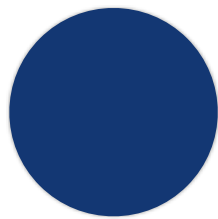
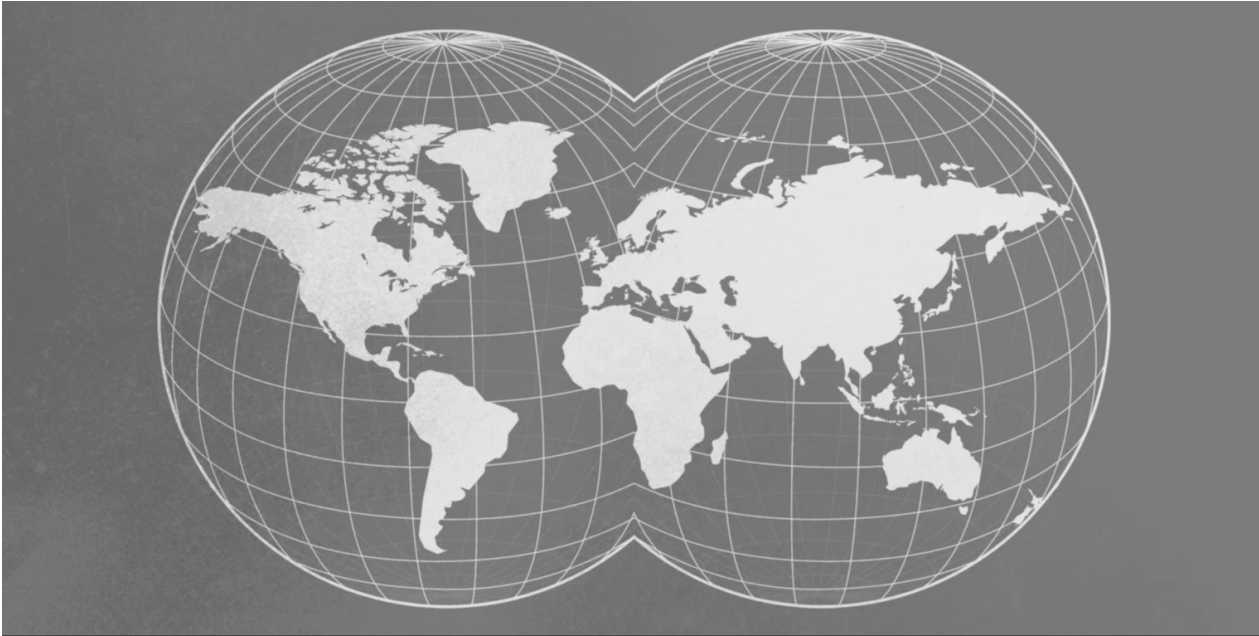


Política Internacional e Geopolítica a policrise do mundo globalizado

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José Pedro Teixeira Fernandes**

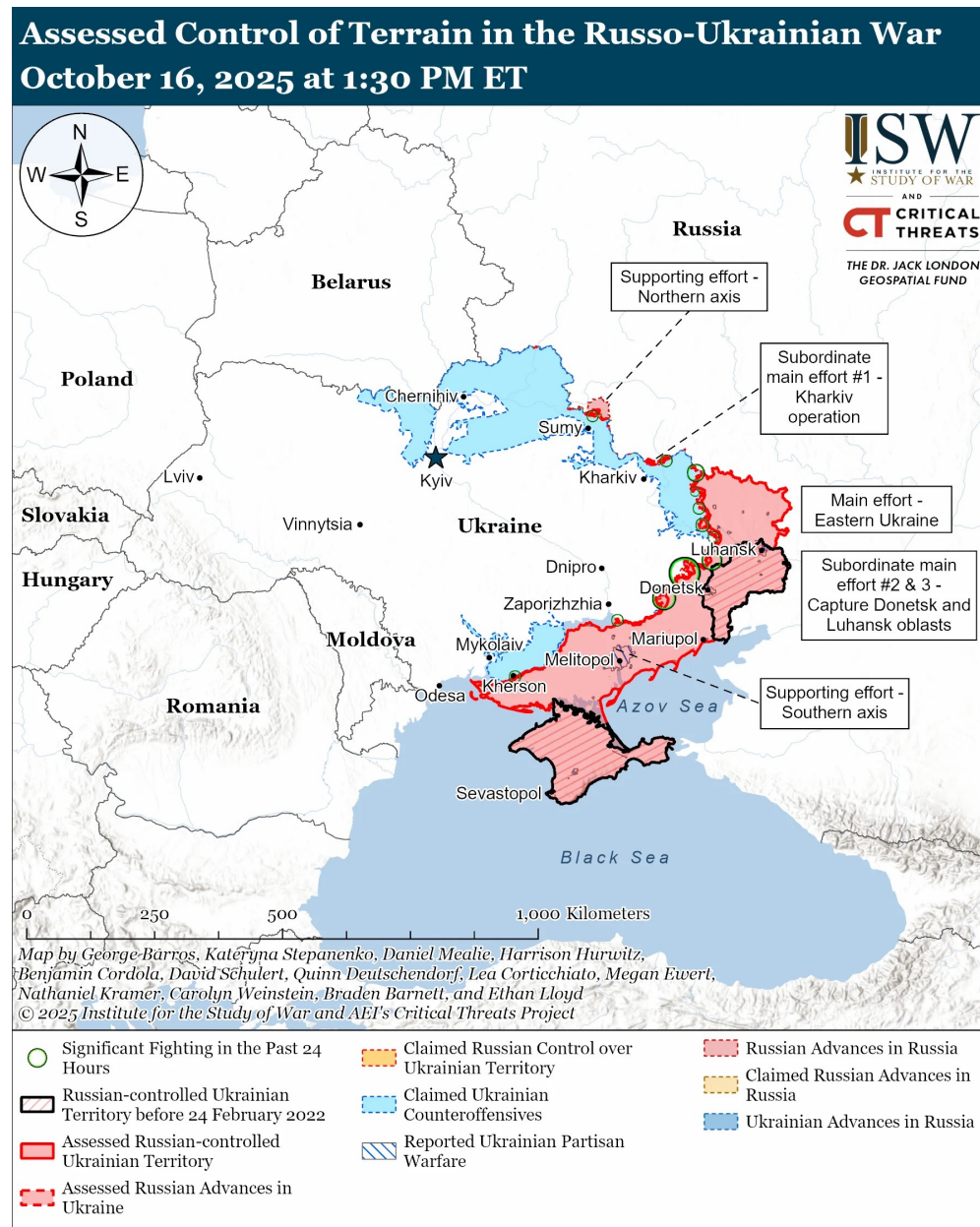
SESSÃO Nº 4

22/10/2025



PARTE I – TEMA PRINCIPAL

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (1) [FONTE: ISW, 16/10/2025]



As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (2) [FONTE: ISW, 16/10/2025]

Key Takeaways

1. US President Donald Trump and Russian President Vladimir Putin spoke on the phone on October 16.
2. Russian Presidential Aide Yuriy Ushakov attempted to obfuscate Russia's deliberate attacks on civilians and civilian infrastructure in his statement on the October 16 Trump-Putin call.
3. Russia is intentionally muddying the information space with false flag claims and information operations in an attempt to generate cover for overt and covert attacks against Europe in the past several years, including the recent Russian drone incursions into NATO airspace.
4. Russian forces are reportedly using North Korean forces operating in Russia in ways that will allow North Korean forces to take battlefield lessons learned back to North Korea.
5. Russian forces are reportedly adapting their long-range drone and missile strike tactics targeting Ukrainian energy infrastructure in an attempt to disrupt the Ukrainian power system on a large scale.
6. Ukraine's European partners announced new military assistance for Ukraine at the October 15 Ukraine Defense Contact Group (the Ramstein Format) meeting.
7. Russian forces advanced near Velykomykhailivka and in eastern Zaporizhia Oblast.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (3) [FONTE: NYT, 17/10/2025. IMAGEM: Axios]

Trump Is Set to Meet With Zelensky, Making New Push for Ukraine Cease-Fire

President Trump is energized after the Mideast deal between Israel and Hamas. But President Volodymyr Zelensky of Ukraine is seeking more weapons to force Russia to negotiate.



As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (4) [FONTE: NYT, 17/10/2025. IMAGEM: Axios]

President Volodymyr Zelensky of Ukraine is set to meet President Trump at the White House on Friday to discuss arms deals and prospects for peace, a day after Mr. Trump said he plans to meet with President Vladimir V. Putin of Russia in the coming weeks in hopes of ending the war.

Mr. Zelensky is coming to Washington aiming to win more American support, as Mr. Trump has dangled the possibility that he would provide Ukraine with [Tomahawk missiles](#) capable of striking deep within [Russia](#).

But after a two-hour [call with Mr. Putin](#) on Thursday, Mr. Trump left unclear whether he might agree to provide the Tomahawks, suggesting that he is again banking on further talks with Mr. Putin to resolve the war.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (5) [FONTE: NYT, 17/10/2025]

It is a situation that Mr. Zelensky has encountered before with Mr. Trump, who has repeatedly delayed imposing sanctions on Russia and put off more aid to Kyiv while giving Mr. Putin chances to negotiate that yield no apparent progress.

In this instance, Mr. Trump has been energized in his peacemaking efforts by bringing about a cease-fire and hostage release deal between Israel and Hamas, and he has made clear that he sees ending Russia's war on Ukraine as his next goal. Over the last week, he had cast the possibility of the Tomahawk sales as an incentive for Mr. Putin to come to the negotiating table.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (6) [FONTE: Deutsch Welle, 16/10/2025]

Tomahawk, o míssil decisivo que Trump avalia fornecer a Kiev



Modelos do Tomahawk podem alcançar com precisão alvos a 2,5 mil quilômetros de distânciaFoto: Taylor DiMartino/US Navy/ABACA/picture alliance

**Presidente dos EUA não descarta o envio dos mísseis americanos de longo alcance para a Ucrânia.
Armamento atinge alvos a 2,5 mil quilômetros e pode transformar poder de fogo ucraniano.**

Os mísseis de fabricação americana Tomahawk ganharam centralidade nas tratativas entre Washington e Kiev pelo fim da [guerra na Ucrânia](#).

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (7) [FONTE: Deutsch Welle, 16/10/2025]

[Zelenski](#) disse já ter discutido a transferência do armamento com Trump, considerado "decisivo" por Kiev para repelir a agressão russa e alcançar a paz. "Vemos e ouvimos que a Rússia teme que os americanos nos forneçam Tomahawks. Isso mostra que esse tipo de pressão pode contribuir para a paz", disse Zelenski, que ainda prometeu usaria o armamento exclusivamente para atacar alvos militares.

Os mísseis ampliariam a capacidade do exército ucraniano de alcançar alvos mais profundos no território russo e com maior precisão, sem depender exclusivamente do despacho de drones. Variantes do Tomahawk podem atingir pontos a 2,5 mil quilômetros de distância.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (8) [FONTE: Deutsch Welle, 16/10/2025]

"Poder de fogo" à Ucrânia

Ainda não está claro se Trump irá autorizar o uso do armamento. Desde que sua cúpula com Putin em agosto [não levou a um avanço nas negociações de paz](#), o presidente americano tem assumido um tom mais crítico a Moscou.

Uma delegação ucraniana que visita Washington nesta semana para preparar o encontro entre Trump e Zelenski chegou a se reunir com representantes da Raytheon, a fabricante do Tomahawk, segundo informou o assessor principal de Zelenski, Andriy Yermak.

Em reunião da Otan em Bruxelas na quarta-feira, o secretário de Defesa dos EUA, Pete Hegseth, disse que "poder de fogo" chegará à Ucrânia, sem citar o Tomahawk diretamente.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (9) [FONTE: The Moscow Times, 13/10/2025]

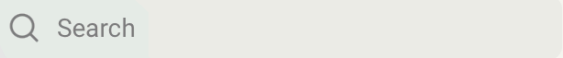
'Could End Badly': Medvedev Threatens Trump Over Tomahawks for Ukraine



As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (10)

[FONTE: Dmitri Medvedev, 13/10/2025]

**Дмитрий Медведев** 
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ПІДВОДНИЙ ЧОВЕН В СТЕПАХ УКРАЇНИ

Трамп сказав, що якщо Президент Росії не урегулює український конфлікт, то для «нього це погано закінчиться». Угрожає в сто перший раз, короче.

Якщо «бізнес-миротворець» про «Томагавки», то фраза невірна. Поставка цих ракет може закінчитися погано для всіх. І перше все – для самого Трампа.

Сто раз було сказано в зрозумілій навіть для зірко-полосатого дядька формі, що відмінити ядерне виконання «Томагавків» від звичайного в польоті неможливо. Пуск їх буде здійснювати не бандерівський Київ, а саме США. Читайте: Трамп. Як відповідати Росії? Ось саме!

**Дмитрий Медведев** 
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As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (11) [FONTE: The Moscow Times, 13/10/2025]

Russian Security Council Deputy Chairman Dmitry Medvedev on Monday **warned** U.S. President Donald Trump that the supply of Tomahawk cruise missiles to Ukraine could “end badly” for him.

Medvedev, who served as Russia’s president from 2008 to 2012, appeared to suggest that Russia might issue a nuclear response if Ukraine receives and fires the long-range rockets at targets inside Russia.

“The supply of these missiles could end badly for everyone. First and foremost for Trump,” Medvedev wrote in a post on Telegram after the American president repeated his own threat of supplying Tomahawk missiles to Ukraine if Russia does not agree to end the war.

Kremlin spokesman Dmitry Peskov later **endorsed** Medvedev’s remarks, claiming that supplying the weapons to Ukraine risks further escalation as U.S. specialists would allegedly need to assist Ukraine in firing on targets in Russia.

“Anyone with even a basic understanding of the issue knows that American experts would be involved in the handling of such missiles,” Peskov told reporters.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (12) [FONTE: Politico, 16/10/2025]

‘We are ready’: Orbán hails planned Trump-Putin meeting in Budapest



"The planned meeting between the American and Russian presidents is great news for the peace-loving people of the world," Viktor Orbán said in a post. | Sadak Souici/EPA

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (13) [FONTE: Politico, 16/10/2025]

Hungarian Prime Minister Viktor Orbán celebrated the announcement that Donald Trump and Vladimir Putin will meet in Budapest to discuss ending the war in Ukraine.

“The planned meeting between the American and Russian presidents is great news for the peace-loving people of the world,” Orbán said in a post on X on Thursday. “We are ready!”

“I just got off the phone with President @realDonaldTrump,” Orbán wrote in a subsequent post. “Preparations for the USA-Russia peace summit are underway.”

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (14) [FONTE: Politico, 16/10/2025]

Putin is in favor of a meeting, Russian presidential aide Yuri Ushakov said, according to state-controlled news agency Interfax.

“President Trump was the first to mention Budapest, and our president immediately supported the idea of holding a possible summit in this European capital,” Ushakov said.

The Budapest summit would follow an initial round of meetings between Secretary of State Marco Rubio and Russian counterparts next week at a location to be determined, the U.S. president said.

Tomahawks in the mix

The call with Putin came ahead of Trump’s scheduled White House meeting on Friday with Ukrainian President Volodymyr Zelenskyy, who has said he hopes to convince Washington to provide Tomahawk missiles and other weapons systems that would enable Ukraine to attack deeper into Russia.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (15) [FONTE: FT, 20/10/2025]

Trump urged Zelenskyy to accept Putin's terms or be 'destroyed' by Russia

US president tossed aside maps of Ukraine frontline in volatile White House meeting



In a meeting with Volodymyr Zelenskyy at the White House on Friday, Donald Trump repeatedly echoed talking points Vladimir Putin had made in their call a day earlier, according to people familiar with the matter © Press Service Of The President Of Ukraine

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (16) [FONTE: FT, 20/10/2025]

At one point in the meeting, the US president threw Ukraine's maps of the battlefield to one side, the official familiar with the encounter said.

According to the official, Trump said he was "sick" of seeing the map of the frontline of Ukraine again and again.

"This red line, I don't even know where this is. I've never been there," Trump said, according to the official.

Trump also said that Russia's economy is "doing great", the official said, in a sharp contrast to his recent public remarks in which he urged Putin to negotiate because his "economy is going to collapse".

The White House and the Ukrainian president's office did not immediately respond to requests for comment.

Trump told Fox News on Sunday that he was confident about securing an end to the conflict, and added that Putin is "going to take something, he's won certain property".

Putin made a new offer to Trump on Thursday under which Ukraine would surrender the parts of the eastern Donbas region under its control in exchange for some small areas of the two southern frontline regions of Kherson and Zaporizhzhia.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (17) [FONTE: FT, 20/10/2025]

But ceding the remainder of the Donbas still under Ukrainian control would be a non-starter for Ukraine, as it would hand Moscow territory it has only partially occupied for more than a decade and failed to seize despite its efforts since Putin ordered the invasion in 2022.

Russian forces have struggled to retain the territory in Kherson and Zaporizhzhia that Putin offered in exchange, and have made virtually no progress on the battlefield there since 2022, the year the war began.

“To give [the Donbas] to Russia without a fight is unacceptable for Ukrainian society, and Putin knows that,” said Oleksandr Merezhko, chair of the Ukrainian parliament’s foreign affairs committee.

He said that Putin might be pushing the contentious idea “with a purpose to cause division within Ukraine and undermine our unity”.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (18) [FONTE: Raytheon]



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Tomahawk® Cruise Missile



As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (19) [FONTE: Raytheon]

Modern, mature, powerful

The Tomahawk cruise missile is a precision weapon that launches from ships, submarines, and ground launchers and can strike targets precisely from 1,000 miles away, even in heavily defended airspace.



As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (20) [FONTE: Raytheon]

Block IV

The most recent version, called the Block IV Tactical Tomahawk, or TACTOM, has a data link that allows it to switch targets while in flight. It can loiter for hours and change course instantly on command.

Block V

In 2020, the U.S. Navy began recertifying and modernizing the Block IV missile, extending its service life by 15 years, and resulting in the new Tomahawk Block V series:

- Block V: A modernized TACTOM with upgraded navigation and communication,
- Block Va: Block V that can strike moving targets at sea.
- Block Vb: Block V, with a joint multi-effects warhead that can hit more diverse land targets.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (21)

[FONTE: NAVAIR / US Department War System]

Tomahawk

The Tomahawk Land Attack Missile (TLAM) is a long range cruise missile used for deep land attack warfare, launched from U. S. Navy surface ships and U.S. Navy and United Kingdom Royal Navy submarines.



As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (22)

[FONTE: NAVAIR / US Department War System]

The Block IV missile is capable of loitering over a target area in order to respond to emerging targets or, with its on-board camera, provide battle damage information to warfighting commanders. Tomahawk Block IV is currently in Full Rate Production (FRP).

The latest variant, Block V Tomahawk missiles, feature a NAV/COMMs upgrade that maintains the capability for In-Flight Target Updates and Improved Navigation. Future Block V capabilities will add to the NAV/COMMs upgrade and include the Maritime Strike Tomahawk (MST) variant, designated as Block Va; and the Joint Multiple Effects Warhead System (JMEWS), designated as Block Vb.

Tomahawk provides on-scene commander with the flexibility to attack long-range fixed targets or support Special Operations Forces with a lethal, responsive, precision weapon system and as such has become the weapon of choice for the U.S. Department of Defense.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (23) [FONTE: NAVAIR / US Department War System]

Specifications

Primary Function: Long-range subsonic cruise missile for striking high value or heavily defended land targets.

Contractor: Raytheon Missile Systems Company, Tucson, AZ

Date Deployed: Block II TLAM-A IOC - 1984

Block III - IOC 1993

Block IV - IOC 2004

Block V Unit Cost: Approximately \$2.404M (FY22\$)

Propulsion: Block II/III TLAM-A, C & D - Williams International F107 cruise turbo-fan engine; ARC/CSD solid-fuel booster

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (24) [FONTE:US Congress, 9/09/2025]

The U.S. Army's Typhon Mid-Range Capability (MRC) System

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What Is the Army's Mid-Range Capability (MRC) System?

Improved Chinese and Russian long-ranged artillery systems, uncrewed aerial vehicles (UAVs), and the proliferation of special munitions (such as precision, thermobaric, loitering, and top-attack munitions) have renewed concerns about the potential impact of Russian and Chinese fires on U.S. combat operations. In response, the U.S. Army is seeking to improve its ability to deliver what it refers to as long-range precision fires (LRPF) by upgrading current artillery and missile systems, developing new longer-ranged systems (including hypersonic weapons), and modifying existing air-and sea-launched missiles for ground launch.

MRC is part of the Army's LRPF modernization portfolio and is intended to hit targets at ranges between the Precision Strike Missile (PrSM) and the developmental Long-Range Hypersonic Weapon (LRHW) system. The MRC system leverages existing Raytheon-produced SM-6 missiles and Raytheon-produced Tomahawk cruise missiles modified for ground launch. The MRC system is also known as the "Typhon" missile system (**Figure 1**).

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (25) [FONTE: US Congress, 9/09/2025]



The Army's Rapid Capabilities and Critical Technologies Office's Mid-Range Capability Project Office successfully demonstrated the launch of a Tomahawk missile from the Army's prototype Mid-Range Capability system. Soldiers assigned to the 1st MDTF conducted this live-fire event. This test follows the successful launch of an SM-6 missile from the Mid-Range Capability system earlier this year, confirming the full operational capability of the system.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (26) [FONTE: US Congress, 9/09/2025]

The Army [accepted](#) its first MRC battery in December 2022. [Reportedly](#), the Army activated this first MRC battery—D Battery, 5th Battalion, 3rd Field Artillery Regiment—as part of Joint Base Lewis-McChord's 1st MDTF in January 2024. [Reportedly](#), a second Typhon battery has been activated at Joint Base Lewis-McChord, WA, and this battery is to be assigned to the Hawaii-based 3rd MDTF later in 2025. It was also [reported](#) that,

the Army is working to field another three batteries to the remaining multidomain task force units between fiscal [years] 2026 and 2028 and plans to next field a battery to the 2nd MDTF based in Europe in fiscal [year] 2026.

MRC Typhon Activities in the Philippines

[Reportedly](#) in January 2025, the Army moved [Typhon launchers](#) from Laoag airfield in the Philippines to another location on the island of Luzon. [According to a Philippine government official](#), "The redeployment would help determine where and how fast the missile battery could be moved to a new firing position." U.S. Indo-Pacific Command (USINDOPACOM) officials [reportedly](#) indicated that the United States "has coordinated closely with the Philippine government on every aspect of the MRC deployment, including the location," and further [noted](#) "the relocation was not an indication that the batteries would be permanently stationed in the Philippines." [In terms of the impact](#) of the Typhon deployment,

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (27) [FONTE: Joseph Trevithick / TWZ, 14/08/2025]

Ukraine's Patriots Now Struggling To Intercept Enhanced Russian Ballistic Missiles

U.S. intel confirms that improvements to Russia's ballistic missiles are proving to be a major challenge for the Patriot air defense system.



As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (28) [FONTE: Joseph Trevithick / TWZ, 14/08/2025]

"We know [Russia] is improving its ballistic weapons," Ihnat said, according to a [story *The Kyiv Independent* published](#) on May 24. "It complicates [the interception], but doesn't make the interception impossible."

"The flight of a ballistic missile along such a quasi-ballistic trajectory – when the missile doesn't just fly in a straight line like it's falling, but actually performs maneuvers in flight – makes it more difficult for the Patriot system, which calculates the interception point using software, to predict exactly where the missile will be," he continued.

"According to Ihnat, the modified missiles are now equipped with radar-decoy systems and use quasi-ballistic flight paths that make them more difficult to track and intercept using Patriot systems," *The Kyiv Independent's* report added.

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (29) [FONTE: Joseph Trevithick / TWZ, 14/08/2025]

It is important to note that any protracted conflict offers the potential for valuable lessons to be learned, but also the risk of the enemy doing the same. Similarly, persistent combat use of systems like Patriot presents repeated opportunities for adversaries to glean useful intelligence about their capabilities, and then put it to work in developing new and improved weapons and countermeasures. TWZ [previously highlighted exactly these issues](#) around U.S. operations against Iranian-backed Houthis in Yemen.

Regardless, all of this is especially worrisome given Ukraine's reliance on Patriot to defend against ballistic missile attacks, as mentioned earlier. Ukraine also has limited options for bolstering its anti-ballistic missile capabilities and capacity beyond just working to acquire more Patriot systems and interceptors. When Russia invaded in 2022, the Ukrainian military did have a limited number of [Soviet-era S-300V1](#) surface-to-air missile

As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (30)

[FONTE: “Armas maravilha” (Wunderwaffe) / Herbert A. Friedman, The German V1 Rocket Leaflet Campaign]



As voltas e reviravoltas da diplomacia e da guerra na Ucrânia (31) [FONTE: Imperial War Museums]

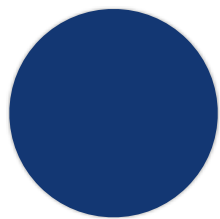
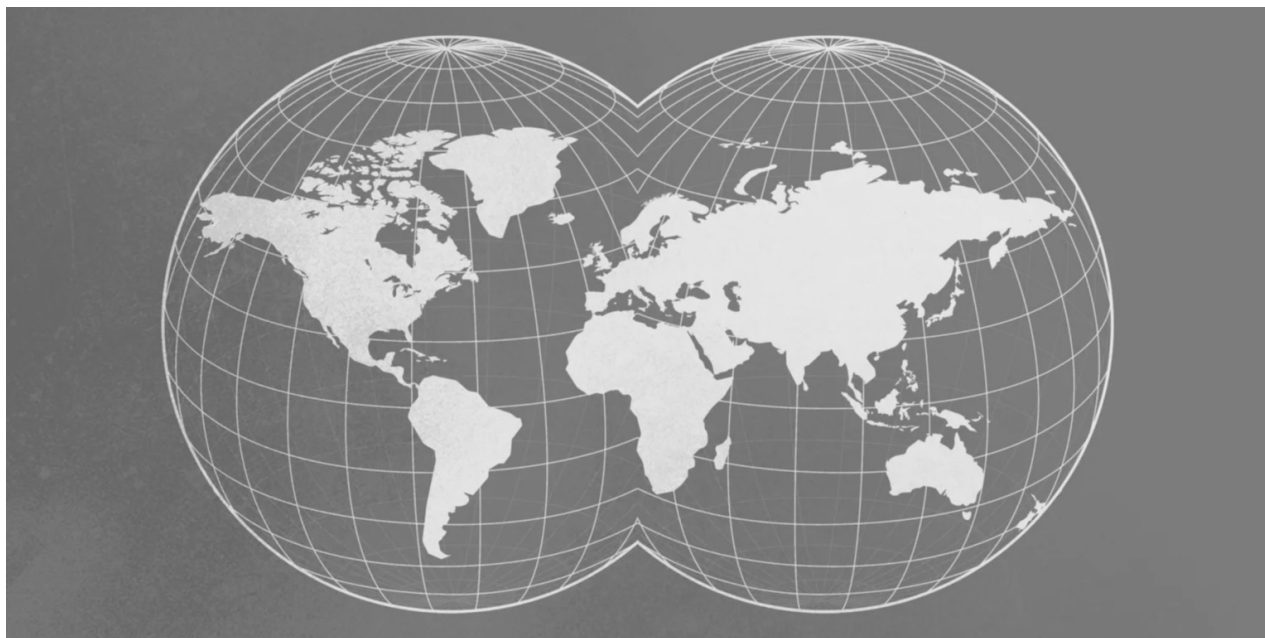
The Terrifying German 'Revenge Weapons' Of The Second World War

The first attacks

Rescue teams and civilians help to recover a casualty after a V1 attack at Clapham in south London on 13 June 1944, the day the first flying bombs hit London. A week before, on D-Day, Allied armies had invaded German-occupied France. Soon after that first V1 strike, Soviet armies launched a massive offensive against German forces in Poland. From the skies over Germany, British and American bombers were able to raid German cities at will. In the face of this disastrous strategic situation, Germany deployed its 'revenge weapons' (*Vergeltungswaffen*) in a bid to terrorise British civilians and undermine morale. Nazi propaganda hailed these weapons as 'wonder weapons' (*Wunderwaffe*) that might turn the tide of the war.



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PARTE II – NOTAS BREVES

A nova geopolítica dos metais estratégicos e críticos (1) [FONTE: Simone Tagliapietra / Bruegel, 7/03/2019]



The geopolitical implications of the global energy transition

Energy has traditionally played an important role in global geopolitics, contributing to the rise of great powers, the formation of alliances and, in many cases, also to the emergence of wars and conflicts. Every international order in modern history has been based on an energy resource. This piece discusses how the ongoing low-carbon energy transformation could reshape global geopolitics in the future.

BY: [SIMONE TAGLIAPIETRA](#)

DATE: MARCH 7, 2019

TOPIC: GREEN ECONOMY

This opinion was also
published on
www.aspeniaonline.it



Since the First World War, oil has undoubtedly been the cornerstone of global energy geopolitics. The decision of the then First Lord of Admiralty Winston Churchill to change the fuel source of the Royal Navy warships from coal to oil, in order to make the fleet faster than its German counterpart, marked the opening of a new era. The shift from secure coal supplies from Wales to uncertain oil supplies from what was then Persia, has led to the Middle East becoming an important epicentre of global geopolitics and to oil becoming a key issue for national security.

A nova geopolítica dos metais estratégicos e críticos (2) [FONTE: Simone Tagliapietra / Bruegel, 7/03/2019]

But, of course, the energy transition will also see the emergence of new geopolitical challenges.

Firstly, the global energy transition represents a challenge for oil- and gas-producing countries, and in particular for those with a less diversified economy more dependent on oil revenues. This is the case for many countries in the Middle East and north Africa which, despite the adoption of elaborate strategies for economic diversification, have not really made much progress in this direction. If the global energy transition were to take place more quickly than expected, and if these countries were to remain unprepared, the consequences could be serious from both the socio-economic and geopolitical points of view.

Secondly, the spread of renewable energies will increase electrification and stimulate cross-border trade in electricity. Energy sources such as solar and wind require flexible energy systems that can cope with the variability of weather conditions. Smart electricity grids will therefore play an increasingly important role in mitigating this variability and ensuring system stability. The digitisation of electricity grids clearly presents security risks, as terrorist groups or hostile countries could seek to either enter the systems to extrapolate information, or to disrupt them to cause economic and social damages.

A nova geopolítica dos metais estratégicos e críticos (3) [FONTE: Simone Tagliapietra / Bruegel, 7/03/2019]

Thirdly, it is important to stress that the rapid development of wind and solar energy, together with that of electric cars, raises concerns about the security of supply of the minerals needed to manufacture them. These concerns have also developed following events such as those of 2008, when China imposed a limit on the supply of rare earths – of which it holds a large part of the global production – to foreign buyers, leading to panic in the markets and a very rapid increase in prices. Another case was the ‘cobalt crisis’ of 1978, following the outbreak of a conflict in the province of Katanga – the heart of world mineral extraction – in what was then called Zaire. The crisis caused a global shortage of cobalt, driving the international price of the mineral to the sky. It is clear that if something like this were to happen in the future, the consequences for the production of electric cars would be important. Cobalt is, in fact, a key component of their batteries. These are just examples of how the minerals at the heart of the energy transition will carry their own geopolitical risks, just as oil and natural gas have had theirs.

The global energy transition will not, therefore, lead to the end of the geopolitics of energy, but rather to its transformation, which will see, as in any revolution, both winners and losers. On the one hand, it will strengthen the energy security of most of the countries currently importing oil and natural gas, promoting job creation and economic growth in those who will be able to seize the industrial opportunities of this development. On the other hand, it will create inevitable elements of instability in oil- and gas-exporting countries, which will have to reinvent themselves to keep developing in the new energy era, and new security risks linked to electricity grids and minerals.

A nova geopolítica dos metais estratégicos e críticos (4) [FONTE: International Energy Agency (2021)]

The Role of Critical Minerals in Clean Energy Transitions

World Energy Outlook Special Report

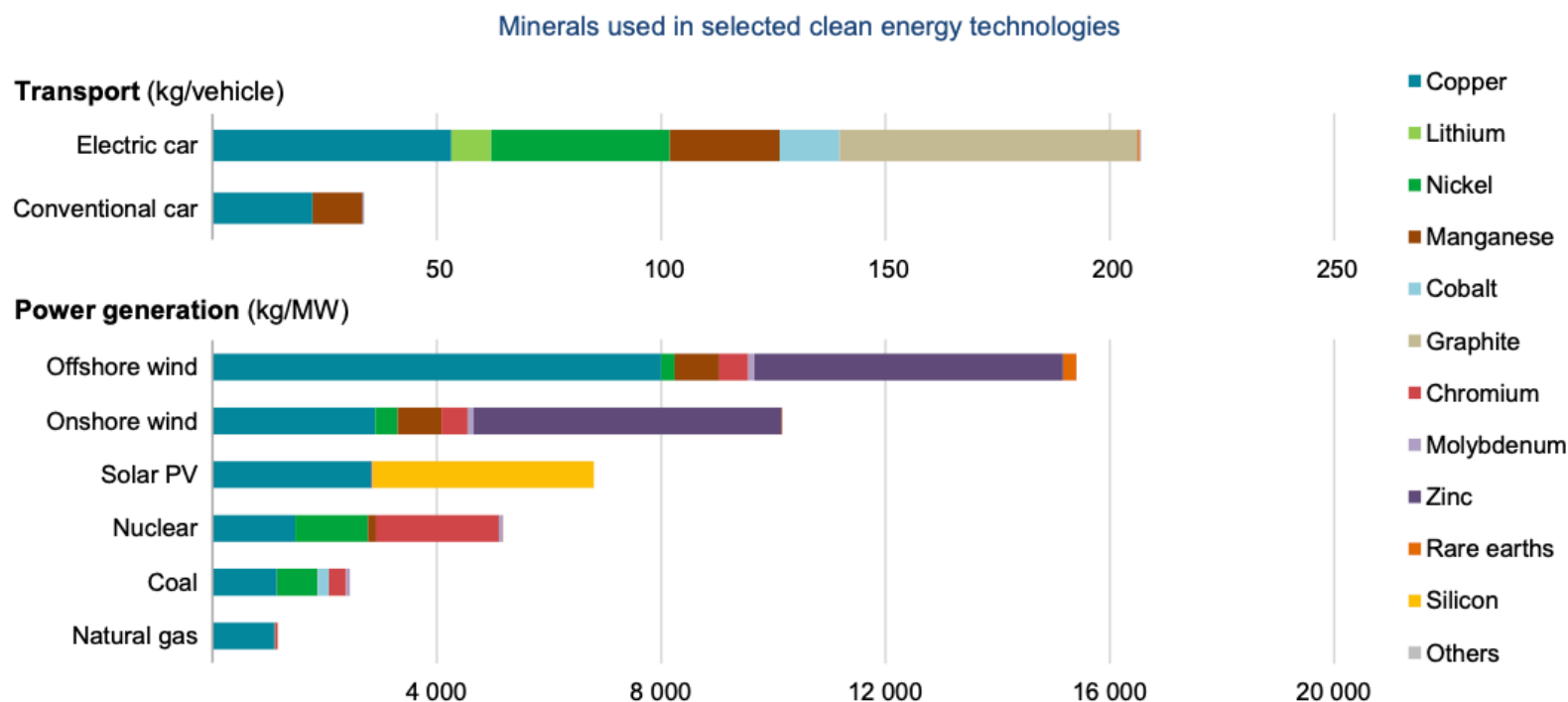


A nova geopolítica dos metais estratégicos e críticos (5) [FONTE: International Energy Agency (2021)]

The Role of Critical Minerals in Clean Energy Transitions

Executive summary

The rapid deployment of clean energy technologies as part of energy transitions implies a significant increase in demand for minerals



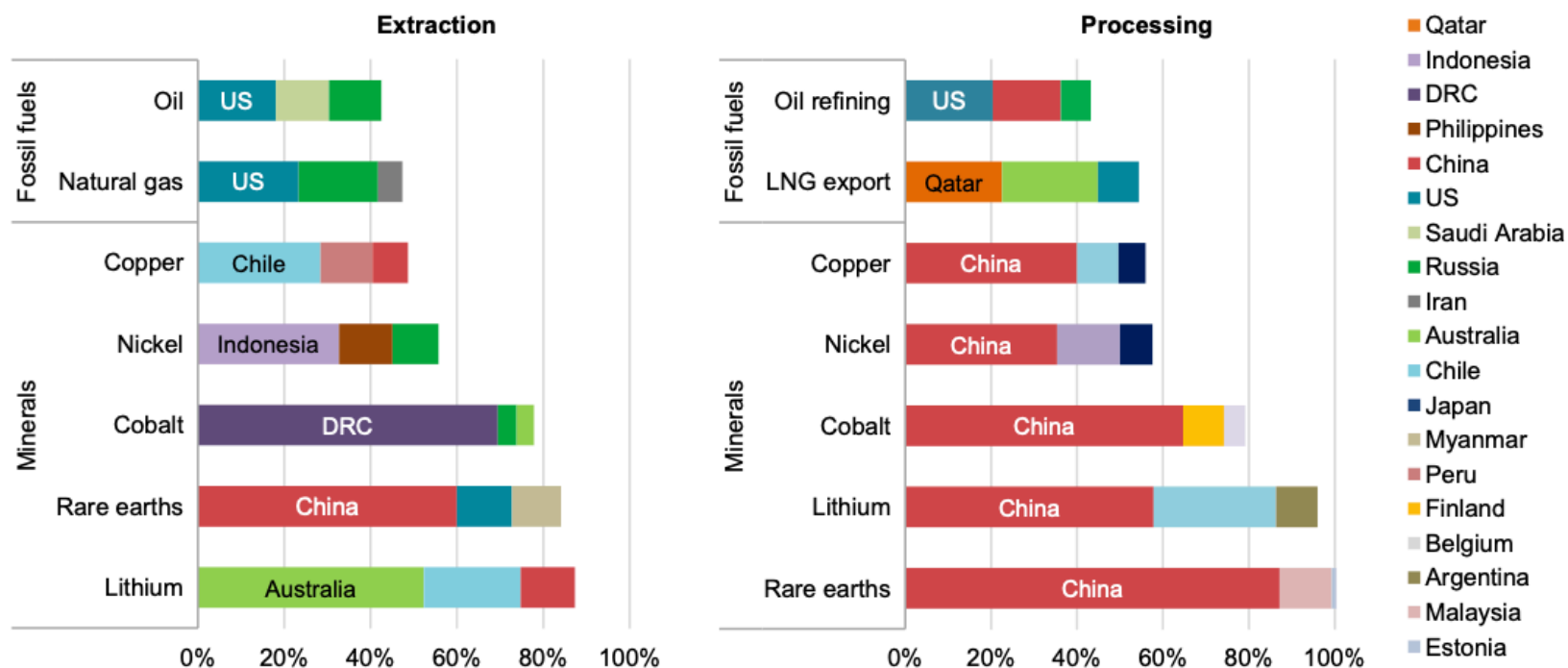
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Notes: kg = kilogramme; MW = megawatt. Steel and aluminium not included. See Chapter 1 and Annex for details on the assumptions and methodologies.

A nova geopolítica dos metais estratégicos e críticos (6) [FONTE: International Energy Agency (2021)]

Production of many energy transition minerals today is more geographically concentrated than that of oil or natural gas

Share of top three producing countries in production of selected minerals and fossil fuels, 2019



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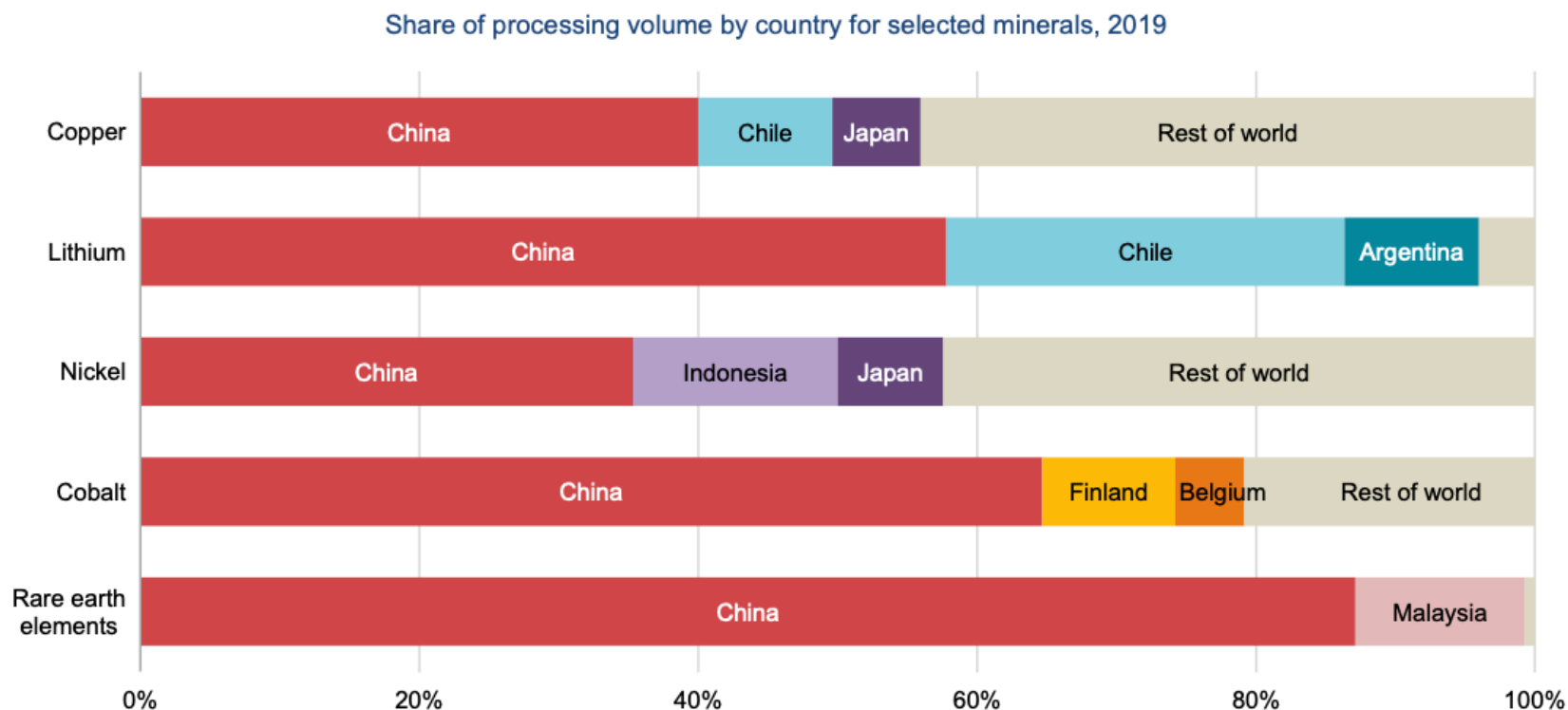
Notes: LNG = liquefied natural gas; US = United States. The values for copper processing are for refining operations.
Sources: IEA (2020a); USGS (2021), World Bureau of Metal Statistics (2020); Adamas Intelligence (2020).

A nova geopolítica dos metais estratégicos e críticos (7) [FONTE: International Energy Agency (2021)]

The Role of Critical Minerals in Clean Energy Transitions

The state of play

The level of concentration is similarly high for processing operations, with China's significant presence across the board



IEA. All rights reserved.

Note: The values for copper are for refining operations.

Sources: World Bureau of Metal Statistics (2020); Adamas Intelligence (2020) for rare earth elements.

A nova geopolítica dos metais estratégicos e críticos (8) [FONTE: Politico, 18/05/2023]

'It's just crazy': How the U.S.-China energy race imperils the climate fight

Beijing's control of the technology behind batteries and solar panels is complicating Washington's efforts to make a swift transition from fossil fuels.



A nova geopolítica dos metais estratégicos e críticos (9) [FONTE: Politico, 18/05/2023]

‘An existential struggle’

The great power competition on clean energy could cut multiple ways, according to current and former officials of both countries and experts on the U.S.-China relationship.

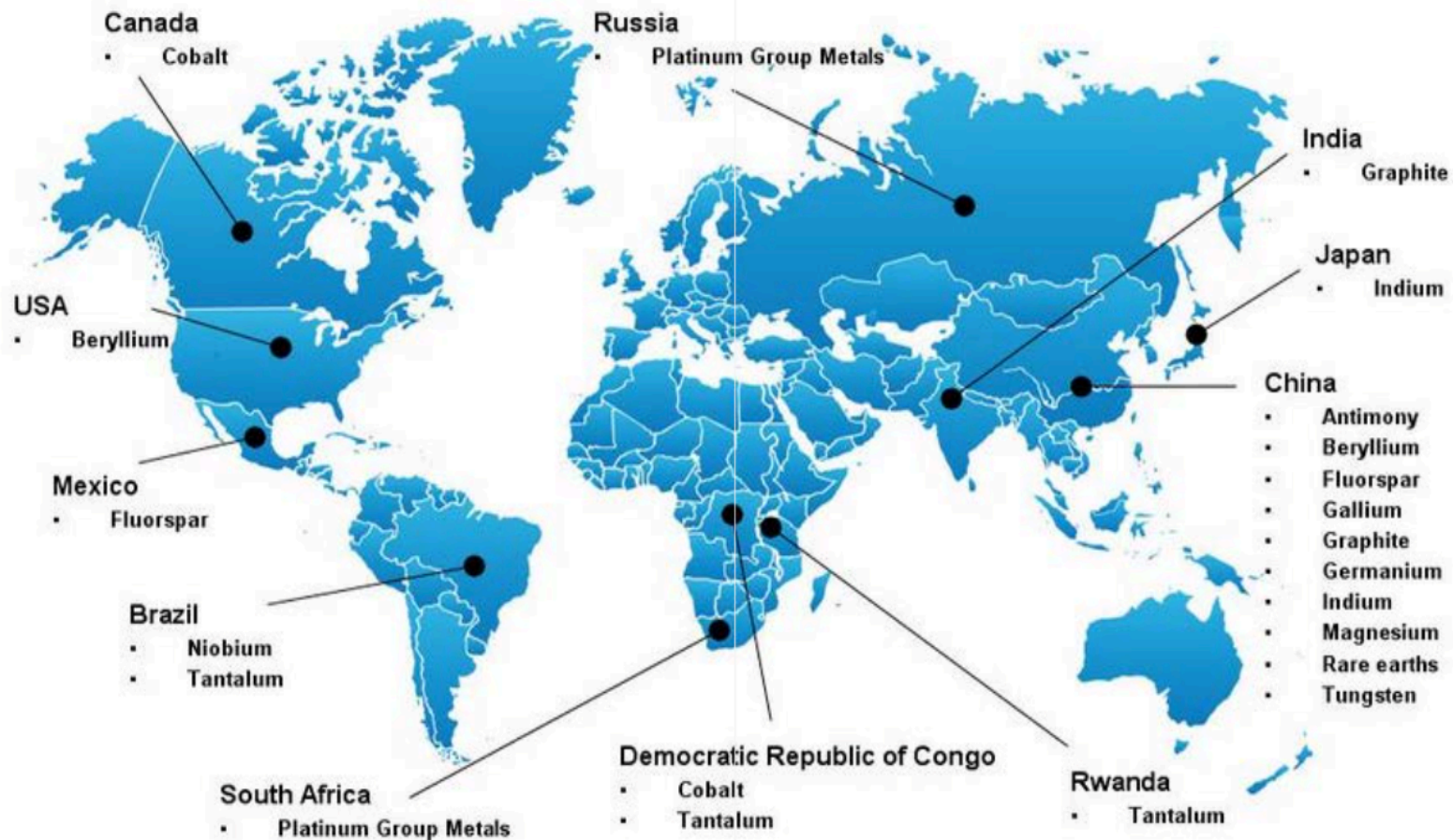
Some people have seen it as a [cause for optimism](#), saying it could increase the global supply of batteries, solar panels, wind turbines and other technologies.

But it could also take entire supply chains out of circulation for parts of the globe, if the U.S., China and their allies divvy up markets and try to box out their rivals. In parts of Africa and Asia, competition between the two superpowers could complicate financing opportunities when countries rely on a mix of U.S.-led bilateral funding and China’s overseas lending for projects to transition away from coal and oil.

Resistance to using Chinese-sourced technologies or minerals in the U.S. could also make it harder to meet Biden’s goal of cutting the nation’s carbon pollution in half by 2030.

A nova geopolítica dos metais estratégicos e críticos (10) [FONTE: FRAME | LNEG Laboratório Nacional de Energia e Geologia]

Production concentration of critical raw mineral materials

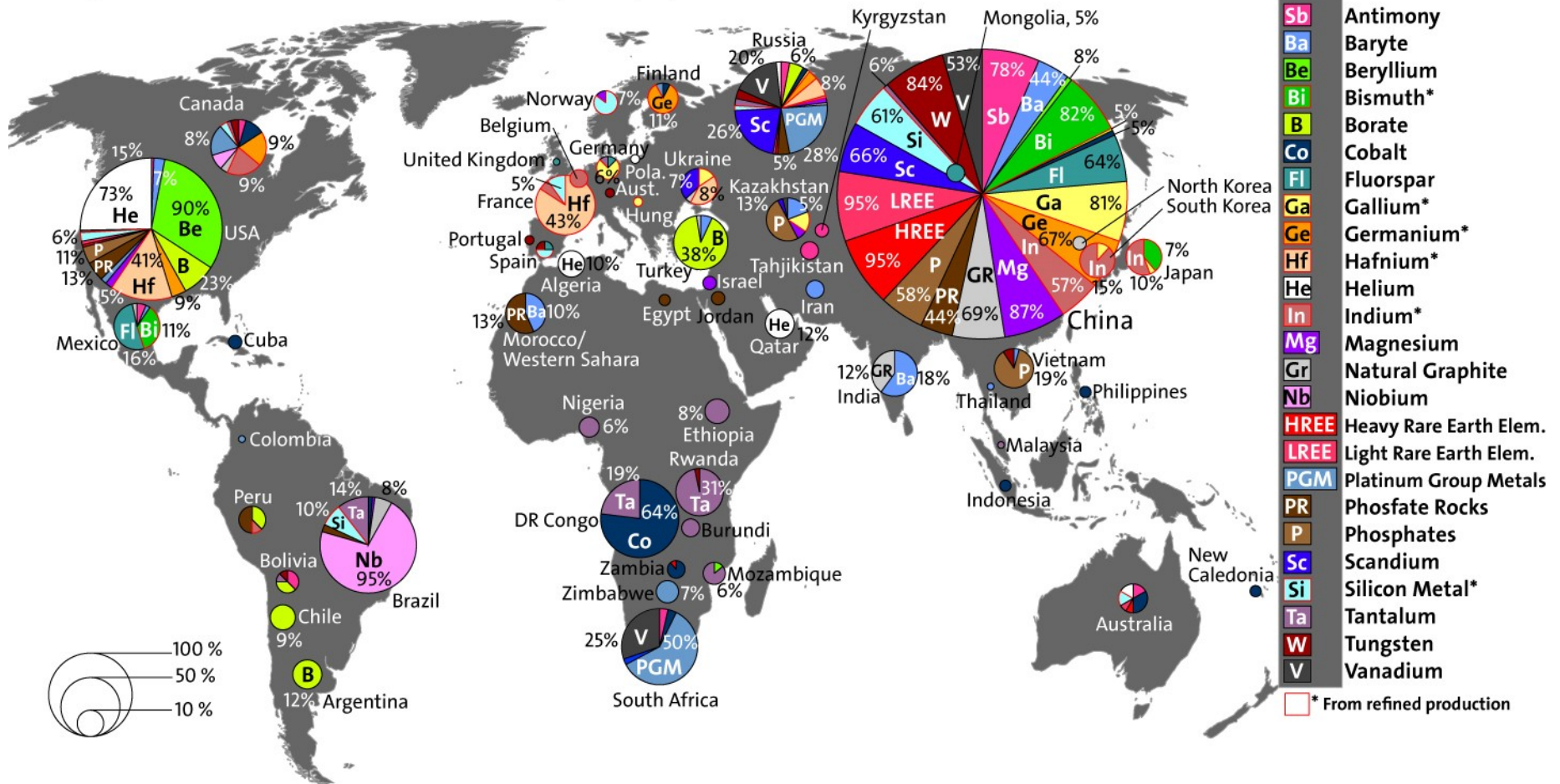


A nova geopolítica dos metais estratégicos e críticos (11)

[FONTE: FRAME | LNEG Laboratório Nacional de Energia e Geologia]

Global Supply of EU Critical Minerals and Metals

The pie charts show the percent distribution of the production of critical metals and minerals. In total, it is 100% for each raw material. The area of the pies are proportional. SGU 2017.



A intensificação da competição sino-americana pelas terras raras (1) [FONTE: BBC 17/10/2025]

China has found Trump's pain point - rare earths



Last week, China's Ministry of Commerce published a document that went by the name of "announcement No. 62 of 2025".

But this wasn't just any bureaucratic missive. It has rocked the [fragile tariffs truce with the US](#).

A intensificação da competição sino-americana pelas terras raras (2) [FONTE: BBC 17/10/2025]

Under [the new rules](#), foreign companies now need the Chinese government's approval to export products that contain even a tiny amount of rare earths and must declare their intended use.

In response, US President Donald Trump [threatened to impose an additional 100% tariff](#) on Chinese goods and put export controls on key software.

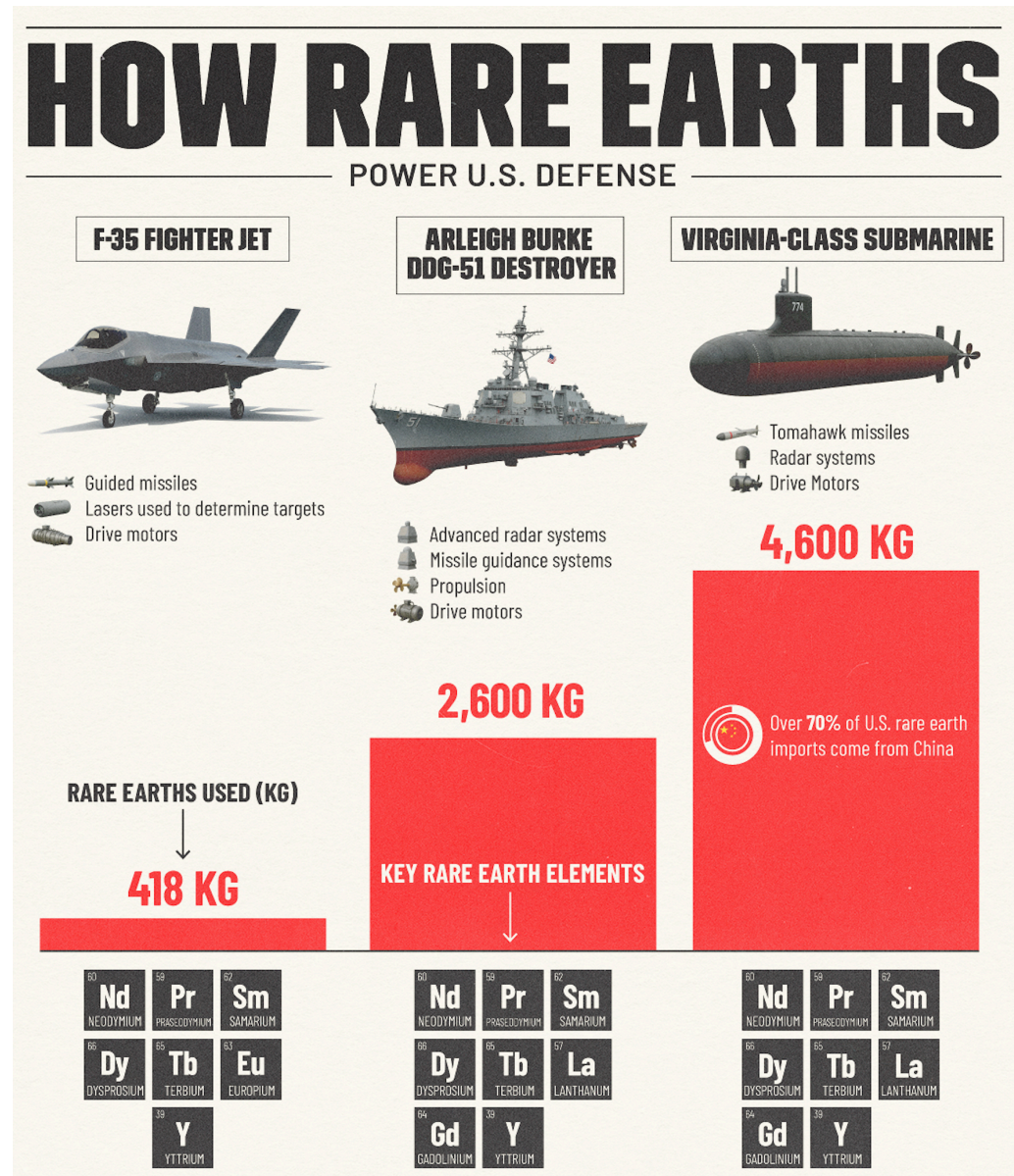
"This is China versus the world. They have pointed a bazooka at the supply chains and the industrial base of the entire free world, and we're not going to have it," said US Treasury Secretary Scott Bessent.

On Thursday, China said the US had "deliberately provoked unnecessary misunderstanding and panic" over the rare earths restrictions.

"Provided the export licence applications are compliant and intended for civilian use, they will be approved," a commerce ministry spokesperson added.

This week, the world's two biggest economies also imposed new port fees on each other's ships.

A intensificação da competição sino-americana pelas terras raras (3) [FONTE: Visual Capitalist / 20/07/2025]



A intensificação da competição sino-americana pelas terras raras (4) [FONTE: Alicia Gracia-

Herrero / Bruegel, 15/10/2025]



Escalating US-China rare earth tensions signal determination to decouple

The future may be parallel refining and supply systems for rare earths and associated technologies, as the US and China drift further apart

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Authors

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A intensificação da competição sino-americana pelas terras raras (5) [FONTE: Alicia Gracia-Herrero / Bruegel, 15/10/2025]

An intensification of United States-China trade frictions, marked by a 9 October expansion of Chinese export controls on rare earth elements (REEs), and President Donald Trump's subsequent threat of an additional 100% tariff on US imports from China, underscores the deepening mistrust between the world's two largest economies. Markets have reacted sharply, erasing over \$1.5 trillion in value in only two days. The dispute even threatens a planned 31 October Asia-Pacific Economic Cooperation (APEC) summit meeting between Trump and Chinese premier Xi Jinping.

China controls 85% to 90% of global REE processing capacity, crucial for supply chains including batteries, semiconductors and precision-guided munitions. It has massively upgraded controls announced in April, which covered raw exports of seven rare earths. Five more (holmium, erbium, thulium, europium and ytterbium) have now been added, while restrictions have also been extended to refining technologies, equipment and products containing as little as 0.1% Chinese-processed REEs. Furthermore, planned foreign military or dual-use applications of REEs will now be blocked automatically.

A intensificação da competição sino-americana pelas terras raras (6) [FONTE: Alicia Gracia-Herrero / Bruegel, 15/10/2025]

The sectors and activities potentially most affected by the Chinese measures include US defence programmes, including up to 30% of Pentagon initiatives, such as F-35 avionics, which face potential delays from REE shortages. Boeing could encounter assembly issues because of constraints on components. In semiconductors, Nvidia, Intel and Apple will certainly see costs rising and, potentially, delays. Producers of electric vehicles in the US (including Tesla) risk production cuts.

In Europe, companies including Airbus, Volkswagen and electric vehicle producers will be hit hard. Finally, Taiwan's chipmaker, TSMC, could be significantly affected because it needs rare earths for the production of AI semiconductors.

The provocative timing of the Chinese move, just before the APEC summit, appears tied to recent US actions and, potentially, Taiwan-related developments. On 29 September, the US Commerce Department implemented the 'affiliates rule', extending entity-list restrictions to companies 50% or more owned by listed parties, limiting Chinese evasion tactics. On the same day, the US Senate voted to prohibit US biotech from sourcing from designated Chinese firms, and, via the provocatively named FIGHT China Act, to block outbound investments in the Chinese semiconductor, AI and quantum sectors. These steps reflect a bipartisan push for economic security.

A intensificação da competição sino-americana pelas terras raras (7) [FONTE: Alicia Gracia-Herrero / Bruegel, 15/10/2025]

Nevertheless, China likely worries that Taiwan might transfer its technology and advanced chip capabilities to the US. Furthermore, the extraterritorial aspects of China's new export controls could potentially hit TSMC's chip sales to US firms by requiring Beijing's approval for essential materials. The potential inclusion of TSMC on a Chinese entity list would further complicate the US AI supply chain.

Calls from Trump and in the Chinese media for renewed negotiations to defuse tensions, have not stopped continued escalation from both sides. China announced on 10 October an antitrust probe into Qualcomm over AI chip practices, following an investigation into NVIDIA in September and inspections of both companies' operations in China. China also ratcheted up fees on US-linked vessels. Meanwhile, US Treasury Secretary Bessent has threatened countermeasures on Chinese students in the US.

Even if a truce is reached, saving the Trump-Xi in-person meeting at the APEC summit, the increasing mistrust and the potentially major consequences of China's announced export controls, coupled with the additional 100% tariffs on the US side, will lead to an even faster decoupling of supply chains. As the US suffers from REE shortages – or the threat thereof – the US will invest more in sourcing/refining REEs elsewhere. China will continue to reduce its dependence on US technology and the US market, accelerating self-reliance. Global companies, especially in semiconductors, electric vehicles and defence, will face higher costs as they adjust to parallel systems.

A intensificação da competição sino-americana pelas terras raras (8) [FONTE: FT, 17/10/2025]

Europe is the biggest loser in US-China rare earth wars

Its dual dependence on America's digital services and Beijing's critical mineral processing industry leaves it highly vulnerable



A intensificação da competição sino-americana pelas terras raras (9) [FONTE: FT, 17/10/2025]

Tech wars between west and east are nothing new. During the cold war, the US and its allies competed fiercely with the Soviet Union in space exploration and weapons systems. More recently, competition between the US and China has been heating up. Ironically, this time Europe stands to be the biggest loser.

The US and its allies founded the Coordinating Committee for Multilateral Export Controls in 1949 to prevent the eastern bloc gaining access to western technology that might enhance its military and economic capability. The committee's impact increased significantly under President Ronald Reagan with a ban on the sale of microprocessors, computers and oil extraction technology to Warsaw Pact countries. From the late 1970s, western technological advances created an unbridgeable strategic gap, helping to speed the collapse of the Soviet Union.

A intensificação da competição sino-americana pelas terras raras (10) [FONTE: FT, 17/10/2025]

In the first week of the Iran-Israel conflict in June this year, approximately 800 missiles were exchanged. Each contained anywhere between two and 20 kilogrammes of rare earth elements, including two, dysprosium and terbium, now subject to Chinese export controls. Based on conservative estimates from the limited data, this means anywhere between 1.6 and 16 metric tonnes of rare earth elements were vaporised in that conflict in seven days.

Ukraine's extraordinary recent performance in its drone war against the Russian invasion is almost entirely dependent on electronics and magnets imported from China. Ukraine is now less concerned about whether European arms deliveries will arrive on time and more worried about the flow of tech imports from China.

A intensificação da competição sino-americana pelas terras raras (11) [FONTE: FT, 17/10/2025]

In the past 30 years, China has become the world leader in the processing of most of the 54 raw minerals that the US Geological Survey classifies as critical for US industry, including the defence sector. Currently the Chinese can process virtually any mineral 30 per cent more cheaply than its competitors. To compete with this, western governments would need to offer subsidies to their own industry. While China leverages its rare earth monopoly, Washington is using its influence to limit China's access to the most powerful microprocessors (although the great majority are physically produced by TSMC in Taiwan).

China's latest restrictions on the export of rare earths and products containing them fall into a broader framework of the US-China tech war. Both governments believe that whoever wins the race in key industries — notably AI, missile technology, quantum computing, robotics and drones — will enjoy a decisive advantage in economic and military competition over the next 30 years.

A intensificação da competição sino-americana pelas terras raras (12) [FONTE: FT, 17/10/2025]

Trump's America may be turning its back on solar and wind, but these renewable energy technologies are central to Europe's 21st-century identity. European companies were pioneers in solar and wind while EVs are gradually increasing their share of the automotive industry. But now China dominates all three industries, along with lithium-ion battery production.

While the US slowly rebuilds its rare earth industry and exerts influence over producers of other critical minerals such as South America's vast lithium stocks, Europe is barely at the races. True, Brussels has developed a critical raw materials strategy but attempts to exploit its own key mineral resources have encountered stiff political resistance from environmental groups.

Europe's dual dependence on America's digital services and China's critical mineral processing industry leaves it highly vulnerable to external pressures. EU investment in key high-tech industries is risible compared with the trillions that China and the US are pouring into the sector.

Bibliografia

