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Center for Strategic and Budgetary Assessments

The Cost of U.S. Nuclear Forces: From BCA to Bow Wave and Beyond

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The Changing Nuclear Weapons Debate

- The Geopolitical Argument
  - But U.S. faces increasing competition with China and Russia
- The Nonproliferation Argument
  - But concerns about proliferation continue despite U.S. nuclear drawdown
- The Resource Argument
  - BCA defense spending caps
  - Overlapping modernization programs

Key Modernization Programs

- Ohio-Replacement Program
- Ground-Based Strategic Deterrent
- Long Range Strike-Bomber
- B61 Life Extension Program
- Long Range Standoff Missile

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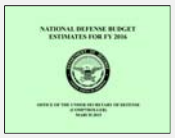
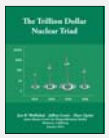
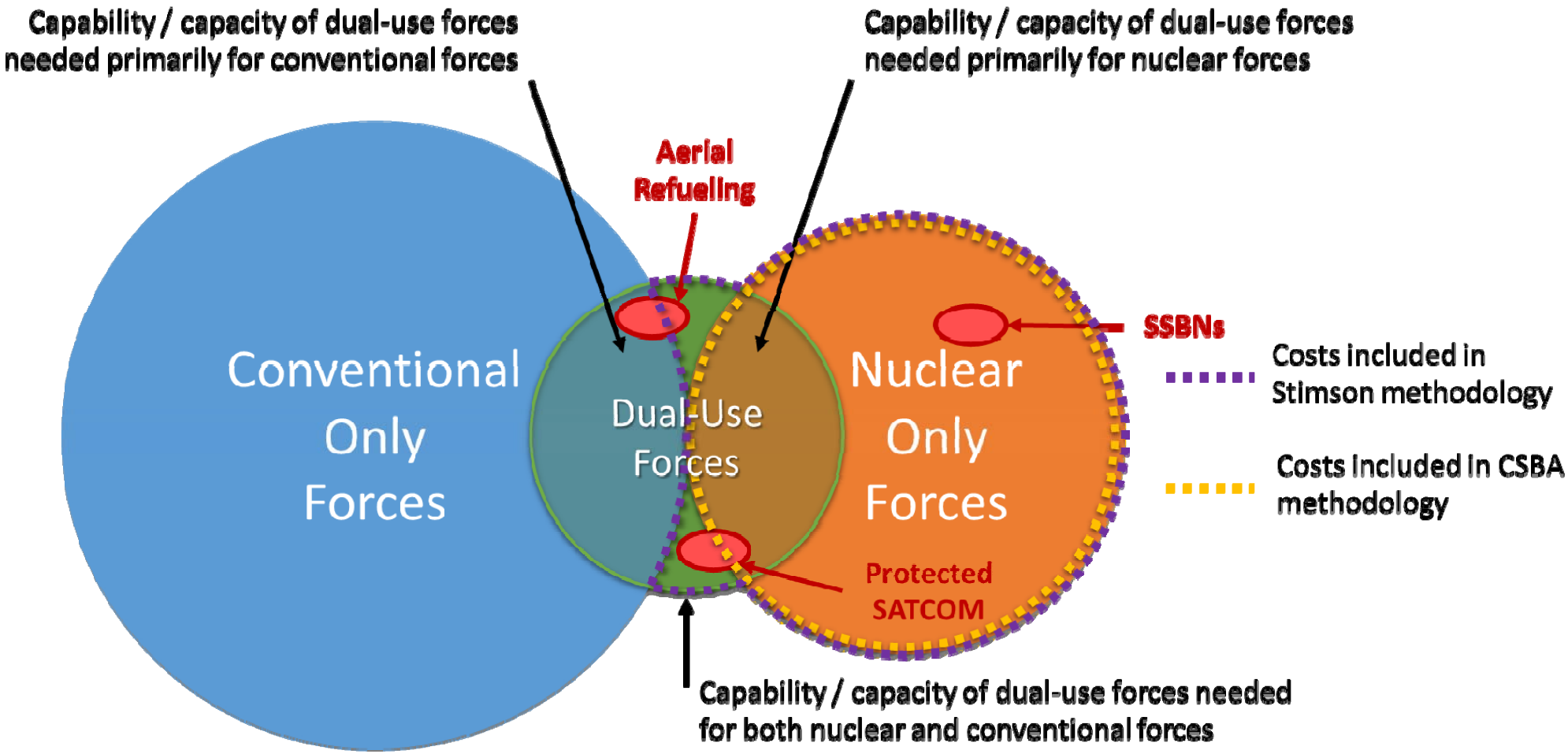
Comparison of Cost Projections

SOURCE	TOTAL COST (IN THEN-YEAR DOLLARS)	TIME PERIOD	YEARS INCLUDED
 DoD's Major Force Program 1: Strategic Forces (April 2014)	$73B	5 years	FY 2016 to 2020
 CBO's *Projected Costs of U.S. Nuclear Forces* (January 2015)	$348B	10 years	FY 2015 to 2024
 Stimson's *Resolving Ambiguity: Costing Nuclear Weapons* (June 2012)	$352 - 392B	10 years	FY 2013 to 2022
 CNS's *The Trillion Dollar Nuclear Triad* (January 2014)	$872 - 1,082B	30 years	FY 2014 to 2043
 DoD and DoE Estimates in GAO Report (July 2015)	$298B	10 years	FY 2015 to 2024

CSBA's Cost Estimate

- Includes nuclear-related costs of:
  - Airborne Delivery Systems
  - Sea-Based Delivery Systems
  - Land-Based Delivery Systems
  - Nuclear Weapons (Warheads and Bombs)
  - Command and Control Systems
- Does not include:
  - Cleanup and disposal of nuclear waste
  - Threat reduction and arms control
  - Missile defense or missile warning systems

Comparison of Methodologies



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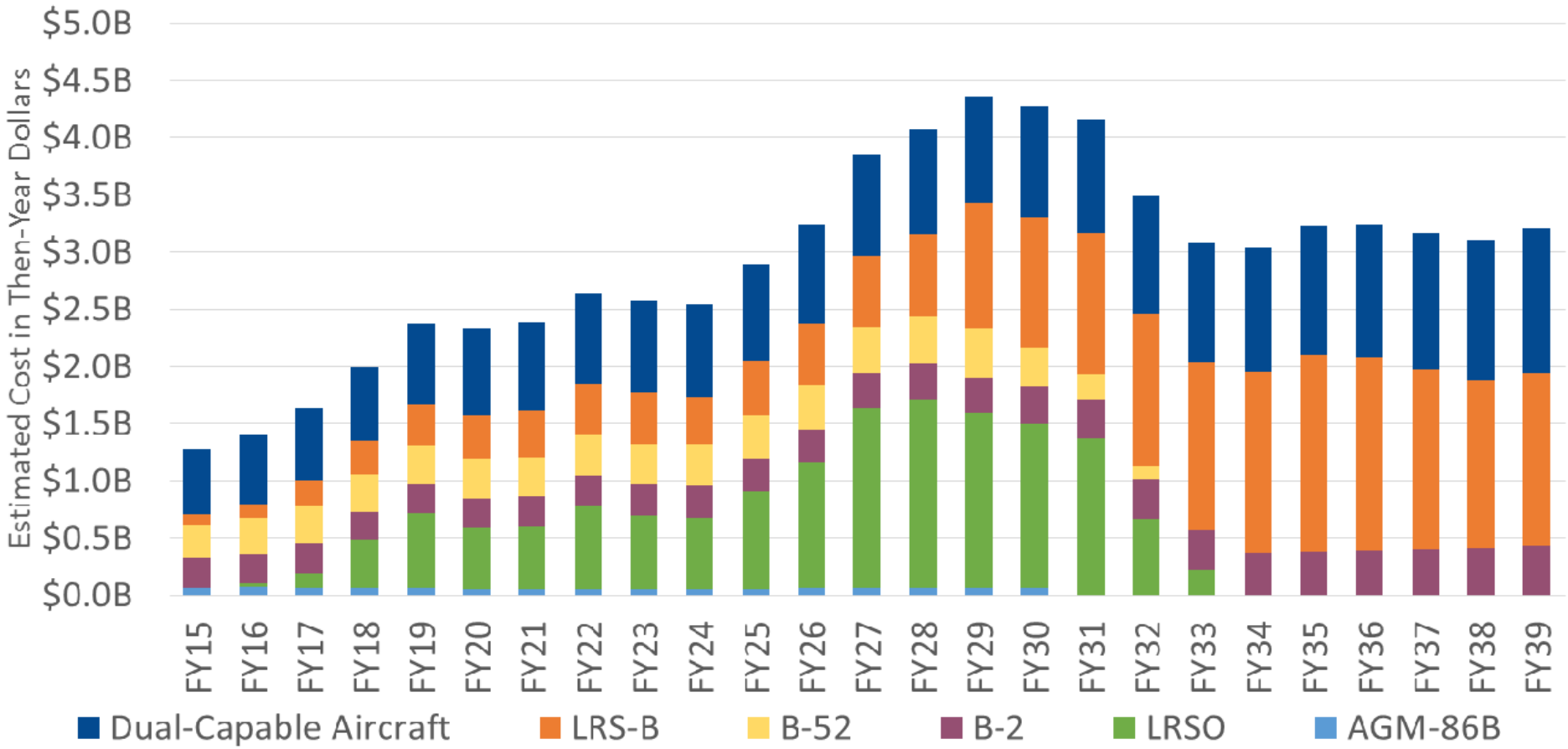
Airborne Delivery Systems

- Bombers (B-52s, B-2s, and LRS-B)
  - 25% of O&M and MILPERS
  - 50% of RDT&E for B-2 communications upgrades
  - 10% of Procurement and RDT&E for LRS-B acquisition

- Air-Launched Cruise Missiles (AGM-86B and LRSO)
  - 100% of costs (nuclear-only system)

- Dual-Capable Fighters (F-16s, F-15Es, and F-35As)
  - 10% of O&M and MILPERS for the entire fleet
  - 100% of DCA upgrades to F-35A

Nuclear-Related Costs for Airborne Systems

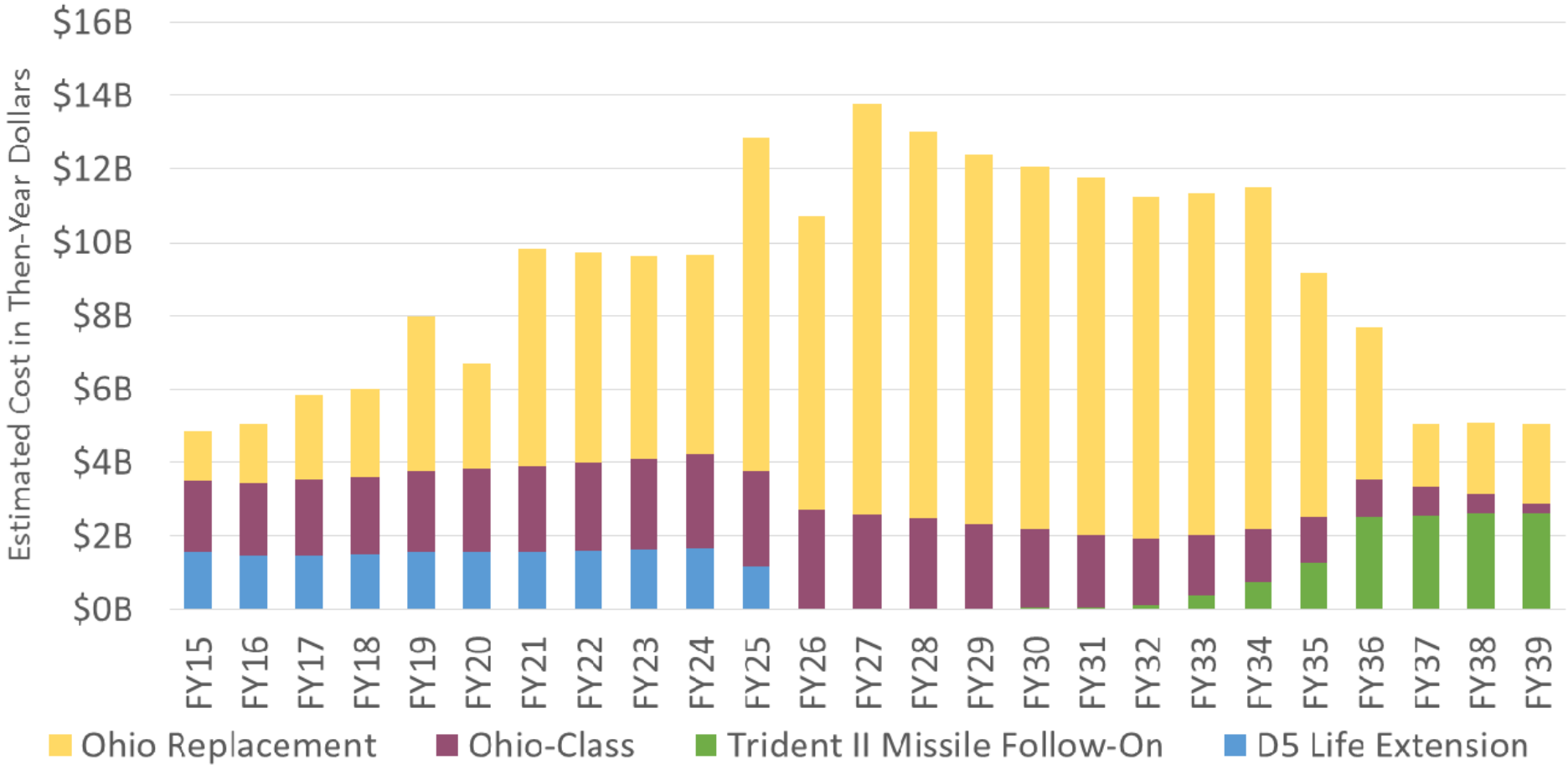


Sea-Based Delivery Systems

- Ballistic Missile Submarines (Ohio-class and Ohio Replacement Program)
  - 100% of all costs (O&M, MILPERS, RDT&E, Procurement, MILCON)
  - Proportionate share of DoE reactor sustainment / acquisition costs

- Sub-Launched Ballistic Missiles (Trident II D5 and Follow-On)
  - 100% of all missile-related costs, warhead costs are included in a separate category
  - Assumes follow-on missile program begins ~FY30 and does not start fielding until sometime after FY39

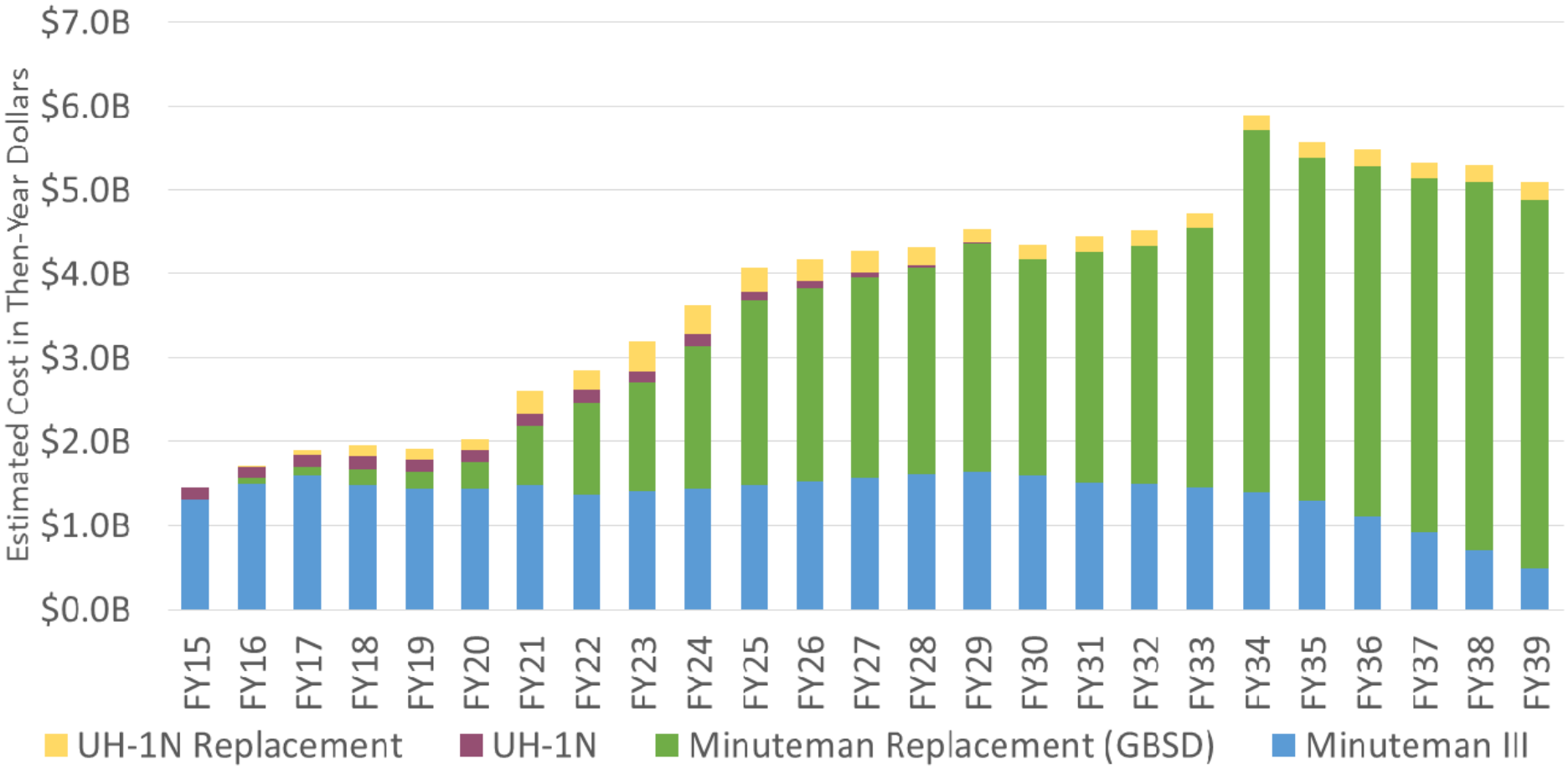
CSBA Nuclear-Related Costs of Sea-Based Systems



Land-Based Delivery Systems

- ICBMs (Minuteman III and GBSD)
  - 100% of all costs (O&M, MILPERS, RDT&E, Procurement, MILCON)
  - Initial GBSD funding begins in FY16, assumes procurement begins in late 2020s
- Helicopter Support for ICBMs (UH-1N and Follow-On)
  - 100% of all costs (O&M, MILPERS, RDT&E, Procurement, MILCON)
  - Initial funding for UH-1N replacement begins in FY16, assumes procurement begins in early 2020s

CSBA Nuclear-Related Costs of Land-Based Systems



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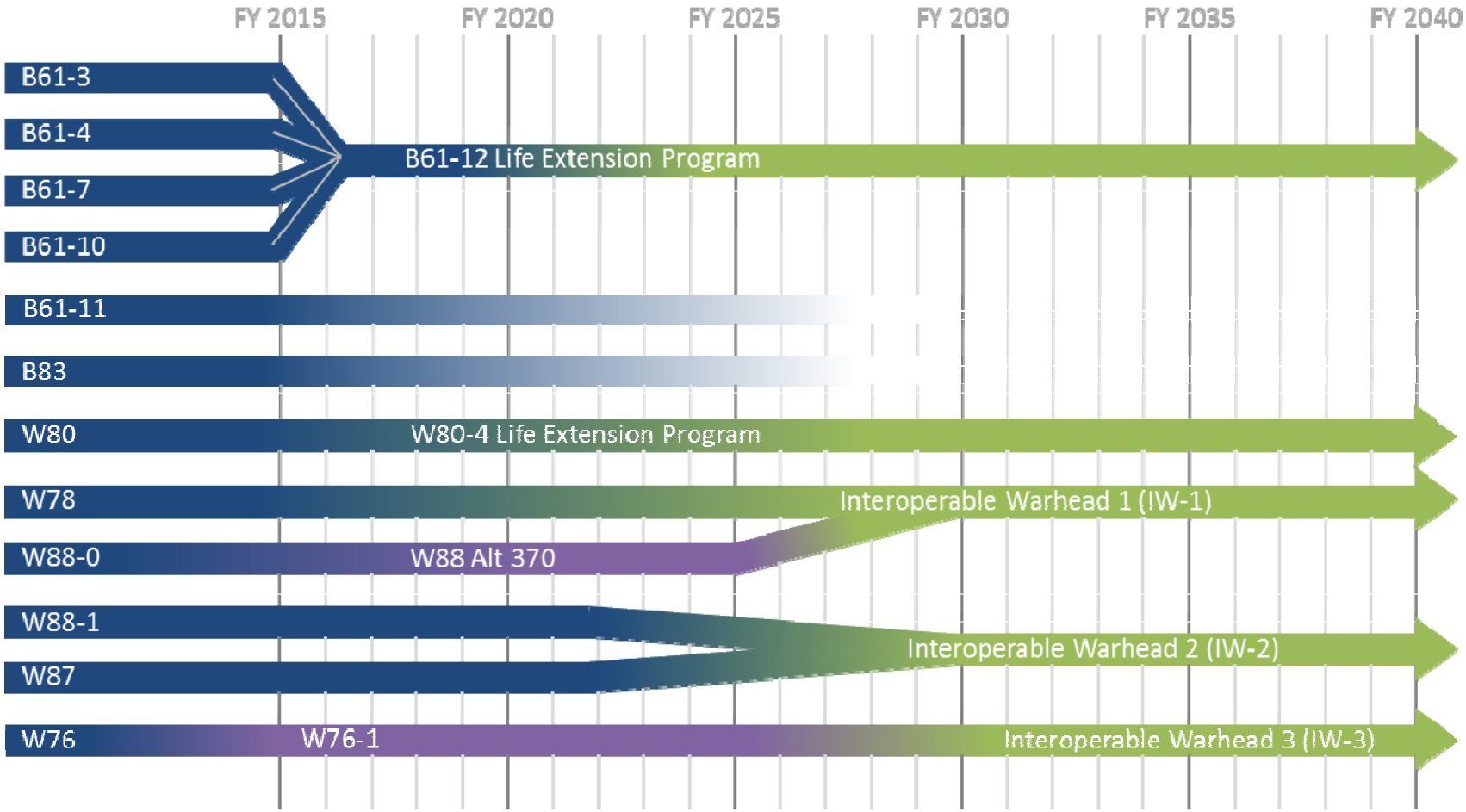
Nuclear Weapons Programs



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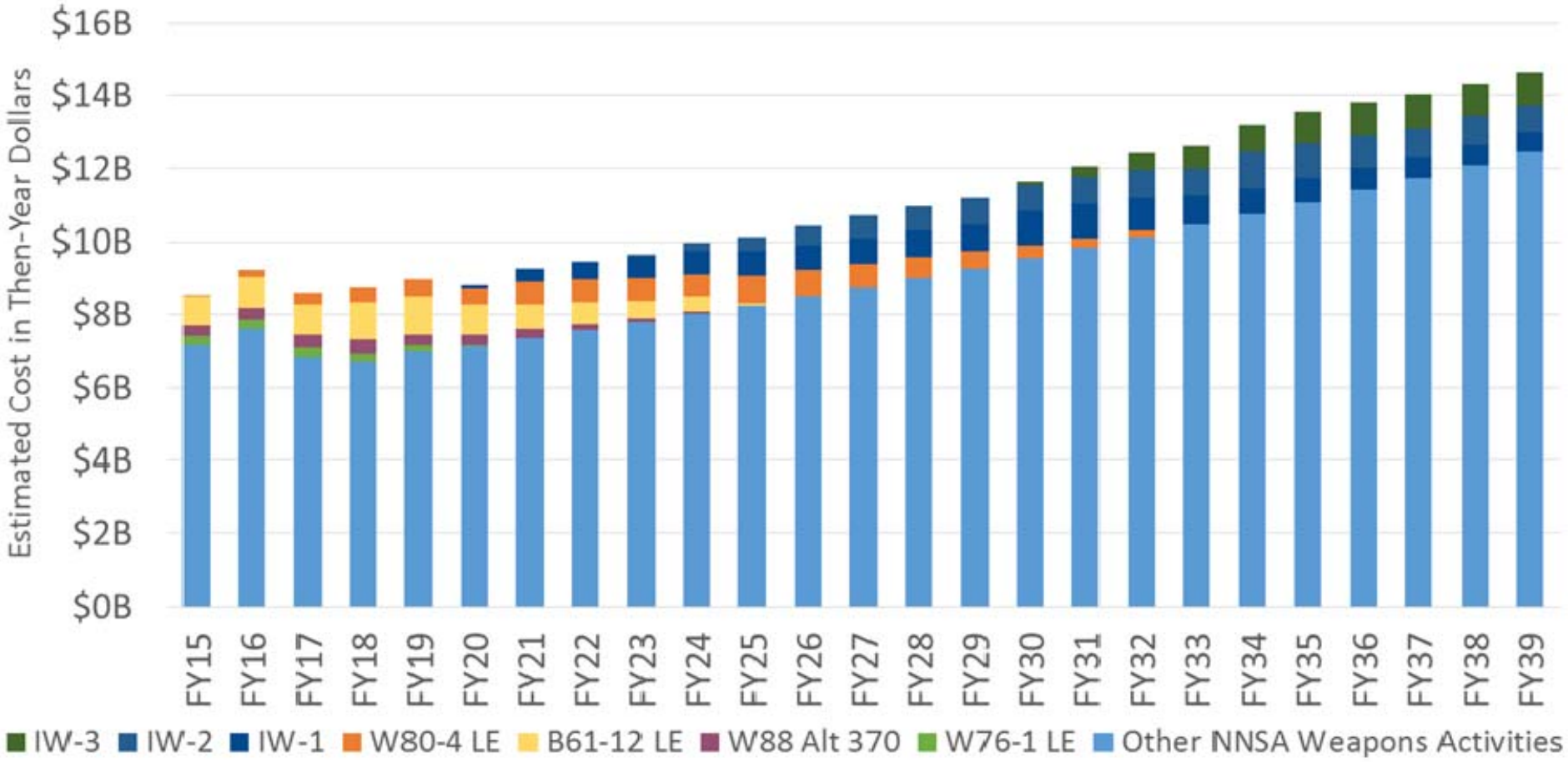
Costs of Nuclear Weapons Programs



Command and Control (C2) Systems

- Terrestrial Command and Control (MEECN, NMCS, SACCS)
  - 100% of all costs

- Airborne Command and Control (E-4B, E-6B)
  - 50% of O&M, MILPERS, and RDT&E costs

- Satellite Communications (IPS, Milstar, EPS, AEHF, EPS Follow-On, and AEHF Follow-On)
  - 100% of polar-orbiting protected SATCOM
  - 50% of GEO protected SATCOM

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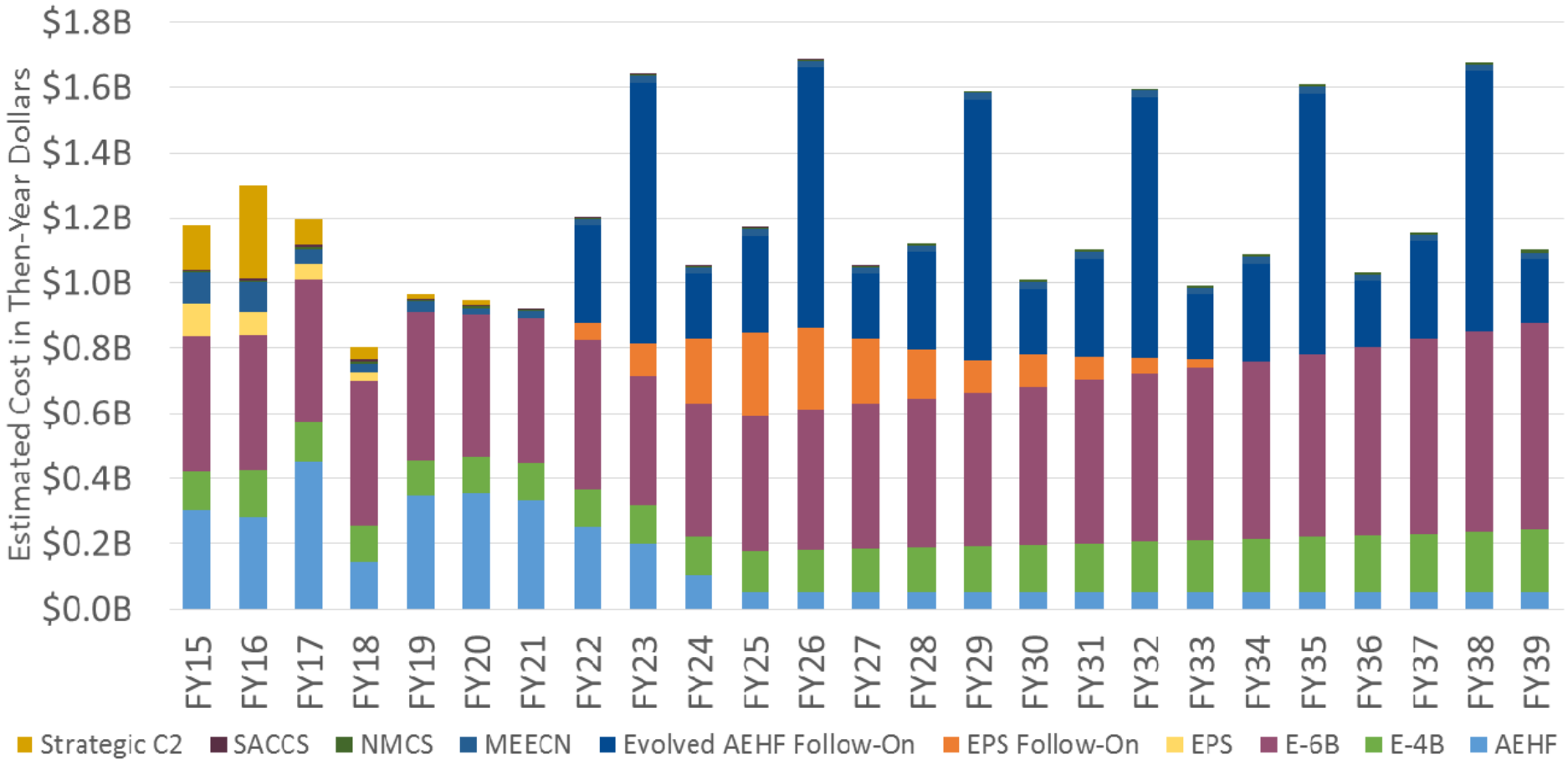
Nuclear-Related Costs of C2 Systems



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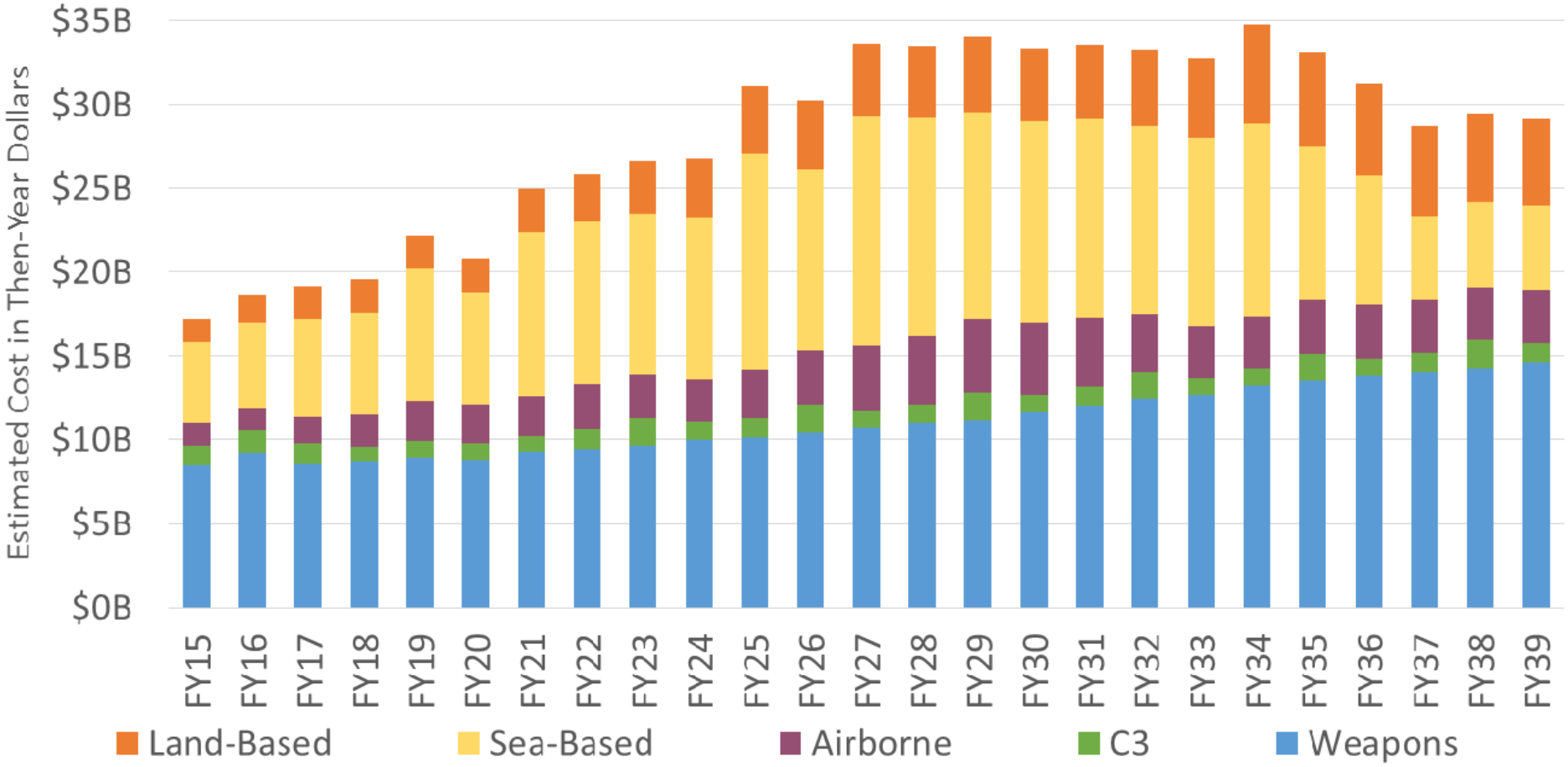
Summary of Nuclear-Related Costs
(in then-year dollars)



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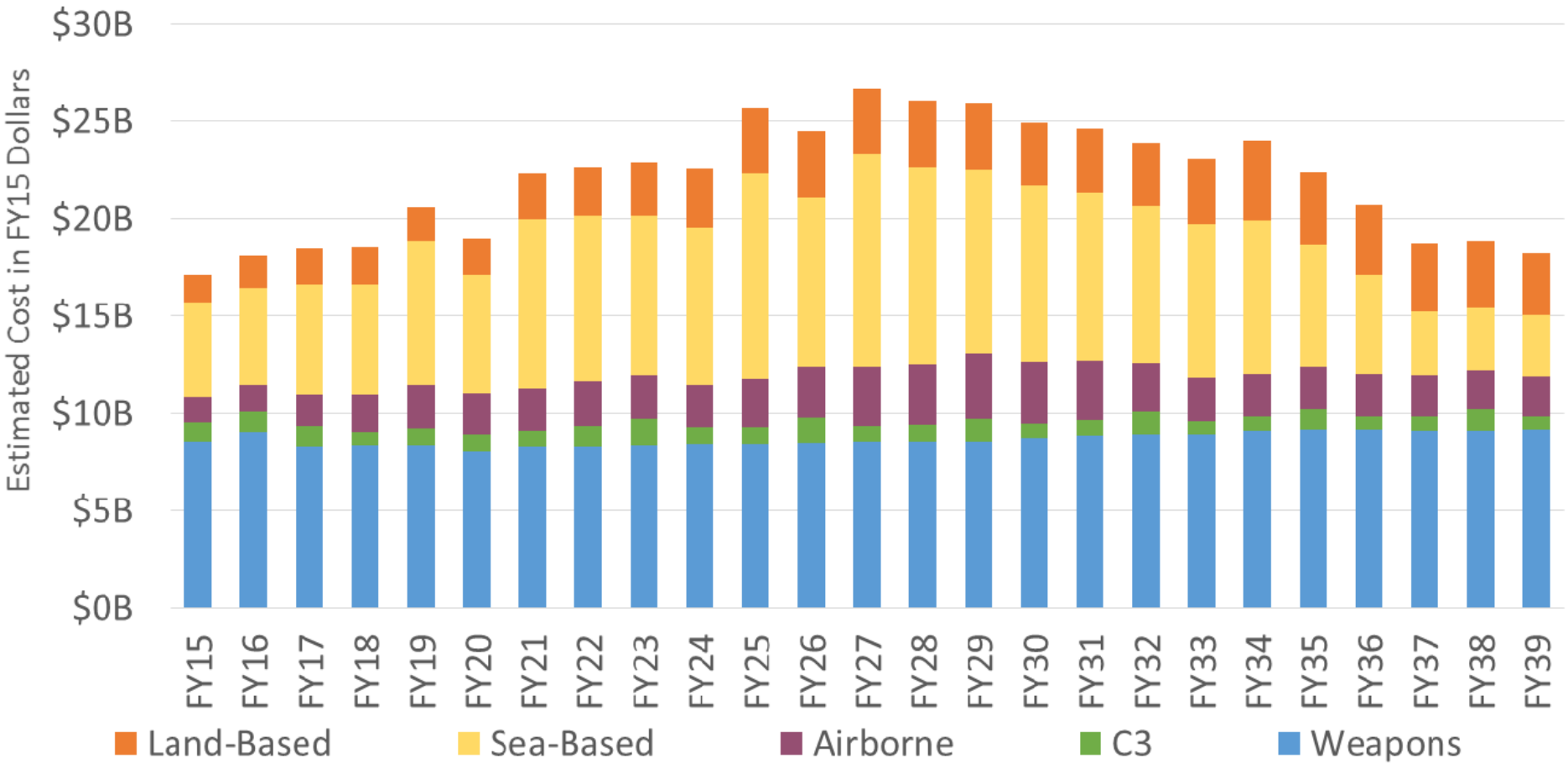
Summary of Nuclear-Related Costs
(in constant FY15 dollars)



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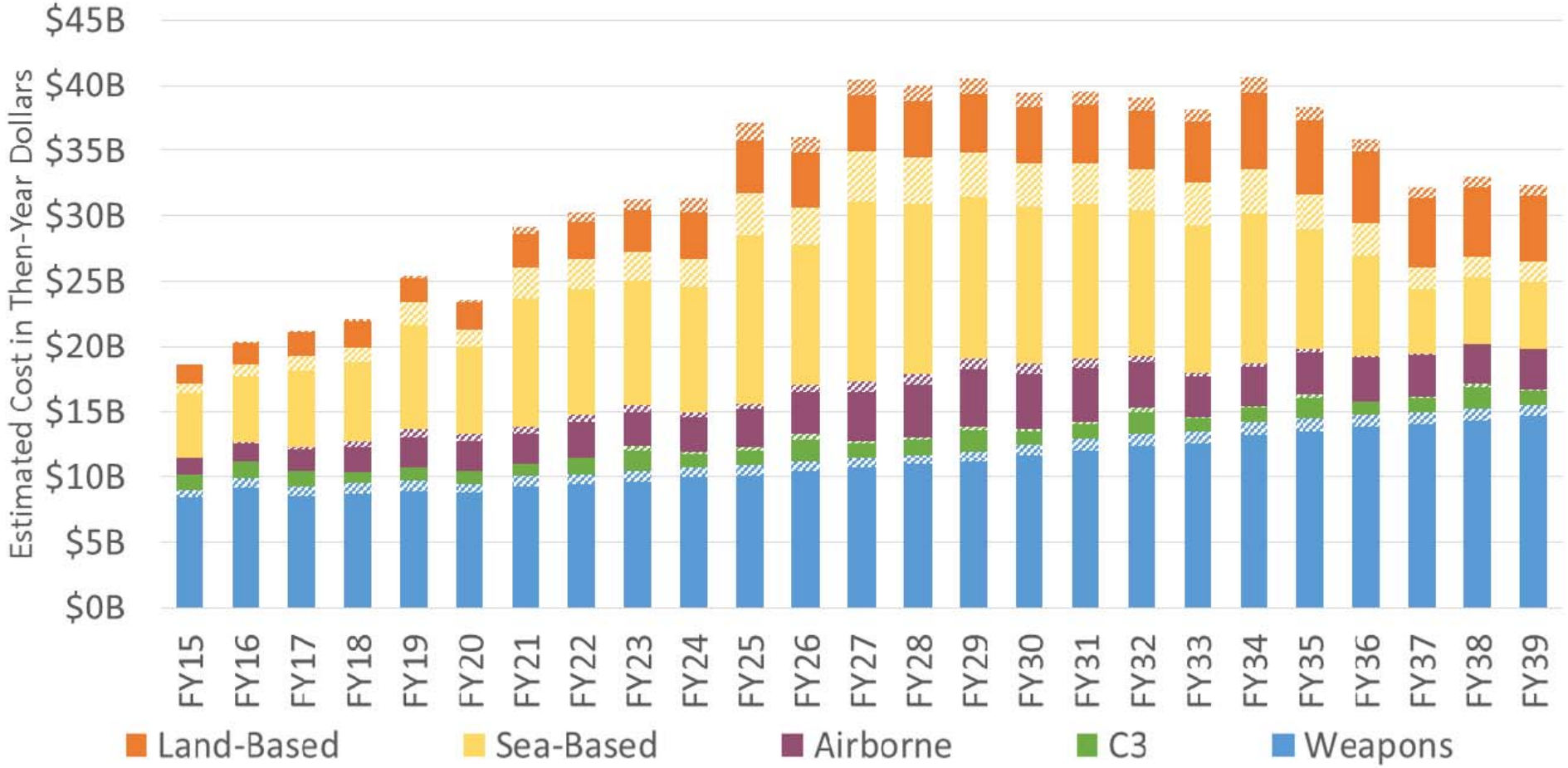
Potential Cost Growth



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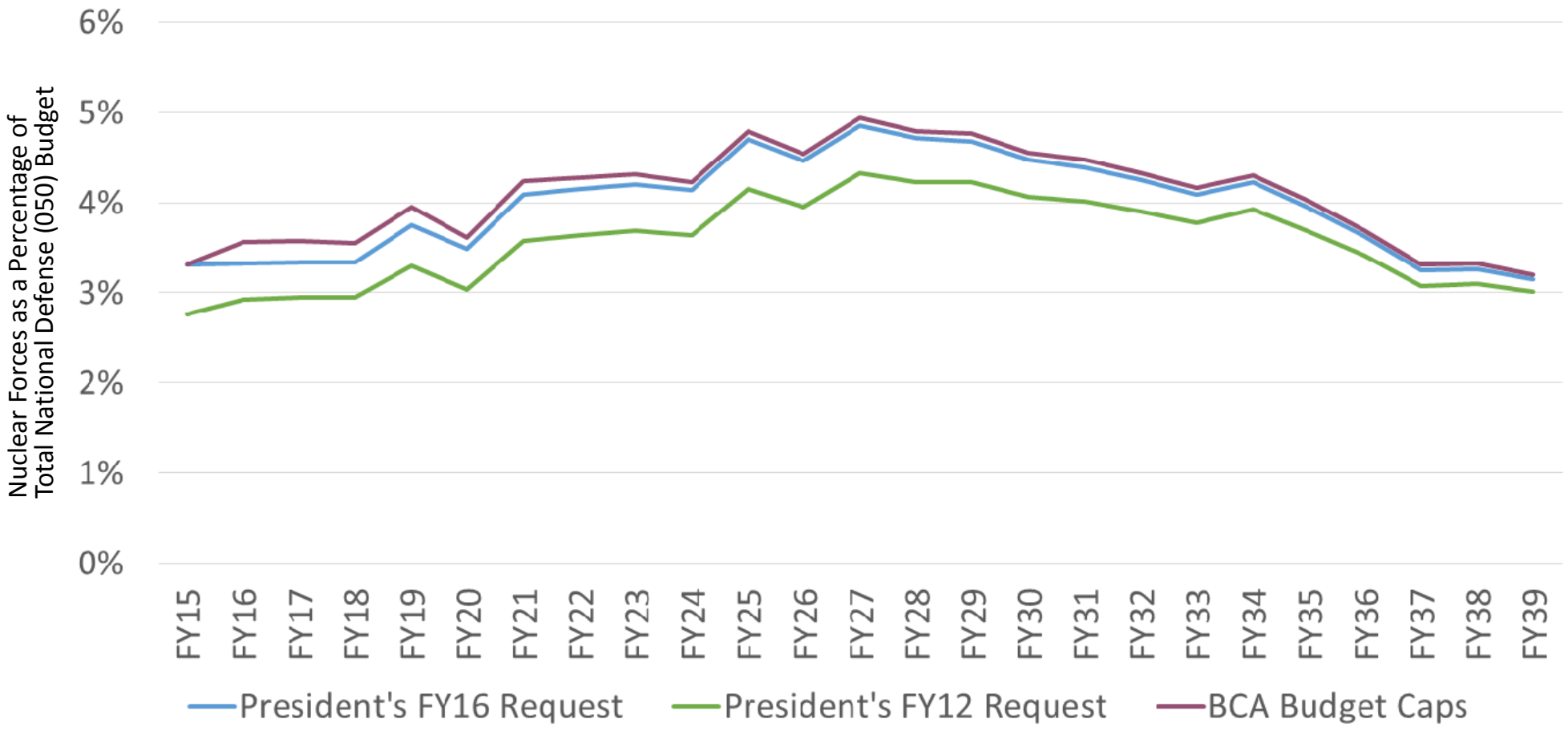
Percentage of Total National Defense



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Comparison to Other Estimates

SOURCE	TOTAL COST (IN THEN-YEAR DOLLARS)	YEARS INCLUDED	CSBA ESTIMATE OVER SAME PERIOD (IN THEN-YEAR DOLLARS)	
			WITHOUT COST GROWTH	WITH COST GROWTH
DoD's Major Force Program 1: Strategic Forces	$73B	FY16-20	$100B	$113B
CBO's *Projected Costs of U.S. Nuclear Forces*	$348B	FY15-24	$222B	$253B
Stimson's *Resolving Ambiguity: Costing Nuclear Weapons*	$352-392B	FY13-22	$199B	$224B
CNS's *The Trillion Dollar Nuclear Triad*	$872-1,082B	FY14-43	$836B	$963B

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Comparison to GAO Report

DELIVERY SYSTEM		DOD ESTIMATE FY15-24	CSBA ESTIMATE WITH DUAL-USE ALLOCATIONS FY15-24	REFERENCE: CSBA ESTIMATE W/O DUAL-USE ALLOCATIONS
Heavy Bombers	B-2 and B-52	$24.4B	$6.0B	$25.0B
	New Bomber	$33.1B	$3.2B	$32.0B
	B61-12 Tail Kit Assembly	$1.3B	$1.3B	$1.3B
Cruise Missiles	Air-Launched Cruise Missile	$0.6B	$0.6B	$0.6B
	Long-Range Standoff Missile	$2.8B	$4.3B	$4.3B
ICBMs*	Minuteman III	$11.6B	$13.2B	$13.2B
	Minuteman III Replacement	$6.0B	$5.7B	$5.7B
	ICBM Fuse Modernization	$1.4B	$1.3B	$1.3B
Dual-Capable Aircraft**		$2.7B	$7.1B	$7.1B
Fleet Ballistic Missile Submarine (SSBN)	Ohio-Class Submarine	$19.0B	$22.4B	$22.4B
	Ohio Replacement Submarine	$35.2B	$36.4B	$36.4B
	SSBN-X Reactor Design	$1.1B	$0.9B	$0.9B
	Trident II	$24.2B	$15.4B	$15.4B
Nuclear Command and Control***		$34.6B	$11.2B	$19.5B
DoE Nuclear Modernization		$100.1B	$90.0B	$90.0B

* DoD and CSBA costs shown here do not include the costs of UH-1N or replacement helicopters

** DoD's estimate includes only the costs of dual-use fighters at bases with a nuclear mission, whereas CSBA's estimate includes 10% of all dual-use fighter costs

*** DoD's estimate includes missile warning systems, whereas CSBA's estimate does not

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Example Savings

LEG OF TRIAD	OPTION	NET SAVINGS FY15-19	NET SAVINGS FY20-29	NET SAVINGS FY30-39	TOTAL NET SAVINGS FY15-39
Airborne	Eliminate B61-12 and dual-capable aircraft	$6.3B	$11.4B	$11.1B	*$28.8B*
	Eliminate nuclear-capable standoff weapons and delivery systems	$4.3B	$20.3B	$5.2B	*$29.7B*
Sea-Based	Reduce SSBN fleet to 10 boats by FY20	$8.1B	$28.8B	-$9.3B	*$27.6B*
	Reduce SSBN fleet to 10 boats by FY30	$7.9B	$22.9B	-$9.4B	*$21.4B*
	Reduce SSBN fleet to 10 boats by FY40	$0	$0	$16.5B	*$16.5B*
Land-Based	Cut one wing of ICBMs and delay follow-on GBSD program by 5 years	$1.0B	$16.3B	$13.6B	*$30.9B*
	Reduce Minuteman III Test Rate and delay GBSD program by 5 years	$0.6B	$11.5B	$9.2B	*$21.2B*

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Savings When You Need Them?

LEG OF TRIAD	OPTION	NET SAVINGS FY15-19	NET SAVINGS FY20-29	NET SAVINGS FY30-39	TOTAL NET SAVINGS FY15-39
Airborne	Eliminate B61-12 and dual-capable aircraft	$6.3B	$11.4B	$11.1B	*$28.8B*
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Sea-Based	Reduce SSBN fleet to 10 boats by FY20	$8.1B	$28.8B	-$9.3B	*$27.6B*
	Reduce SSBN fleet to 10 boats by FY30	$7.9B	$22.9B	-$9.4B	*$21.4B*
	Reduce SSBN fleet to 10 boats by FY40	$0	$0	$16.5B	*$16.5B*
Land-Based	Cut one wing of ICBMs and delay follow-on GBSD program by 5 years	$1.0B	$16.3B	$13.6B	*$30.9B*
	Reduce Minuteman III Test Rate and delay GBSD program by 5 years	$0.6B	$11.5B	$9.2B	*$21.2B*
Total		***$19.7B***	***$76.8B***	***$20.6B***	***$117.0B***

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Conclusions

- Much of the variation among cost estimates for nuclear forces is due to how dual-use systems are treated
- In our estimate, the cost of U.S. nuclear forces is projected to peak at *just under 5%* of the total national defense budget
- Nuclear modernization is affordable within current budget constraints *if it remains a priority*
- The savings from potential reductions in nuclear forces and modernization programs accrue largely *after the BCA budget caps are set to expire*

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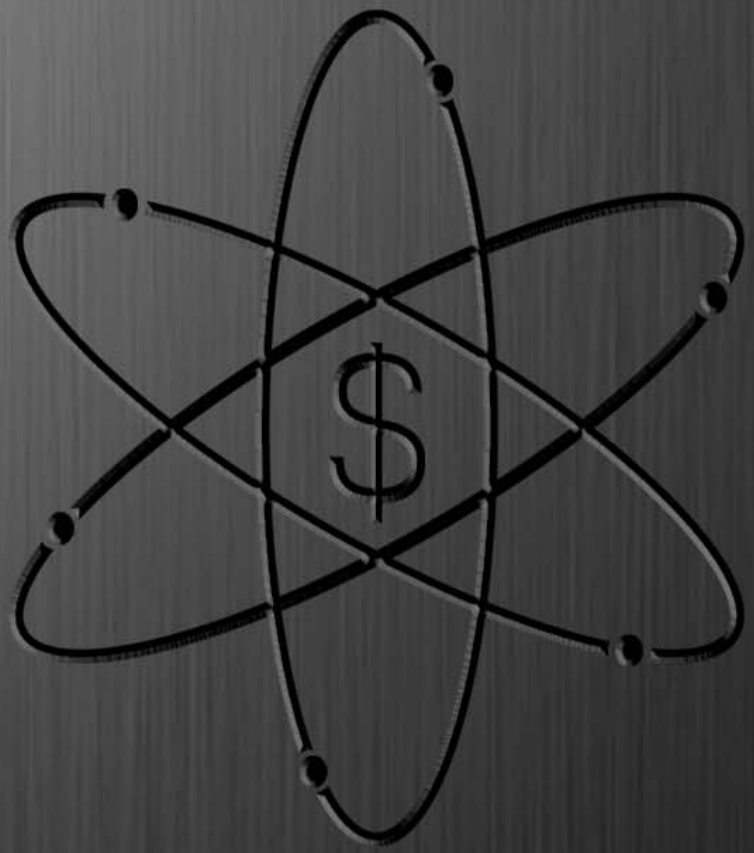
Questions?



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Data Sources

- Prioritization of data sources used:
  - FY16 Budget Request (FY14-20)
  - Selected Acquisition Reports
  - DoD public statements and press releases
  - Prior studies and cost estimates (RAND, CBO, etc.)
  - Cost of analogous systems
  - Author estimates
- Overall assumptions:
  - Inflation: OMB's GDP price index, long-term assumed to be 2.0%
  - O&M and MILPERS Growth: 3.0% (consistent with long-term trends)