Page 1. Available at: [https://www.energy.gov/nnsa/downloads/contract-no-de-na0001942](#) (Accessed: 8 December 2023); *CONTRACT to CONSOLIDATED NUCLEAR SECURITY LLC*. | USAspending', 8 January 2013. Available at: [https://www.usaspending.gov/award/CONT_AWD_DENA0001942_8900_-NONE_-NONE-](#) (Accessed: 8 December 2023).

292 'Back to square one for \$28B nuclear management contract', *Washington Technology*, 17 May 2022. Available at: [Back to square one for \\$28B nuclear management contract - Washington Technology](#); 'FY2019 Performance Evaluation Summary' (2020). *National Nuclear Security Administration*. Available at: [https://www.energy.gov/sites/prod/files/2020/06/f76/CNS%20FY2019%20PES%20%2012%20Jun%202020.pdf](#).

293 *NNSA announces contract extension to Consolidated Nuclear Security for the management and operation of the Y-12 National Security Complex and the Pantex Plant*. Energy.gov, 3 October 2022. Available at: [https://www.energy.gov/nnsa/articles/nnsa-announces-contract-extension-consolidated-nuclear-security-management-and](#).

294 *Profile (2023)* | *Leonardo*. Available at: [https://www.leonardocompany.com/en/about-us/profile](#).

295 *Succès du tir de qualification du missile air-sol moyenne portée amélioré (ASMPA) rénové, sans charge militaire*. Direction Générale de l'armement - Ministère des Armées (2022). Available at: [https://www.defense.gouv.fr/dga/actualites/succes-du-tir-qualification-du-missile-air-sol-moyenne-portee-ameliore-asmpe-renové-charge](#); *About Us (2023)* | *MBDA Systems*. Available at: [https://www.mbda-systems.com/about-us/](#).

296 '2022 Annual Report Summary', *Leonardo (2023)*, p. 6. Available at: [SintesiBilancio22_ESE_Digital_EN.pdf \(leonardo.com\)](#).

297 *ASMPA (2023)* | *MBDA*. Available at: [https://www.mbda-systems.com/product/asmpe/](#); 'Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2023), *RÉPUBLIQUE FRANÇAISE (2023)*, p. 31. Available at: [https://www.budget.gouv.fr/documentation/file-download/21423](#)

298 Ibid, p. 34.

299 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', *Bulletin of the Atomic Scientists*, 79:4, 272-281, p. 276. DOI: [https://doi.org/10.1080/00963402.2023.2223088](#);

'The ASN4G Hypersonic Missile for the Rafale Fighter Will Replace the ASMP-A Missile by 2035', *Defense Express*, 15 March 2023. Available at: [The ASN4G Hypersonic Missile for the Rafale Fighter Will Replace the ASMP-A Missile by 2035](https://doi.org/10.1080/00963402.2023.2223088) | *Defense Express* ([defence-ua.com](https://www.defence-ua.com)).

300 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', *Bulletin of the Atomic Scientists*, 79:4, 272-281, p. 276. DOI: <https://doi.org/10.1080/00963402.2023.2223088>;

'RAPPORT D'INFORMATION DÉPOSÉ en application de l'article 145 du Règlement PAR LA COMISION DE LA DÉFENSE NATIONALE ET DES FORCES ARMÉES portant recueil d'auditions de la commission sur la dissuasion nucléaire', *ASSEMBLÉE NATIONALE* (2023). Available at: [Rapport d'information n°1112 - 16e législature - Assemblée nationale](https://www.assemblee-nationale.fr) ([assemblee-nationale.fr](https://www.assemblee-nationale.fr)).

301 *Leonardo DRS Receives Over \$1 Billion to Support U.S. Navy's Columbia-Class Submarine Program*. Leonardo, 4 April 2023. Available at: [Leonardo DRS Receives Over \\$1 Billion to Support U.S. Navy's Columbia-Class Submarine Program](https://www.usaspending.gov/award/CONT_AWD_N0003016C0100_9700_-NONE_-NONE) | *Leonardo DRS*; *Leonardo DRS Awarded Contracts Valued at Over \$3 Billion for U.S. Navy's Columbia-Class Submarine Program*. Leonardo, 10 January 2024. Available at: [Leonardo DRS Awarded Contracts Valued at Over \\$3 Billion for U.S. Navy's Columbia-Class Submarine Program](https://www.usaspending.gov/award/CONT_AWD_N0003019C0100_9700_-NONE_-NONE) | *Leonardo DRS*.

302 'Lockheed Martin Corporation 2022 Annual Report', *Lockheed Martin* (2023) p. 3. Available at: [lockheed-martin-annual-report-2022.pdf](https://www.lockheedmartin.com) ([lockheedmartin.com](https://www.lockheedmartin.com)).

303 *Ibid*, p. 63.

304 Mehta, Aaron, 'Northrop teams with Lockheed on ICBM replacement. Here's who else is involved', *Defense News*, 16 September 2019. Available at: <https://www.defensenews.com/digital-show-dailies/afa-air-space/2019/09/16/northrop-teams-with-lockheed-on-icbm-replacement-heres-who-else-is-involved/>.

305 *Contracts for October 30, 2023* (2021) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023).

306 *Intercontinental Ballistic Missile ICBM* (2023) | *Lockheed Martin*. Available at: [Intercontinental Ballistic Missile ICBM](https://www.lockheedmartin.com).

307 *IDV to LOCKHEED MARTIN CORPORATION* | *USAspending*, 5 June 2019. Available at: [IDV to LOCKHEED MARTIN CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_FA820418C0009_9700_-NONE_-NONE) (Accessed 8 December 2023); *Contracts for April 16, 2019* (2019) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023).

308 *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 22 October 2019. Available at: [CONTRACT to LOCKHEED MARTIN CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_FA820418C0009_9700_-NONE_-NONE) (Accessed: 8 December 2023); *Contracts for August 4, 2021* (2021) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023).

309 *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 3 October 2017. Available at: https://www.usaspending.gov/award/CONT_AWD_FA820418C0009_9700_-NONE_-NONE (Accessed: 8 December 2023); *Contracts for October 3, 2017* (2017) *U.S. Department of Defense*. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/1333296/](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023).

310 *Contracts for October 3, 2017* (2017) *U.S. Department of Defense*. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/1333296/](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023).

311 Losey, Stephen, 'Northrop, Lockheed, Raytheon team up on Navy's E-XX 'doomsday' plane', *DefenseNews*, 3 April 2023. Available at:

[Northrop, Lockheed, Raytheon team up on Navy's E-XX 'doomsday' plane](https://www.lockheedmartin.com/en-us/products/trident-ii-d5-fleet-ballistic-missile.html) ([defensenews.com](https://www.lockheedmartin.com/en-us/products/trident-ii-d5-fleet-ballistic-missile.html)).

312 *Contracts for April 13, 2023* (2023) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_N0003016C0100_9700_-NONE_-NONE) (Accessed: 8 December 2023); *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 1 June 2021. Available at: [CONTRACT to LOCKHEED MARTIN CORP | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023).

313 *Trident II D5 Fleet Ballistic Missile* (2023) | *Lockheed Martin*. Available at: <https://www.lockheedmartin.com/en-us/products/trident-ii-d5-fleet-ballistic-missile.html>.

314 *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 14 July 2016. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003016C0100_9700_-NONE_-NONE (Accessed: 8 December 2023); *Contracts for July 14, 2016* (2016) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 31 January 2020. Available at: [CONTRACT to LOCKHEED MARTIN CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_N0003019C0100_9700_-NONE_-NONE) (Accessed: 8 December 2023); *Contracts for January 31, 2020* (2020) *U.S. Department of Defense*. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/2071889/](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 30 August 2019. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003019C0100_9700_-NONE_-NONE (Accessed: 8 December 2023); *Contracts for December 20, 2019* (2019) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 7 August 2020. Available at: [CONTRACT to LOCKHEED MARTIN CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *Contracts for September 30, 2020* (2020) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 31 July 2020. Available at: https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700 (Accessed: 8 December 2023);

CONTRACT to LOCKHEED MARTIN CORPORATION | *USAspending*, 10 August 2021. Available at: [CONTRACT to LOCKHEED MARTIN CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *Contracts for August 10, 2021* (2021) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023);

CONTRACT to LOCKHEED MARTIN CORPORATION | *USAspending*, 1 March 2021. Available at: [CONTRACT to LOCKHEED MARTIN CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *Contracts for March 1, 2021* (2021) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 16 June 2021. Available at: [CONTRACT to LOCKHEED MARTIN CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *Contracts for June 16, 2021* (2021) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023);

CONTRACT to LOCKHEED MARTIN CORPORATION | *USAspending*, 18 August 2022. Available at: [CONTRACT to LOCKHEED MARTIN CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *Contracts for August 18, 2022* (2022) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023);

CONTRACT to LOCKHEED MARTIN CORPORATION | *USAspending*, 3 August 2017. Available at: [CONTRACT to LOCKHEED MARTIN CORP | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *Contracts for September 29, 2017* (2017) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023);

CONTRACT to LOCKHEED MARTIN CORPORATION | *USAspending*, 1 October 2022; Available at: [CONTRACT to LOCKHEED MARTIN CORP | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700)

(Accessed: 8 December 2023); *Contracts for December 8, 2022* (2022) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023);

CONTRACT to LOCKHEED MARTIN CORPORATION | *USAspending*, 5 September 2023. Available at: [CONTRACT to LOCKHEED MARTIN CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *Contracts for September 6, 2023* (2023) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023).

315 *CONTRACT to LOCKHEED MARTIN CORPORATION* | *USAspending*, 1 April 2018; Available at: [CONTRACT to LOCKHEED MARTIN CORP | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023); *Contracts for April 1, 2019* (2019) *U.S. Department of Defense*. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/1802502/](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 8 December 2023).

316 *Who We Are* (2023) | *Northrop Grumman*. Available at: <https://www.northropgrumman.com/who-we-are>.

317 '2022 Annual Report', *Northrop Grumman* (2023), p. 33 Available at: [Northrop-Grumman-2022-Annual-Report-bookmarked-and-web-ready-FINAL.pdf](https://www.northropgrumman.com/2022-annual-report) ([agencyq.site](https://www.northropgrumman.com/2022-annual-report)).

318 'Veritas Capital Completes Acquisition of Northrop Grumman's IT and Mission Support Services Business', *Business Wire*, 1 February 2021. Available at: <https://www.businesswire.com/news/home/20210201005535/en/Veritas-Capital-Completes-Acquisition-of-Northrop-Grumman%E2%80%99s-IT-and-Mission-Support-Services-Business>.

319 *CONTRACT to PERATON INC.* | *USAspending*, 5 April 2021. Available at: https://www.usaspending.gov/award/CONT_AWD_FA873021F8503_9700_47Q_TCK18D0011_4732 (Accessed: 11 December 2023).

320 *Sandia National Laboratories contract* (2017) *Energy.gov*, Section J, Appendix D, page 4. Available at: [Sandia National Laboratories Contract | Department of Energy](https://www.energy.gov/contracts/sandia-national-laboratories-contract) (Accessed: 11 December 2023).

321 *CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION* | *USAspending*, 8 September 2020. Available at: [CONTRACT to NORTHROP GRUMMAN SYSTEMS CORP | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023); *Contracts for September 8, 2020* (2020) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023); *Sentinel – The Ground Based Strategic Deterrent* (2023) | *Northrop Grumman*. Available at: [Sentinel – The Ground Based Strategic Deterrent | Northrop Grumman](https://www.northropgrumman.com/sentinel).

322 *About* (2023) | *Consolidated Nuclear Security, LLC*. Available at: [https://cns-llc.us/about](https://www.cns-llc.us/about); 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), pp. F-47 – F-49 and F-61 – F-64. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf](https://www.energy.gov/contracts/fy24-ssmp-final-november-2023-0.pdf) ([energy.gov](https://www.energy.gov/contracts/fy24-ssmp-final-november-2023-0.pdf)).

323 *Contract No. DE-NA0001942* (2018) *Energy.gov*. Available at: <https://www.energy.gov/nnsa/downloads/contract-no-de-na0001942> (Accessed: 11 December 2023); *CONTRACT to CONSOLIDATED NUCLEAR SECURITY LLC.* | *USAspending*, 8 January 2013. Available at: https://www.usaspending.gov/award/CONT_AWD_DENA0001942_8900_-NONE_-NONE (Accessed: 11 December 2023).

324 'Back to square one for \$28B nuclear management contract', *Washington Technology*, 17 May 2022. Available at: [Back to square one for \\$28B nuclear management contract - Washington Technology](https://www.washingtontechnology.com/news/back-to-square-one-for-28-billion-nuclear-management-contract/); 'FY2019 Performance Evaluation Summary' (2020). *National Nuclear Security Administration*. Available at: <https://www.energy.gov/sites/prod/files/2020/06/f76/CNS%20FY2019%20PES%20%2012%20Jun%202020.pdf>.

325 *NNSA announces contract extension to Consolidated Nuclear Security for*

the management and operation of the Y-12 National Security Complex and the Pantex Plant. *Energy.gov*, 3 October 2022. Available at: <https://www.energy.gov/nnsa/articles/nnsa-announces-contract-extension-consolidated-nuclear-security-management-and>.

326 *CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION* | *USAspending*, 19 October 1999. Available at: [CONTRACT to NORTHROP GRUMMAN SPACE AND MISSION SYSTEMS CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023); *Contracts for August 4, 2014* (2014) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023);

327 *Propulsion Systems* (2023) | *Northrop Grumman*. Available at: <https://www.northropgrumman.com/space/propulsion-systems>.

328 *IDV to NORTHROP GRUMMAN SYSTEMS CORPORATION* | *USAspending*. Available at: [https://usaspending.gov/award/CONT_IDV_FA821421D0001_9700](https://www.usaspending.gov/award/CONT_IDV_FA821421D0001_9700) (Accessed: 11 December 2023); *Contracts for April 20, 2021* (2021) *U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2579547/> (Accessed: 11 December 2023);

IDV to NORTHROP GRUMMAN SYSTEMS CORPORATION | *USAspending*. Available at: https://www.usaspending.gov/award/CONT_IDV_FA821421D0002_9700 (Accessed: 11 December 2022); *Contracts for July 7, 2021* (2021) *U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2684977/> (Accessed: 11 December 2022).

329 *CONTRACT to ATK LAUNCH SYSTEMS INC.* | *USAspending*, 6 September 2018. Available at: https://www.usaspending.gov/award/CONT_IDV_FA831818D0001_9700 (Accessed: 11 December 2023); *Contracts for September 6, 2018* (2018) *U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1622674/> (Accessed: 11 December 2023).

330 *Propulsion Systems* (2023) | *Northrop Grumman*. Available at: <https://www.northropgrumman.com/space/propulsion-systems>.

331 *CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION* | *USAspending*, 1 October 2015. Available at: [CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023);

Contracts for November 4, 2015 (2015) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023); *Contracts for June 27, 2018* (2018) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023); *CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION* | *USAspending*, 10 November 2015. Available at: [CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 26 January 2024);

Contracts for November 10, 2015 (2015) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 26 January 2024);

332 *CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION* | *USAspending*, 1 October 2020. Available at: [CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023); *Contracts for October 1, 2020* (2020) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023).

333 *CONTRACT NORTHROP GRUMMAN SYSTEMS CORPORATION* | *USAspending*, 12 March 2019. Available at: [CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION | USAspending](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700) (Accessed: 11 December 2023); *Contracts for March 12, 2019* (2019) *U.S. Department of Defense*. Available at: [U.S. Department of Defense > Contract](https://www.usaspending.gov/award/CONT_AWD_S3309A20F0001_9700_N0003019G0053_9700)

[U.S. Department of Defense > Contract](#) (Accessed: 11 December 2023).

334 *CONTRACT NORTHROP GRUMMAN SYSTEMS CORPORATION* USAspending, 17 June 2022. Available at: [CONTRACT to NORTHROP GRUMMAN SYSTEMS CORPORATION | USAspending](#) (Accessed: 26 January 2024);
Contracts for June 17, 2022 (2022) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 26 January 2024).

335 *Northrop Grumman Continues B-2 Spirit Modernization*. Northrop Grumman, 25 August 2022. Available at: [Northrop Grumman Continues B-2 Spirit Modernization | Northrop Grumman](#).

336 *Company (2024) | Peraton*. Available at: [Company | Peraton; Peraton \(2024\) | Veritas Capital](#). Available at: [Veritas Capital](#).

337 *PERATON COMPLETES ACQUISITION OF PERSPECTA, CREATING LEADING MISSION CAPABILITY INTEGRATOR AND TRANSFORMATIVE ENTERPRISE IT PROVIDER*. Peraton, 6 May 2021. Available at: [Peraton Completes Acquisition of Perspecta, Creating Leading Mission Capability Integrator and Transformative Enterprise IT Provider | Peraton](#).

338 *Missions (2024) | Peraton*. Available at: [Missions | Peraton](#).

339 'PERATON 2022 EXPERT GUIDE', *Peraton (2022)*, p. 2. Available at: [2022-Peraton_ExpertGuide.pdf](#).

340 *CONTRACT to PERATON INC.* | USAspending, 5 April 2021. Available at: [https://www.usaspending.gov/award/CONT_AWD_FA873021F8503_9700_47Q_TCK18D0011_4732](#) (Accessed: 11 December 2023);

Contracts for March 19, 2021 (2021) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 27 January 2024).

341 *Sandia National Laboratories contract (2017) Energy.gov*, Section J, Appendix D, page 4. Available at: [Sandia National Laboratories Contract | Department of Energy](#) (Accessed: 11 December 2023).

342 'W88 Alteration 370 Program' (2023). *National Nuclear Security Administration*. Available at: [W88-ALT370_1123.pdf \(energy.gov\)](#).

343 'W39/Mk7 Acquisition Program' (2023). *National Nuclear Security Administration*. Available at: [W93_1123.pdf \(energy.gov\)](#).

344 'W87-1 Modification Program' (2019). *National Nuclear Security Administration*. Available at: [2019-03-08-FACTSHEET-W87-1.pdf \(energy.gov\)](#).

345 'W80-4 Life Extension Program'(2023). *National Nuclear Security Administration*. Available at: [W80-4_1123.pdf \(energy.gov\)](#).

346 'B61-12 Life Extension Program' (2023). *National Nuclear Security Administration*. Available at: [B61-12_042023.pdf \(energy.gov\)](#).

347 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-26 – F-27. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](#).

348 *IDV to PERATON INC.* | USAspending, 31 March 2021. Available at: [https://www.usaspending.gov/award/CONT_IDV_FA820721D1001_9700](#) (Accessed: 3 January 2024);
Contracts for March 25, 2021 (2021) U.S. Department of Defense. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/2550918//](#) (Accessed: 11 January 2024).

349 *About (2024) | Rolls-Royce*. Available at: [About | Rolls-Royce](#).

350 '2022 Full Year Results', *Rolls Royce (2023)*, p. 6. Available at: [Full Year Results Presentation 2022 \(rolls-royce.com\)](#).

351 *Submarines (2024) | Rolls-Royce*. Available at: [Submarines | Rolls-Royce](#).

352 'The United Kingdom's future nuclear deterrent: the 2019 update to Parliament' (2019) *GOV.UK*. Available at: [https://www.gov.uk/government/publications/the-united-kingdoms-future-nuclear-deterrent-the-2019-update-to-parliament/the-united-kingdoms-future-nuclear-deterrent-the-2019-update-to-parliament](#).

353 *Alliance partners (2024) | Dreadnought Alliance*. Available at: [Alliance partners - Dreadnought Alliance](#).

354 *More than £2 billion to boost UK submarine programme*. Government of the United Kingdom, 9 may 2022. Available at: [https://www.gov.uk/government/news/more-than-2-billion-to-boost-uk-submarine-programme](#).

355 *About (2023) | Rostec*. Available at: [https://rostec.ru/en/about/](#).

356 'Science. Overcoming Technologic Barriers. Annual Report, Rostec State Corporation 2019' *Rostec (2020)*, pp. 12-13. Available at: [https://rostec.ru/upload/iblock/baf/baf448d95ffa8611fad46e0df57032df.pdf](#).

357 *U.S. Treasury Sanctions Nearly 100 Targets in Putin's War Machine, Prohibits Russian Gold Imports* (press release). U.S. Department of the Treasury, 28 June 2022. Available at: [https://home.treasury.gov/news/press-releases/jy0838](#).

358 'Science. Overcoming Technologic Barriers. Annual Report, Rostec State Corporation 2019' *Rostec (2020)*, pp. 152 and 187. Available at: [https://rostec.ru/upload/iblock/baf/baf448d95ffa8611fad46e0df57032df.pdf](#).

359 Ibid.

360 *The First Upgraded Tu-160M has Proceeded to Official Integration Test*. Rostec, 6 July 2023. Available at: [The First Upgraded Tu-160M has Proceeded to Official Integration Test \(rostec.ru\)](#).

361 Hans M. Kristensen, Matt Korda & Eliana Reynolds (2023) 'Russian nuclear weapons, 2023', *Bulletin of the Atomic Scientists*, 79:3, 174-199, pp. 185-187. DOI: 10.1080/00963402.2023.2202542.

362 *The First Upgraded Tu-160M has Proceeded to Official Integration Test*. Rostec, 6 July 2023. Available at: [The First Upgraded Tu-160M has Proceeded to Official Integration Test \(rostec.ru\)](#).

363 *United Technologies and Raytheon Complete Merger of Equals Transaction*. Raytheon Technologies, 3 April 2020. Available at: [https://www.rtx.com/news/2020/04/03/united-technologies-and-raytheon-complete-merger-of-equals-transaction](#).

364 'FORM 8-K. CURRENT REPORT. Pursuant to Section 13 OR 15(d) of The Securities Exchange Act of 1934. *UNITED STATES SECURITIES AND EXCHANGE COMMISSION*, 17 July 2023. Available at: [SEC Filing | RTX](#).

365 *Our Businesses (2022) | Raytheon Technologies*. Available at: [Our Businesses | RTX](#).

366 '2022 Annual Report', *Raytheon Technologies (2023)*, p. 33. Available at: [765e55a0-fe27-4a6c-b5ac-649cf6fa71cc \(rtx.com\)](#).

367 *Contracts for July 1, 2021 (2021) U.S. Department of Defense*. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/2680485//](#) (Accessed: 11 December 2023).

368 Napoli, Jessica, *Collins Aerospace to deliver launch platform for*

ICBM modernization program. Collins Aerospace, 9 November 2020. Available at: [https://www.collinsaerospace.com/newsroom/News/2020/11/Collins-deliver-launch-platform-ICBM-modernization-program](#).

369 Ibid.

370 *CONTRACT to ROCKWELL COLLINS, INC.* | USAspending, 22 February 2022. Available at: [CONTRACT to ROCKWELL COLLINS, INC. | USAspending](#) (Accessed: 27 January 2024);
Contracts for February 22, 2022 (2022) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 27 January 2024).

371 *CONTRACT to RAYTHEON COMPANY* | USAspending, 27 September 2013. Available at: [https://www.usaspending.gov/award/CONT_AWD_FA820413C0009_9700_-NONE_-NONE-](#) (Accessed: 11 December 2023);
Contracts for September 26, 2016 (2016) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 11 December 2023).

372 *More than £2 billion to boost UK submarine programme*. Government of the United Kingdom, 9 may 2022. Available at: [https://www.gov.uk/government/news/more-than-2-billion-to-boost-uk-submarine-programme](#).

373 *Safran at a glance (no date) | Safran*. Available at: [https://www.safran-group.com/group/profile](#) (Accessed: 13 December 2023).

374 *Company profile (no date) | ArianeGroup*. Available at: [https://www.ariane-group/en/about-us/company-profile/](#) (Accessed: 13 December 2023).

375 '2022 UNIVERSAL REGISTRATION DOCUMENT: Including the Annual Financial Report and the Integrated Report', *Safran (2023)*, p. 124 Available at: [https://www.safran-group.com/media/450927/download](#).

376 *M51: A CENTRAL PART OF FRENCH DETERRENCE (no date) | ArianeGroup*. Available at: [https://www.ariane-group/en/defense/m51/](#) (Accessed: 13 December 2023).

377 Ibid.

378 *Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2024), RÉPUBLIQUE FRANÇAISE (2023)*, pp. 27-28. Available at: [https://www.budget.gouv.fr/documentation/file-download/21423](#).

379 Roxel is the European leader in tactical propulsion systems and a major player in world markets (2022) | *Roxel*. Available at: [https://www.roxelgroup.com/en/corporate/; Roxel \(2023\) | MBDA](#). Available at: [https://www.mbda-systems.com/polska/about-us/mbda-worldwide/roxel-2/](#).

380 Market segments: propulsion systems (2022) | *Roxel*. Available at: [https://www.roxelgroup.com/en/market-segments/](#).

381 *A FAMILY OF BUSINESSES AND POWERFUL BRANDS (2023) | Textron*. Available at: [Businesses | Textron](#).

382 *TEXTRON'S POWERFUL BRANDS (2023) | Textron*. Available at: [https://www.textron.com/](#).

383 'Textron 2022 Annual report', *Textron (2023)*, p. 1. Available at: [textron_2022_annual_-report.pdf \(q4cdn.com\)](#).

384 *CONTRACT to TEXTRON SYSTEMS CORPORATION* | USAspending, 27 September 2013. Available at: [https://www.usaspending.gov/award/CONT_AWD_FA820414C0011_9700_-NONE_-NONE-](#) (Accessed: 14 December 2023);

Contracts for July 12 2019 (2019) U.S. Department of Defense. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/1903937/](#) (Accessed: 14 December 2023).

385 *CONTRACT to TEXTRON SYSTEMS CORPORATION* | USAspending, 6 March 2014. Available at: [https://www.usaspending.gov/award/CONT_IDV_FA820414D0001_9700](#) (Accessed: 14 December 2023);
Contracts for February 25, 2019 (2019) U.S. Department of Defense. Available at: [https://www.defense.gov/News/Contracts/Contract/Article/1903937/](#) (Accessed: 14 December 2023).

386 *TEXTRON SYSTEMS AWARDED TASK ORDER FOR GROUND BASED STRATEGIC DETERRENT*. Textron Systems, 29 September 2020. Available at: [Textron Systems Awarded Task Order for Ground Based Strategic Deterrent | Textron Systems](#).

387 *About Thales (2023) | Thales Group*. Available at: [https://www.thalesgroup.com/en/global/group](#).

388 Ibid.

389 'Integrated Report. Corporate Responsibility 2021-2022', *Thales (2022)*, p. 48. Available at: [https://www.thalesgroup.com/sites/default/files/database/document/2022-06/Thales_IntegratedReport_0.pdf](#).

390 *Governance (2020) | Naval Group*. Available at: [https://www.naval-group.com/en/governance-26](#).

391 *Incorporating CSR principles all along the value chain (2023) | Thales*. Available at: [Incorporating CSR principles all along the value chain | Thales Group](#).

392 Thales Group, written response to PAX, dated 6 October 2023. See also 'Building a future we can all trust: Safer, greener and more inclusive', Thales' inaugural ESG Investor Day, *Thales (2021)*, p. 61. Available at: [Présentation PowerPoint \(thalesgroup.com\)](#).

393 *Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2024), RÉPUBLIQUE FRANÇAISE (2023)*, p. 29. Available at: [https://www.budget.gouv.fr/documentation/file-download/21423](#).

394 *ASMPA (2023) | MBDA Missile Systems*. Available at: [https://www.mbda-systems.com/product/asmpa/](#).

395 *Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2024), RÉPUBLIQUE FRANÇAISE (2023)*, p. 29. Available at: [https://www.budget.gouv.fr/documentation/file-download/21423](#).

396 *Submarines (2020) | Naval Group*. Available at: [Submarines | Naval Group \(naval-group.com\)](#).

397 Ibid; Nicolas Fiorenza, 'France launches SNLE 3G SSBN programme', *Janes*, 22 February 2021. Available at: [France launches SNLE 3G SSBN programme \(janes.com\)](#).

398 *Overview (no date) | Walchandnagar Industries*. Available at: [https://walchand.com/about-us/company-profile/overview/](#) (Accessed: 18 December 2023).

399 '114th Annual Report 2022-23', *Walchandnagar Industries (2023)*, p. 14. Available at: [Walchandnagar Annual Report_2023.pdf](#).

400 'DEFENSE, AEROSPACE, MISSILES', *WALCHANDNAGAR INDUSTRIES LIMITED (2015)*. Available at: <https://walchand.com/download.php?fp=https://walchand.com/wp-content/uploads/2015/07/WIL-Brochure-Defence-Aerospace-Missile-Reduced.pdf>.

401 'Corporate Presentation', *Walchannagar Industries (2012)*, p. 18. Available at: [Microsoft PowerPoint - WIL Corporate Presentation_2012 \(walchand.com\)](https://www.microsoft.com/ppt/Walchannagar-Industries-2012).

402 Hans M. Kristensen and Matt Korda (2022) 'Indian nuclear weapons, 2022', *Bulletin of the Atomic Scientists*, 78:4, 224-236, p. 231. DOI: 10.1080/00963402.2022.2087385.

403 Gady, Franz-Stefan, 'India Test Fires Short-Range Ballistic Missiles From Submerged Sub', *The Diplomat*, 22 August 2018. Available at: <https://thediplomat.com/2018/08/india-test-fires-short-range-ballistic-missiles-from-submerged-sub/>.

404 Hans Kristensen and Matt Korda, 'World Nuclear Forces', SIPRI Yearbook 2023, *Oxford University Press* (2023), p. 298.

405 Richard Sterk, 'India Levels Up in Nuclear Submarines', *Defense Security Monitor*, 1 May 2023. Available at: <https://dsm.forecastinternational.com/2023/05/01/india-levels-up-in-undersea-nuclear-submarines/>.

406 *Defence (no date)* | *Walchandnagar Industries*. Available at: <https://walchand.com/business-area/defence-missile/> (Accessed: 18 December 2023).

407 Hans M. Kristensen and Matt Korda (2022) 'Indian nuclear weapons, 2022', *Bulletin of the Atomic Scientists*, 78:4, 224-236, pp. 225 and 228. DOI: 10.1080/00963402.2022.2087385.

408 Ibid.

409 'What to expect from Agni-Prime, the new generation ballistic missile', *Business Standard*, 19 June 2023. Available at: [What to expect from Agni-Prime, the new generation ballistic missile \(business-standard.com\)](https://www.business-standard.com/article/what-to-expect-from-agni-prime-the-new-generation-ballistic-missile-1230619).

410 Ibid.

411 'India test-flies Agni-V ballistic missile', *Janes*, 16 December 2022. Available at: [India test-flies Agni-V ballistic missile \(janes.com\)](https://www.janes.com/article/118481/india-test-flies-agni-v-ballistic-missile).

412 Hans M. Kristensen and Matt Korda (2022) 'Indian nuclear weapons, 2022', *Bulletin of the Atomic Scientists*, 78:4, 224-236, pp. 225 and 228. DOI: 10.1080/00963402.2022.2087385; 'What to expect from Agni-Prime, the new generation ballistic missile', *Business Standard*, 19 June 2023. Available at: [What to expect from Agni-Prime, the new generation ballistic missile \(business-standard.com\)](https://www.business-standard.com/article/what-to-expect-from-agni-prime-the-new-generation-ballistic-missile-1230619).

413 'BHARAT DYNAMICS LIMITED CORPORATE PRESENTATION', *Bharat Dynamics Limited (2022)*, p. 3. Available at: [Intimation of Investors Meeting & Investor Presentation 14.12.2022.pdf \(bdl-india.in\)](https://www.bdlin.com/Investor-Presentation-14.12.2022.pdf). 'India conducts successful training launch of the Agni-1 Ballistic Missile', *Organiser*, 2 June 2023. Available at: [India conducts successful training launch of the Agni-1 Ballistic Missile \(organiser.org\)](https://www.organiser.org/article/india-conducts-successful-training-launch-of-the-agni-1-ballistic-missile).

414 'DEFENSE, AEROSPACE, MISSILES', *WALCHANDNAGAR INDUSTRIES LIMITED (2015)*. Available at: <https://walchand.com/download.php?fp=https://walchand.com/wp-content/uploads/2015/07/WIL-Brochure-Defence-Aerospace-Missile-Reduced.pdf>.

415 Hans M. Kristensen and Matt Korda (2022) 'Indian nuclear weapons, 2022', *Bulletin of the Atomic Scientists*, 78:4, 224-236, p. 228. DOI: 10.1080/00963402.2022.2087385.

416 'Nuclear capable Prithvi-2 missile successfully testfired at night', *The Economic Times*, last updated: 20 November 2019. Available at: <https://economictimes.indiatimes.com/news/defence/nuclear-capable-prithvi-2-missile-successfully-testfired-at-night/articleshow/72147446.cms>.

417 *Le missile air-sol moyenne portée amélioré (ASMPA) (no date)* | *Direction générale de l'armement*. Available at: <https://www.defense.gouv.fr/dga/missile-air-sol-moyenne-portee-ameliore-asmpa> (Accessed at: 18 January 2024).

418 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', *Bulletin of the Atomic Scientists*, 79:4, 272-281, p. 276. DOI: <https://doi.org/10.1080/00963402.2023.2223088>; *ASMPA (2024)* | *MBDA*. Available at: [ASMPA | Air Dominance, DEEP STRIKE | MBDA \(mbda-systems.com\)](https://www.mbdasystems.com/ASMPA).

419 *Le missile air-sol moyenne portée amélioré (ASMPA) (no date)* | *Direction générale de l'armement*. Available at: <https://www.defense.gouv.fr/dga/missile-air-sol-moyenne-portee-ameliore-asmpa> (Accessed at: 18 January 2024); *About Us (2024)* | *MBDA Systems*. Available at: <https://www.mbdasystems.com/about-us/>.

420 Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2023: Équipement des forces' (2024), *RÉPUBLIQUE FRANÇAISE (2023)*, p. 29. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

421 Roxel is the European leader in tactical propulsion systems and a major player in world markets (2022) | *Roxel*. Available at: <https://www.roxelgroup.com/en/corporate/>; *Roxel (2023)* | *MBDA*. Available at: <https://www.mbdasystems.com/polska/about-us/mbda-worldwide/roxel-2/>.

422 Market segments: propulsion systems (2022) | *Roxel*. Available at: <https://www.roxelgroup.com/en/market-segments/>.

423 *Market segments: propulsion systems (no date)* | *Roxel Propulsion Systems*. Available at: <https://www.roxelgroup.com/en/market-segments/> (Accessed: 16 November 2022);

'MBDA opens data centre in France for missile development', *AIRFORCE TECHNOLOGY*, 5 April 2019. Available at: <https://www.airforce-technology.com/news/mbda-data-centre-france-missiles/>.

424 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', *Bulletin of the Atomic Scientists*, 79:4, 272-281, p. 276. DOI: <https://doi.org/10.1080/00963402.2023.2223088>; 'The ASN4G Hypersonic Missile for the Rafale Fighter Will Replace the ASMP-A Missile by 2035', *Defense Express*, 15 March 2023. Available at: [The ASN4G Hypersonic Missile for the Rafale Fighter Will Replace the ASMP-A Missile by 2035 | Defense Express \(defence-ua.com\)](https://www.defence-express.com/news/the-asn4g-hypersonic-missile-for-the-rafale-fighter-will-replace-the-asmp-a-missile-by-2035).

425 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', *Bulletin of the Atomic Scientists*, 79:4, 272-281, p. 276. DOI: <https://doi.org/10.1080/00963402.2023.2223088>;

'RAPPORT D'INFORMATION DÉPOSÉ en application de l'article 145 du Règlement PAR LA COMISION DE LA DÉFENSE NATIONALE ET DES FORCES ARMÉES portant recueil d'auditions de la commission sur la dissuasion nucléaire', *ASSEMBLÉE NATIONALE (2023)*. Available at: [Rapport d'information n°112 - 16e législature - Assemblée nationale \(assemblee-nationale.fr\)](https://www.assemblee-nationale.fr/16/legislature/16e-legislature/rapport-d-information-n112-16e-legislature).

426 'Budget Général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement Des Forces' (2023), *RÉPUBLIQUE FRANÇAISE*, p. 34. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

427 Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2024), *RÉPUBLIQUE FRANÇAISE (2023)*, p. 27. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

428 Ibid.

429 Ibid.

430 Hans M. Kristensen, Matt Korda, and Eliana Johns, 'French Nuclear Weapons, 2023', *Bulletin of the Atomic Scientists*, 79:4, 272-281, p. 275. DOI: <https://doi.org/10.1080/00963402.2023.2223088>; Pierre Tran, 'France makes progress on refitting submarine for M51 missiles', *DEFENSE NEWS*, 23 July 2018. Available at: <https://www.defensenews.com/naval/2018/07/23/france-makes-progress-on-refitting-submarine-for-m51-missiles/>.

431 Projet annuel de performances. Budget général. Programme 146. Projets Annuels de Performances. Annexe au Projet de Loi de Finances pour 2024: Équipement des forces' (2024), *RÉPUBLIQUE FRANÇAISE (2023)*, pp. 27-28. Available at: <https://www.budget.gouv.fr/documentation/file-download/21423>.

432 Ibid, p. 29.

433 'B61-12 Life Extension Program' (2021). *National Nuclear Security Administration*. Available at: <https://www.energy.gov/sites/default/files/2021-12/B61-12%20Fact%20Sheet%20December%202021.pdf>.

434 Hans M. Kristensen and Matt Korda (2023) 'United States nuclear weapons, 2023', *Bulletin of the Atomic Scientists*, 79:1, 28-52, p. 43. DOI: 10.1080/00963402.2022.2156686.

435 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. 2-9 - 2-10. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](https://www.energy.gov/sites/default/files/2023-09/FY24SSMP_FINAL_NOVEMBER_2023_0.pdf).

436 'B61-12 Life Extension Program' (2021). *National Nuclear Security Administration*. Available at: <https://www.energy.gov/sites/default/files/2021-12/B61-12%20Fact%20Sheet%20December%202021.pdf>.

437 Johnson, R.C., Deputy Assistant Secretary of Defense for Nuclear and Countering Weapons of Mass Destruction Policy, *Statement at Carnegie International Nuclear Policy Conference, Washington DC, 28 October 2022*, p. 15. Available at: [Parsing+the+2022+U.S.+Nuclear+Posture+Review.pdf \(ceipfiles.s3.amazonaws.com\)](https://www.ceipfiles.s3.amazonaws.com/parsing+the+2022+U.S.+Nuclear+Posture+Review.pdf).

438 'US planning to station nuclear weapons in UK amid threat from Russia – report', *The Guardian*, 27 January 2024. Available at: [US planning to station nuclear weapons in UK amid threat from Russia – report | UK news | The Guardian](https://www.theguardian.com/world/2024/jan/27/us-planning-to-station-nuclear-weapons-in-uk-amid-threat-from-russia-report). Matt Korda & Hans Kristensen, 'Increasing Evidence That The US Air Force's Nuclear Mission May Be Returning To UK Soil', *Federation of American Scientists Blogs*, 28 August 2023. Available at: [Increasing Evidence that the US Air Force's Nuclear Mission May Be Returning to UK Soil - Federation of American Scientists \(fas.org\)](https://www.fas.org/blogs/security/2023/08/increasing-evidence-that-the-us-air-force-s-nuclear-mission-may-be-returning-to-uk-soil). See also Hans Kristensen, 'Lakenheath Air Base Added To Nuclear Weapons Storage Site Upgrades', *Federation of American Scientists Blogs*, 11 April 2022. Available at: [https://fas.org/blogs/security/2022/04/lakenheath-air-base-added-to-nuclear-weapons-storage-site-upgrades/](https://www.fas.org/blogs/security/2022/04/lakenheath-air-base-added-to-nuclear-weapons-storage-site-upgrades/).

439 Aaron Mehta, 'How a \$5 part used to modernize nuclear warheads could cost \$850 million to fix, Defense News', *DEFENSE NEWS*, 26 September 2019. Available at: <https://www.defensenews.com/smr/nuclear-arsenal/2019/09/25/nuclear-warhead-programs-need-850m-fix-heres-how-the-government-plans-to-cover-it/>.

440 *CONTRACT to BOEING COMPANY, THE* | USAspending, 2 July 2018. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1825952/> (Accessed: 26 October 2023); *Contracts for June 12, 2020 (2020) U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2218996/> (Accessed: 26 October 2023).

441 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration (2023)*, pp. F-15 - F-27. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf \(energy.gov\)](https://www.energy.gov/sites/default/files/2023-09/FY24SSMP_FINAL_NOVEMBER_2023_0.pdf).

442 Ibid, p. F-49.

443 Ibid, pp. F-61 - F-62 and F-64.

444 Ibid, p. F-42; 'B61-12 Life Extension Program' (2021). *National Nuclear Security Administration*. Available at: <https://www.energy.gov/sites/default/files/2021-12/B61-12%20Fact%20Sheet%20December%202021.pdf>.

445 *Kansas City National Security Campus contract (2017) Energy.gov*. Available at: <https://www.energy.gov/nnsa/kansas-city-national-security-campus-contract> (Accessed: 9 November 2023); *CONTRACT to NATIONAL TECHNOLOGY & ENGINEERING SOLUTIONS OF SANDIA, LLC* | USAspending, 18 January 2017. Available at: [CONTRACT to | USAspending](https://www.usaspending.gov/contracts/contract-to-national-technology-engineering-solutions-of-sandia-llc) (Accessed: 9 November 2023); *About Sandia (2022)* | *Sandia National Laboratories*. Available at: [About Sandia – Sandia National Laboratories](https://www.sandia.gov/).

446 *Department of Defense Announces Pursuit of B61 Gravity Bomb Variant*. US Department of Defense, 27 October 2023. Available at: [Department of Defense Announces Pursuit of B61 Gravity Bomb Variant > U.S. Department of Defense > Release](https://www.defense.gov/News/Announcements/Pursuit-of-B61-Gravity-Bomb-Variant).

447 Hans Kristensen & Matt Korda, 'Biden Administration Decides To Build A New Nuclear Bomb To Get Rid Of An Old Bomb', *Federation of American Scientists Blogs*, 27 October 2023. Available at: [Biden Administration Decides To Build A New Nuclear Bomb to Get Rid Of An Old Bomb - Federation of American Scientists \(fas.org\)](https://www.fas.org/blogs/security/2023/10/biden-administration-decides-to-build-a-new-nuclear-bomb-to-get-rid-of-an-old-bomb).

448 Hans M. Kristensen and Matt Korda (2023) 'United States nuclear weapons, 2023', *Bulletin of the Atomic Scientists*, 79:1, 28-52, p. 35. DOI: 10.1080/00963402.2022.2156686.

449 Ibid, p. 15.

450 *CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC.* | USAspending, 1 August 2013. Available at: https://www.usaspending.gov/award/CONT_AWD_FA821413C0001_9700_-NONE_-NONE (Accessed: 16 October 2023); *Contracts for July 31, 2014 (2014) U.S. Department of Defense*. Available at: [> U.S. Department of Defense > Contract](https://www.defense.gov/News/Contracts/Contract/Article/3284067/) (Accessed: 16 October 2023); *Contracts for July 31, 2014 (2014) U.S. Department of Defense*. Available at: [> U.S. Department of Defense > Contract](https://www.defense.gov/News/Contracts/Contract/Article/3284067/) (Accessed: 16 October 2023); *Contracts for January 31, 2023 (2023) U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/3284067/> (Accessed: 26 October 2023).

451 *LGM-35A Sentinel (2023)* | *L3Harris*. Available at: [LGM-35A Sentinel | L3Harris* Fast Forward](https://www.l3harris.com/Products/Programs/L3Harris-Fast-Forward).

452 *CONTRACT to BOEING COMPANY* | USAspending, 14 January 2015. Available at: [https://usaspending.gov/award/CONT_AWD_FA821415C0001_9700_-NONE_-NONE](https://www.usaspending.gov/award/CONT_AWD_FA821415C0001_9700_-NONE_-NONE) (Accessed: 19 January 2024).

453 *CONTRACT to HONEYWELL INTERNATIONAL INC.* | USAspending, 21 March 2022. Available at: https://www.usaspending.gov/award/CONT_AWD_FA821422C0002_9700_-NONE_-NONE (Accessed: 9

November 2023); *Contracts for March 21, 2022* (2022) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 8 November 2023).

454 *CONTRACT to TEXTRON SYSTEMS CORPORATION* | USAspending, 27 September 2013. Available at: https://www.usaspending.gov/award/CONT_AWD_FA820414C0011_9700_-NONE_-NONE (Accessed: 14 December 2023); *Contracts for July 12 2019* (2019) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1903937/> (Accessed: 14 December 2023).

455 *Intercontinental Ballistic Missile ICBM (2024)* | Lockheed Martin. Available at: <https://www.lockheedmartin.com/en-us/products/icbm.html> *CONTRACT to LOCKHEED MARTIN CORPORATION*, | USAspending, 3 October 2017. Available at: https://www.usaspending.gov/award/CONT_AWD_FA820418C0009_9700_-NONE_-NONE (Accessed: 19 January 2024).

456 *Propulsion Systems (2023)* | Northrop Grumman. Available at: <https://www.northropgrumman.com/space/propulsion-systems>.

457 *Contract builds on Peraton's 45-year track record delivering critical software validation support to the Minuteman III ICBM System*. Peraton, 28 April 2021. Available at: [Peraton Receives \\$360M Air Force Contract to Support Minuteman III ICBM System](#) | Peraton.

458 *CONTRACT to RAYTHEON COMPANY* | USAspending, 27 September 2013. Available at: https://www.usaspending.gov/award/CONT_AWD_FA820413C0009_9700_-NONE_-NONE (Accessed: 11 December 2023); *Contracts for September 26, 2016* (2016) U.S. Department of Defense. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 11 December 2023).

459 *Sentinel – The Ground Based Strategic Deterrent (2023)* | Northrop Grumman. Available at: [Sentinel – The Ground Based Strategic Deterrent](#) | Northrop Grumman.

460 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), p. 8-31. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf](#) (energy.gov); 'W87-1 Modification Program' (2023). *National Nuclear Security Administration*. Available at: [W87-1_1123.pdf](#) (energy.gov); Hans M. Kristensen and Matt Korda (2023) 'United States nuclear weapons, 2023', *Bulletin of the Atomic Scientists*, 79:1, 28-52, pp. 36-37. DOI: /10.1080/00963402.2022.2156686.

461 John A. Tirpak, 'New ICBM Has 'Critical' Cost and Schedule Overruns, Needs SecDef Certification to Continue', *Air & Space Forces Magazine*, 18 January 2024. Available at: [New ICBM Has 'Critical' Cost and Schedule Overruns](#) (airandspaceforces.com).

462 Ibid, p. 36.

463 Noel Oman, 'News in brief', ARKANSAS DEMOCRAT GAZETTE, 26 April 2019. Available at: <https://www.arkansasonline.com/news/2019/apr/26/news-in-brief-20190426/>; *Aerjet Rocketdyne Expands Solid Rocket Motor Center of Excellence at Arkansas Facility*, Aerjet Rocketdyne, 15 August 2018. Available at: <https://www.rocket.com/article/aerjet-rocketdyne-expands-solid-rocket-motor-center-excellence-arkansas-facility>.

464 *LGM-35A SENTINEL (2023)* | L3HarrisTM Fast. Forward. Available at: [LGM-35A Sentinel](#) | L3Harris® Fast. Forward.

465 *Company adds Bechtel and Kratos Defense and Security Solutions to its nationwide team*. Northrop Grumman, 25 February 2020. Available at: [Northrop Grumman Expands its Ground Based Strategic Deterrent Nationwide Team](#) |

[Northrop Grumman](#); *Modernizing the Nation's Aging Intercontinental Ballistic Missile (ICBM) System (2023)* | Bechtel. Available at: [Sentinel](#) | Bechtel.

466 'Nuclear Deterrent Systems, Modernization, Production, & Sustainment', General Dynamics Mission Systems (2023). Available at: <https://gdmissonsyste.ms.com/-/media/general-dynamics/maritime-and-strategic-systems/pdf/strategic-weapon-deterrence-icbm-datasheet.ashx>; Mehta, Aaron,'Northrop teams with Lockheed on ICBM replacement. Here's who else is involved', *Defense News*, 16 September 2019. Available at: <https://www.defensenews.com/digital-show-dailies/afa-air-space/2019/09/16/northrop-teams-with-lockheed-on-icbm-replacement-heres-who-else-is-involved/>.

467 Aaron Mehta, 'Northrop teams with Lockheed on ICBM replacement. Here's who else is involved', *DEFENSE NEWS*, 16 September 2019. Available at: <https://www.defensenews.com/digital-show-dailies/afa-air-space/2019/09/16/northrop-teams-with-lockheed-on-icbm-replacement-heres-who-else-is-involved/>

468 Aaron Mehta, 'Northrop teams with Lockheed on ICBM replacement. Here's who else is involved', *DEFENSE NEWS*, 16 September 2019. Available at: <https://www.defensenews.com/digital-show-dailies/afa-air-space/2019/09/16/northrop-teams-with-lockheed-on-icbm-replacement-heres-who-else-is-involved/>

469 Napoli, Jessica, *Collins Aerospace to deliver launch platform for ICBM modernization program*. Collins Aerospace, 9 November 2020. Available at: <https://www.collinsaerospace.com/newsroom/News/2020/11/Collins-deliver-launch-platform-ICBM-modernization-program>.

470 *TEXTRON SYSTEMS AWARDED TASK ORDER FOR GROUND BASED STRATEGIC DETERRENT*. Textron Systems, 29 September 2020. Available at: [Textron Systems Awarded Task Order for Ground Based Strategic Deterrent](#) | Textron Systems.

471 Hans M. Kristensen and Matt Korda (2023) 'United States nuclear weapons, 2023', *Bulletin of the Atomic Scientists*, 79:1, 28-52, pp. 29 and 31. DOI: /10.1080/00963402.2022.2156686.

472 Ibid, p. 41.

473 John A. Tirpak, 'New Details of Secret LRSO Missile: Nine Successful Flight Tests in 2022', *Air & Space Forces Magazine*, 2 October 2023. Available at: [New Details of Secret LRSO Missile: Nine Successful Flight Tests in 2022](#) (airandspaceforces.com).

474 Ibid.

475 *CONTRACT to BOEING COMPANY, THE*.| USAspending, 17 May 2018. Available at: https://www.usaspending.gov/award/CONT_AWD_FA811919F0094_9700_FA811914D000_3_9700 (Accessed: 26 October 2023); *Contracts for May 10, 2018* (2018) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1518141/> (Accessed: 26 October 2023); *IDV to BOEING COMPANY, THE*.| USAspending', 15 March 2019. Available at: [IDV to BOEING COMPANY, THE](#) | USAspending (Accessed: 26 October 2023); *Contracts for March 13, 2019* (2019) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1784315/> (Accessed: 26 October 2023).

476 John A. Tirpak, 'New Details of Secret LRSO Missile: Nine Successful Flight Tests in 2022', *Air & Space Forces Magazine*, 2 October 2023. Available at: [New Details of Secret LRSO Missile: Nine Successful Flight Tests in 2022](#) (airandspaceforces.com).

477 'Defense Primer: Strategic Nuclear Forces', *Congressional Research Service*, updated: 19 May 2023. Available at: [IF10519](#) (congress.gov).

478 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), p. 2-10. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf](#) (energy.gov).

479 'W80-4 Life Extension Program' (2023). *National Nuclear Security Administration*. Available at: [W80-4_1123.pdf](#) (energy.gov).

480 *Contracts for March 13, 2019* (2019) US Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/1784315/>;

IDV to BOEING COMPANY, THE.| USAspending, 22 March 2019. Available at: https://www.usaspending.gov/award/CONT_IDV_FA865019D2055_9700 (Accessed: 19 January 2024); Hans M. Kristensen and Matt Korda (2023) 'United States nuclear weapons, 2023', *Bulletin of the Atomic Scientists*, 79:1, 28-52, p. 42. DOI: /10.1080/00963402.2022.2156686.

481 *CONTRACT to NATIONAL TECHNOLOGY & ENGINEERING SOLUTIONS OF SANDIA, LLC* | USAspending, 18 January 2017. Available at: [CONTRACT to](#) | USAspending (Accessed: 9 November 2023); *About Sandia (2022)* | Sandia National Laboratories. Available at: About Sandia – Sandia National Laboratories; 'W80-4 Life Extension Program'(2023). *National Nuclear Security Administration*. Available at: [W80-4_1123.pdf](#) (energy.gov).

482 *Sandia National Laboratories contract* (2017) *Energy.gov*, Section J, Appendix D, page 4. Available at: [Sandia National Laboratories Contract](#) | Department of Energy (Accessed: 11 December 2023).

483 *Contracts for July 1, 2021* (2021) U.S. Department of Defense. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2680485/> (Accessed: 11 December 2023).

484 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), pp. F-47 – F-49 and F61 – F64. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf](#) (energy.gov).

485 Ibid, pp. F-47 – F-49; *About (2024)* | Pantex. Available at: [About](#) | Pantex Plant (energy.gov).

486 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), pp. F-61 – F-64. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf](#) (energy.gov).

487 *About (2024)* | Consolidated Nuclear Security, LLC. Available at: <https://cns-llc.us/about>.

488 Ibid.

489 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), pp. F-54 – F-56. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf](#) (energy.gov).

490 Ibid.

491 *Our Parent Companies (2010)* | Savannah Rives Nuclear Solutions. Available at: <https://www.savannahrivesnuclearsolutions.com/about/parent.htm>

492 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), pp. F-38 – F-41. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf](#) (energy.gov).

493 Ibid, p. 2-10; 'W87-1 Modification Program'(2023). *National Nuclear Security Administration*. Available at: [W87-1_1123.pdf](#) (energy.gov); 'W80-4 Life Extension Program'(2023). *National Nuclear Security Administration*. Available at: [W80-4_1123.pdf](#) (energy.gov).

494 *Lawrence Livermore National Laboratory contract* (2019) *Energy.gov*. Available at: <https://www.energy.gov/nnsa/lawrence-livermore-national-laboratory-contract> (Accessed: 20 January 2024).

495 *Team (no date)* | Lawrence Livermore National Laboratory. Available at: <https://www.llnslc.com/#team> (Accessed: 20 January 2024).

496 *NTESS Board of Managers (2024)* | Sandia National Laboratories. Available at: <https://www.sandia.gov/about/bofm/>.

497 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), pp. F-15 – F-20. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf](#) (energy.gov).

498 Ibid.

499 *Home (no date)* | Triad National Security LLC. Available at: [Home](#) (triadns.org) (Accessed: 4 January 2024).

500 Ibid.

501 'W88 Alteration 370 Program' (2022). *National Nuclear Security Administration*. Available at: <https://www.energy.gov/sites/default/files/2022-01/W88-ALT370%20012422.pdf>.

502 Ibid.

503 Ibid.

504 *About* | Consolidated Nuclear Security, LLC (no date). Available at: <https://cns-llc.us/about> (Accessed: 19 November 2022).

505 'W88 Alteration 370 Program' (2022). *National Nuclear Security Administration*. Available at: <https://www.energy.gov/sites/default/files/2022-01/W88-ALT370%20012422.pdf> ;

506 'Fiscal Year 2024 Stockpile Stewardship and Management Plan', *National Nuclear Security Administration* (2023), p. 8-29. Available at: [FY24SSMP_FINAL_NOVEMBER_2023_0.pdf](#) (energy.gov).

507 *Trident II D5 Fleet Ballistic Missile* (2024) | Lockheed Martin. Available at: <https://www.lockheedmartin.com/en-us/products/trident-ii-d5-fleet-ballistic-missile.html>.

508 'Amendment to the Agreement between the government of the United Kingdom of Great Britain and Northern Ireland and the government of the United States of America for cooperation on the uses of atomic energy for mutual defense purposes' (2014), *Great Britain and Foreign and Commonwealth Office*. London: HM Government. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/396347/TS_2_2015_Cm_8996_Web.pdf.

509 'Defense Primer: Strategic Nuclear Forces', *Congressional Research Service*, updated: 19 May 2023. Available at: [IF10519](#) (congress.gov).

510 Ibid.

511 Ibid.

512 *Defence Secretary announces programme to replace the UK's nuclear warhead*, GOV.UK., 25 February 2020, Available at: <https://www.gov.uk/government/news/defence-secretary-announces-programme-to-replace-the-uks-nuclear-warhead>.

513 Jamie Doward, 'Pentagon reveals deal with Britain to replace Trident', *The Guardian* 22 February 2020. Available at: <https://www.theguardian.com/uk-news/2020/feb/22/pentagon-gaffe-reveals-uk-deal-replace-trident-nuclear-weapon>.

514 *Trident II D5 (2023)* | L3Harris. Available at: [Trident II D5 | L3Harris® Fast Forward](#).

515 *Contracts for October 1, 2021 (2021) U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/2796431/> (Accessed: 7 December 2023).

516 *CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC.* | USAspending, 1 October 2021. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003022C6001_9700_-NONE_-NONE (Accessed: 16 October 2023); *Contracts for September 30, 2021 (2022) U.S. Department of Defense*. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 16 October 2023); *CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC.* | USAspending, 1 October 2021. Available at: https://www.usaspending.gov/award/CONT_AWD_N0003022C6001_9700_-NONE_-NONE (Accessed: 16 October 2023); *Contracts for September 18, 2023 (2023) U.S. Department of Defense*. Available at: [> U.S. Department of Defense > Contract](#) (Accessed: 16 October 2023); *BAE Systems has been awarded a five-year Systems Engineering and Integration Support Services contract to continue supporting the U.S. Navy Strategic Systems Programs (SSP) office*, BAE Systems, 27 October 2021. Available at: [BAE Systems awarded \\$478 million U.S. Navy contract for systems engineering and integration services | BAE Systems](#).

CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC. | USAspending, 1 October 2022. Available at: [CONTRACT to BAE SYSTEMS TECHNOLOGY SOLUTIONS & SERVICES INC. | USAspending](#) (Accessed: 16 October 2023); *Contracts for October 21, 2022 (2022) U.S. Department of Defense*. Available at: <https://www.defense.gov/News/Contracts/Contract/Article/3196439/> (Accessed: 16 October 2023).

517 *Strategic Weapon Deterrence (2024) | General Dynamics Mission Systems*. Available at: [Strategic Weapon Deterrence - General Dynamics Mission Systems \(gdmissionsystems.com\)](#).

518 *Trident II D5 Fleet Ballistic Missile (2023) | Lockheed Martin*. Available at: <https://www.lockheedmartin.com/en-us/products/trident-ii-d5-fleet-ballistic-missile.html>.

519 Hans M. Kristensen, Matt Korda & Eliana Reynolds (2023) 'Russian nuclear weapons, 2023', *Bulletin of the Atomic Scientists*, 79:3, 174-199, p. 191. DOI: 10.1080/00963402.2023.2202542.

520 Hans M. Kristensen & Matt Korda (2022) 'Russian nuclear weapons, 2022', *Bulletin of the Atomic Scientists*, 78:2, 98-121, p. 114. DOI: 10.1080/00963402.2022.2038907.

521 'What did Putin say on tactical nuclear weapons and Belarus?', *Reuters*, 25 March 2023. Available at: [What did Putin say on tactical nuclear weapons and Belarus? | Reuters](#); Hans M. Kristensen & Matt Korda (2022) 'Russian nuclear weapons, 2022', *Bulletin of the Atomic Scientists*, 78:2, 98-121, p. 114. DOI: 10.1080/00963402.2022.2038907.

522 S.V. Chemezov and N.V. Borisova, 'Annual Report of the Rostec State Corporation 2019. Science. Overcoming Technologic Barriers.' *Rostec (2020)*, p. 187. Available at: <https://rostec.ru/upload/iblock/baf/baf448d95ffa8611fad46e0df57032df.pdf>; 'Science. Overcoming Technologic Barriers. Annual Report, Rostec State Corporation 2019' *Rostec (2020)*, pp. 152 and 187. Available at: <https://rostec.ru/upload/iblock/baf/baf448d95ffa8611fad46e0df57032df.pdf>.

523 Hans M. Kristensen, Matt Korda, Eliana Johns & Mackenzie Knight (2024) 'Chinese nuclear weapons, 2024', *Bulletin of the Atomic Scientists*, 80:1, 49-72, p. 65. DOI: /1080/00963402.2023.2295206.

524 Ma Xiu and Peter W. Singer, 'What Do We Know About China's Newest Missiles?' *DEFENSE ONE*, 19 March 2021. Available at: <https://www.defenseone.com/ideas/2021/03/what-do-we-know-about-chinas-newest-missiles/172782/>.

525 'China previews new ballistic missiles in practices for 3 September parade', *Janes*, 30 August 2015. Available at: [China previews new ballistic missiles in practices for 3 September parade | IHS Jane's 360 \(archive.org\)](#).



**DON'T BANK
ON THE BOMB**