



Senior Vice President of the AFPC Ilan Berman discusses Israel's new "laser wall"

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The Logic of Israel's Laser Wall

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In early February, Israeli Prime Minister Naftali Bennett announced a major new defense initiative when, in an address to Tel Aviv University's Institute for National Strategic Studies, he laid out his administration's plans for a "laser wall" to protect the country from rockets, missiles and UAVs. "In about a year, the IDF will launch a laser interception system," Bennett explained. "At first experimentally and later it will become operational. First in the south and then elsewhere. This will allow us, in the medium to long term, to surround Israel with a laser wall that protects us from missiles, rockets, UAVs and other threats."^[1]

The announcement marked the public unveiling of a capability that has been an area of intense focus for the Israeli government and industry for some time, with hundreds of millions of shekels allocated to its development to date. It represents an attempt to address what has become a long-standing problem: the war of economic attrition being waged against Israel by Hamas and other militants.

Adverse Economics

The math confronting the Israeli government is both simple and stark. While missile defense systems like Iron Dome offer extensive protection against the rockets and mortars fired by Palestinian extremists, they are extremely costly to operate. For instance, each Iron Dome battery is estimated to cost approximately \$100 million, while each interceptor missile costs roughly \$50,000.^[2] By contrast, the simple, unsophisticated rockets utilized by Hamas and other militants can cost as little as \$300 apiece. As a result, though overwhelmingly successful at protecting Israeli population centers and civilians of inestimable value, existing Israeli missile defenses have become a distinct drag on Israeli finances.

This economic cost was showcased last May, in the most recent round of fighting between Israel and Hamas. Over the course of the eleven-day conflict, Hamas fired more than 4,000 rockets and mortars at assorted targets in Israel.^[3] Iron Dome successfully defended against the lion's share of these attacks, with an estimated interception rate of 90 percent.^[4] However, the economic costs of doing so were high – so much so that, following the conflict, Israeli Defense Minister Benny Gantz formally sought \$1 billion in emergency aid from the United States in order to replenish Israel's stocks of Iron Dome interceptors.

For their part, extremists have understood this adverse economic equation, and the power that it confers. The strategy embraced by Hamas in the latest round of fighting, experts have observed, represented a departure from past conflicts. The group's approach, entailing "unprecedented rocket fire," reflected a recognition of the adverse economic calculus confronting Israel.^[5] Other extremists have taken note as well. For instance, Lebanon's Hezbollah militia has, with Iranian assistance, stepped up its development and stockpiling of precision guided munitions (PGMs) in recent years. This arsenal has become so extensive that experts now believe that this capability will be a significant – if not the decisive – factor in any future confrontation.^[6]

Breaking Out

To counter these threats, Israel has accelerated work on a directed energy complement to its existing layered missile defense structure. Israeli defense firm Elbit Systems is now developing an aerial laser defense capability, to be attached and flown on light aircraft, while state-owned Rafael Advanced Defense Systems is concurrently working on a ground-based laser weapon with an 8-10 kilometer range.^[7] The technology is rapidly maturing, and an initial directed energy defense capability is anticipated to come online within the year, with sustained operations to follow over the next three years,^[8] or perhaps even sooner.

In April, Israel's Defense Ministry revealed that the ground-based component of the system, dubbed "Iron Beam," had successfully completed a series of live-fire tests against mortars, rockets and unmanned aerial vehicles.[9] These successes have been hailed by Israeli officials as nothing short of a "game changer" for the country's ability to field a robust, economically-viable defense against adversary projectiles.[10] They also represent a major developmental milestone for the system itself—one that could bring it significantly closer to operational deployment.

Once it does, it will fundamentally alter the disadvantageous economic equation between Israel and its adversaries. In contrast to interceptions carried out by Iron Dome, the operating cost of the new Israeli laser defense system is miniscule – just \$3.50 a "shot." [11] Nevertheless, defense experts stress, for the foreseeable future this capability is intended as a complement to existing systems, rather than a replacement for them. The focus of this line of effort is to augment existing components of Israel's layered missile defense system while simultaneously bringing down the marginal costs of its operation. In this way, Israeli officials believe, they can break out of their country's current, costly defense cycle.

A Reinvigorated American Focus

Notably, Israel's gravitation toward laser defense comes at precisely the moment when the issue is receiving renewed attention in the United States. Although directed energy systems have been an area of U.S. defense development since the 1980s, the concept has seen little forward motion in recent years. Indeed, the issue has appeared to languish, as once-promising projects like the Airborne Laser (ABL) developed by the Boeing Company were canceled. Others, like the Tactical High Energy Laser (THEL) have faded into obscurity despite a series of successful tests in the 2000s.

But interest now seems to be building anew. In recent years, in response to a growing awareness of the need for strategic competition with China and the resurgence of Russia as a geopolitical foe, U.S. lawmakers have embraced what officials have described as a "lean-forward posture" toward the development of directed energy systems for both offense and defense.[12] This attention has translated into a renewed mandate for investment in lasers for missile defense applications. Thus, the 2022 National Defense Authorization Act, formally passed by Congress back in December, includes provisions authorizing the Missile Defense Agency to "budget for, direct and manage directed energy programs applicable for ballistic and hypersonic missile defense mission in coordination with other directed energy efforts of the Department of Defense." [13]

The U.S. military is already beginning to do so. In April, the U.S. Navy's Office of Naval Research carried out a successful test of the Layered Laser Defense system, developed by Lockheed Martin, against a drone target.[14] The implications are potentially profound. Directed energy systems "present transformational capabilities to the fleet, address diverse threats, and provide precision engagements with a deep magazine to complement existing defensive systems and enhance sustained lethality in high-intensity conflict," Navy officials have noted.[15]

A Meeting of the Minds?

This emerging logic mirrors the shift in strategic thinking underway in Jerusalem, where policymakers have gravitated to directed energy as a solution to the vexing problem of steep missile defense costs. As Prime Minister Bennett noted, lasers have the potential to "reverse" the detrimental economic equation confronting the Jewish state, and to "nullify the ring of fire" that adversaries such as Iran have established on the country's borders.[16]

They could do something else as well. Given the parallels, laser defense could well become a new arena of sustained collaboration in the long-standing strategic partnership between the two countries.

[1] Prime Minister's Office, "PM Bennett's Remarks at the INSS 15th Annual International Conference," February 1, 2022, available at https://www.gov.il/en/departments/news/event_laser010222.

[2] See, for instance, Naama Barak, "Everything you need to know about the Iron Dome," Israel21c, May 19, 2021, available at <https://www.israel21c.org/everything-you-need-to-know-about-the-iron-dome/>.

[3] Israel Ministry of Foreign Affairs, "Operation Guardian of the Walls," May 20, 2021, available at <https://mfa.gov.il/MFA/ForeignPolicy/Terrorism/Palestinian/Pages/Operation-Guardian-of-the-Walls-10-May-2021.aspx>.

[4] Ibid.

[5] See, for instance, Seth J. Frantzman, "Israel's Iron Dome Won't Last Forever," Foreign Policy, June 3, 2021, available at <https://foreignpolicy.com/2021/06/03/israels-iron-dome-wont-last-forever/>.

[6] See, for instance, Jacob Nagel and Jonathan Schanzer, "PGM: Iran's greatest threat to Israel after nuclear program," Jerusalem Post, December 2, 2021, available at <https://www.jpost.com/opinion/pgm-irans-greatest-threat-to-israel-after-nuclear-program-opinion-687695>.

[7] "Israel says it is developing airborne laser to down drones," Reuters, June 21, 2021, available at <https://www.reuters.com/business/aerospace-defense/israel-says-it-is-developing-airborne-laser-down-drones-2021-06-21/>.

[8] Ibid.

[9] Emanuel Fabian, "In 'game changer,' Israeli laser-based air defense shoots down drones," The Times of Israel, April 14, 2022, available at https://www.timesofisrael.com/laser-based-air-defense-shoots-down-drones-rockets-in-first-series-of-trials/?fbclid=IwAR0862LQe_7iKk6xVqy0-6m2ZZrGnn19HPnUalJ9F5mELN1QJ_JaVShoIWg.

[10] Emanuel Fabian, "In 'game changer,' Israeli laser-based air defense shoots down drones," The Times of Israel, April 14, 2022, available at https://www.timesofisrael.com/laser-based-air-defense-shoots-down-drones-rockets-in-first-series-of-trials/?fbclid=IwAR0862LQe_7iKk6xVqy0-6m2ZZrGnn19HPnUalJ9F5mELN1QJ_JaVShoIWg.

[11] "What is Iron Beam, the Star Wars-like missile defense system tested by Israel?" India Today, April 18, 2022, available at <https://www.indiatoday.in/science/story/what-is-iron-beam-the-star-wars-like-missile-defense-system-tested-by-israel-1938825-2022-04-18>.

[12] David Staten, "Senior DoD Official Discusses Future of Directed Energy Weapons," DoD News, March 21, 2018, available at <https://www.defense.gov/News/News-Stories/Article/Article/1472095/senior-dod-official-discusses-future-of-directed-energy-weapons/>.

[13] As cited in Jen Judson, "Congress gives Missile Defense Agency authority to research and develop laser tech for the United States," Defense News, December 30, 2021, available at <https://www.defensenews.com/pentagon/2021/12/30/congress-gives-missile-defense-agency-authority-to-research-and-develop-laser-tech-for-missile-defense/>.

[14] "U.S. Navy Conducts Historic Test Of New Laser Weapon System," Naval News, April 14, 2022, available at <https://www.navalnews.com/naval-news/2022/04/u-s-navy-conducts-historic-test-of-new-laser-weapon-system/>.

[15] Ibid.

[16] "PM Bennett's Remarks at the INSS 15th Annual International Conference," op cit.

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