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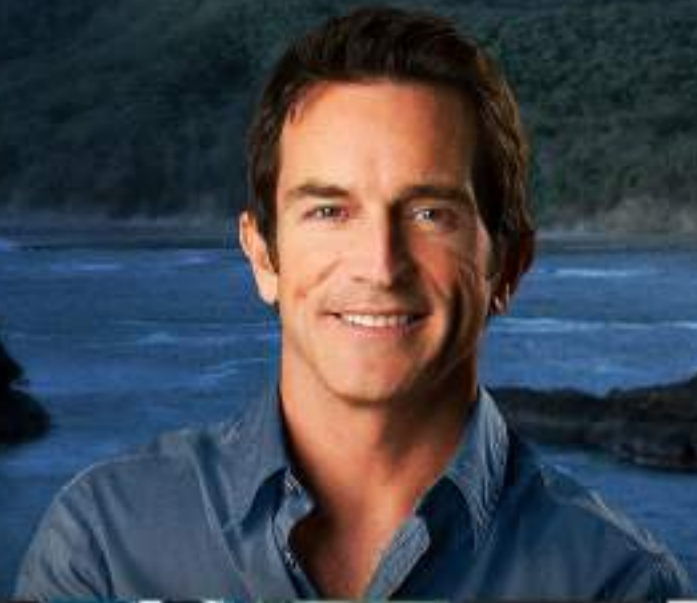
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**PIONEERS IN  
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Two pioneers of artificial intelligence — John Hopfield and Geoffrey Hinton — won the Nobel Prize in physics this week for helping create the building blocks of machine learning that is revolutionizing the way we work and live but also creates new threats for humanity.

Hinton, who is known as the godfather of artificial intelligence, is a citizen of Canada and Britain who works at the University of Toronto, and Hopfield is an American working at Princeton.

“These two gentlemen were really the pioneers,” said Nobel physics committee member Mark Pearce.

The artificial neural networks — interconnected computer nodes inspired by neurons in the human brain — the researchers pioneered are used throughout science and medicine and “have also become part of our daily lives,” said Ellen Moons of the Nobel committee at the Royal Swedish Academy of Sciences.

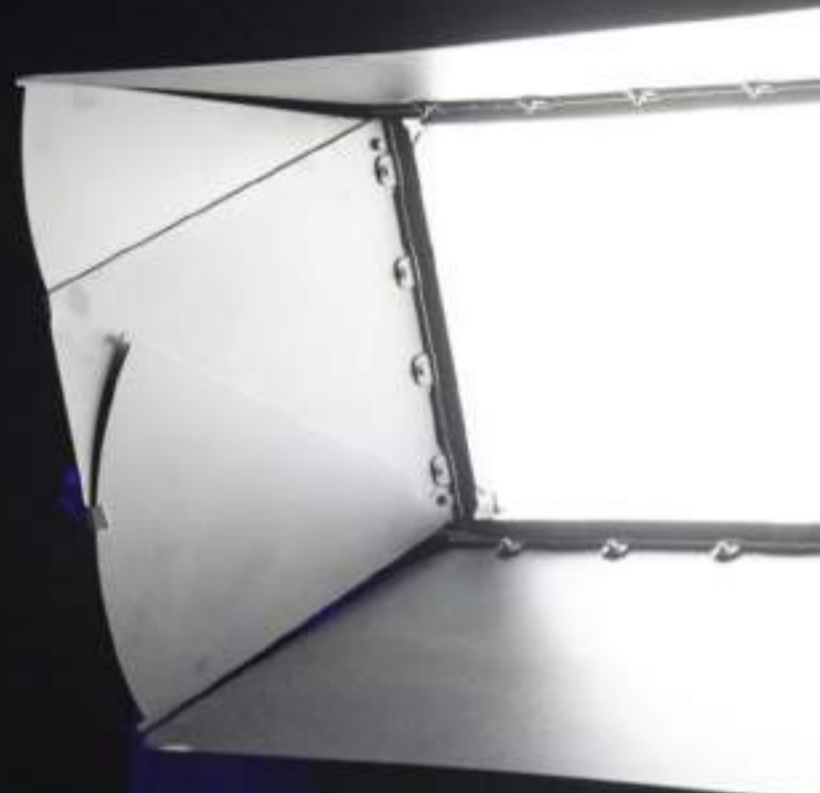
Hopfield, whose 1982 work laid the groundwork for Hinton’s, told, “I continue to be amazed by the impact it has had.”

Hinton predicted that AI will end up having a “huge influence” on civilization, bringing improvements in productivity and health care.

“It would be comparable with the Industrial Revolution,” he said in an open call with reporters and officials of the Royal Swedish Academy of Sciences.

“Instead of exceeding people in physical strength, it’s going to exceed people in intellectual ability. We have no experience of what it’s like to have things smarter than us. And







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THE NOBEL PRIZE IN PHYSICS 2024



Photo: Mary Matthews

**John J. Hopfield**  
Princeton University, NJ, USA

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*"for foundational discoveries and inventions that enable"*



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THE ROYAL SWEDISH ACADEMY OF SCIENCES

ELLEN MOONS

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Geoffrey E. Hinton

University of Toronto, Canada

gör maskininläring med artificiella neuronnätverk

machine learning with artificial neural networks"



it's going to be wonderful in many respects," Hinton said.

"But we also have to worry about a number of possible bad consequences, particularly the threat of these things getting out of control."

## WARNING OF AI RISKS

The Nobel committee also mentioned fears about the possible flipside.

Moons said that while it has "enormous benefits, its rapid development has also raised concerns about our future. Collectively, humans carry the responsibility for using this new technology in a safe and ethical way for the greatest benefit of humankind."

Hinton, who quit a role at Google so he could speak more freely about the dangers of the technology he helped create, shares those concerns.

"I am worried that the overall consequence of this might be systems more intelligent than us that eventually take control," Hinton said.

For his part, Hopfield, who signed early petitions by researchers calling for strong control of the technology, compared the risks and benefits to work on viruses and nuclear energy, capable of helping and harming society.

## NEITHER WINNER WAS HOME TO GET THE CALL

Hopfield, who was staying with his wife at a cottage in Hampshire, England, said that after grabbing coffee and getting his flu shot, he opened his computer to a flurry of activity.

"I've never seen that many emails in my life,"

he said. A bottle of champagne and bowl of soup were waiting, he added, but he doubted there were any fellow physicists in town to join the celebration.

Hinton said he was shocked at the honor.

"I'm flabbergasted. I had no idea this would happen," he said when reached by the Nobel committee on the phone. He said he was at a cheap hotel with no internet.

### **HINTON'S WORK CONSIDERED 'THE BIRTH' OF AI**

Hinton, 76, helped develop a technique in the 1980s known as backpropagation instrumental in training machines how to "learn" by fine-tuning errors until they disappear. It's similar to the way a student learns, with an initial solution graded and flaws identified and returned to be fixed and repaired. This process continues until the answer matches the network's version of reality.

Hinton had an unconventional background as a psychologist who also dabbled in carpentry and was genuinely curious about how the mind works, said protege Nick Frosst, who was Hinton's first hire at Google's AI division in Toronto.

His "playfulness and genuine interest in answering fundamental questions I think is key to his success as a scientist," Frosst said.

Nor did he stop at his pioneering 1980s work.

"He's been consistently trying out crazy things and some of them work very well and some of them don't," Frosst said. "But they all have contributed to the success of the field and






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galvanized other researchers to try new things as well.”

Hinton’s team at the University of Toronto wowed peers by using a neural network to win the prestigious ImageNet computer vision competition in 2012. That spawned a flurry of copycats and was “a very, very significant moment in hindsight and in the course of AI history,” said Stanford University computer scientist and ImageNet creator Fei-Fei Li.

“Many people consider that the birth of modern AI,” she said.

Hinton and fellow AI scientists Yoshua Bengio and Yann LeCun won computer science’s top prize, the Turing Award, in 2019.

“For a long time, people thought what the three of us were doing was nonsense,” Hinton told the AP in 2019. “They thought we were very misguided and what we were doing was a very surprising thing for apparently intelligent people to waste their time on.”

“My message to young researchers is, don’t be put off if everyone tells you what are doing is silly.”

Many of Hinton’s former students and collaborators followed him into the tech industry as it began capitalizing on AI innovations, and some started their own AI companies, including Frosst’s Cohere and ChatGPT maker OpenAI. Hinton said he uses machine learning tools in his daily life.

“Whenever I want to know the answer to anything, I just go and ask GPT-4,” Hinton said at the Nobel announcement. “I don’t totally trust it because it can hallucinate, but on almost

everything it's a not-very-good expert. And that's very useful."

## HOPFIELD'S WORK WAS FOUNDATION FOR HINTON'S

Hopfield, 91, created an associative memory that can store and reconstruct images and other types of patterns in data, the Nobel committee said.

"What fascinates me most is still this question of how mind comes from machine," Hopfield said in a video posted online by The Franklin Institute after it awarded him a physics prize in 2019.

Hinton used Hopfield's network as the foundation for a new network that uses a different method, known as the Boltzmann machine, that the committee said can learn to recognize characteristic elements in a given type of data.

While there's no Nobel for computer science, Li said that awarding a traditional science prize to AI pioneers is significant and shows how boundaries between disciplines have blurred.

Bengio, who was mentored by Hinton and "profoundly shaped" by Hopfield's thinking, told the AP the winners both "saw something that was not obvious: Connections between physics and learning in neural networks, which has been the basis of modern AI."

## DISAGREEMENT ON AI RISKS

Not all of Hinton's peers agree with him about the risks of the technology he helped create.

Frosst has had many "spirited debates" with Hinton about AI's risks and disagrees with some

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NOBEL PRIZE IN PHYSICS 2024



**John J. Hopfield**

Princeton University, NJ, USA

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discoveries and inventions that enable machine





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Geoffrey E. Hinton  
University of Toronto, Canada

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of Hinton's warnings but not his willingness to publicly address them.

"Mostly we disagree on timescale and on the particular technology that he's sounding the alarm on," Frosst said. "I don't think that neural nets and language models as they exist today pose an existential risk."

Bengio, who has long sounded alarms about AI risks, said what really alarms him and Hinton is "loss of human control" and whether AI systems will act morally when they're smarter than humans.

"We don't know the answer to these questions," he said. "And we should make sure we do before we build those machines."

Asked whether the Nobel committee might have factored in Hinton's warnings when deciding on the award, Bengio dismissed that, saying "we're talking about very early work when we thought that everything would be rosy."

Six days of Nobel announcements opened Monday with Americans Victor Ambros and Gary Ruvkun winning the medicine prize.

The prize carries a cash award of 11 million Swedish kronor (\$1 million) from a bequest left by the award's creator, Swedish inventor Alfred Nobel. The laureates are invited to receive their awards at ceremonies on Dec. 10, the anniversary of Nobel's death.

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# COLLAPSE OF NATIONAL SECURITY ELITES' CYBER FIRM LEAVES BITTER WAKE

The future was once dazzling for IronNet.

Founded by a former director of the National Security Agency and stacked with elite members of the U.S. intelligence establishment, IronNet promised it was going to revolutionize the way governments and corporations combat cyberattacks.

Its pitch — combining the prowess of ex-government hackers with cutting-edge software — was initially a hit. Shortly after going public in 2021, the company's value shot past \$3 billion.

Yet, as blazing as IronNet started, it burned out.

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Last September the never-profitable company announced it was shutting down and firing its employees after running out of money, providing yet another example of a tech firm that faltered after failing to deliver on overhyped promises.

The firm's crash has left behind a trail of bitter investors and former employees who remain angry at the company and believe it misled them about its financial health.

IronNet's rise and fall also raises questions about the judgment of its well-credentialed leaders, a who's who of the national security establishment. National security experts, former employees and analysts told that the firm collapsed, in part, because it engaged in questionable business practices, produced subpar products and services, and entered into associations that could have left the firm vulnerable to meddling by the Kremlin.

"I'm honestly ashamed that I was ever an executive at that company," said Mark Berly, a former IronNet vice president. He said the company's top leaders cultivated a culture of deceit "just like Theranos," the once highly touted blood-testing firm that became a symbol of corporate fraud.

IronNet's collapse ranks as one of the most high-profile flameouts in the history of cybersecurity, said Richard Stiennon, a longtime industry analyst. The main reason for its fall, he said: "hubris."

"The company got what was coming to" it, Stiennon said.

IronNet and top former company officials either declined to comment or did not respond to requests for comment.

## THE GENERAL

IronNet's founder and former CEO Keith Alexander is a West Point graduate who retired as a four-star Army general and was once one of the most powerful figures in U.S. intelligence. He oversaw an unprecedented expansion of the NSA's digital spying around the world when he led the U.S.'s largest intelligence agency for nearly a decade.

Alexander, who retired from the government in 2014, remains a prominent voice on cybersecurity and intelligence matters and sits on the board of the tech giant Amazon. Alexander did not respond to requests for comment.

IronNet's board has included Mike McConnell, a former director of both the NSA and national intelligence; Jack Keane, a retired four-star general and Army vice chief of staff, and Mike Rogers, the former Republican chairman of the House Intelligence Committee who is running for the U.S. Senate in Michigan. One of IronNet's first presidents and co-founders was Matt Olsen, who left the company in 2018 and leads the Justice Department's National Security Division.

Alexander's reputation and the company's all-star lineup ensured IronNet stood out in a competitive market as it sought contracts in the finance and energy sectors, as well as with the U.S. government and others in Asia and the Middle East.

IronNet marketed itself as a kind of private version of the NSA. By scanning the networks





of multiple customers, the company claimed, IronNet's advanced software and skilled staff could spot signals and patterns of sophisticated hackers that a single company couldn't do alone. The company dubbed the approach the "Collective Defense Platform."

## THE SOUTH AFRICAN

Venture capital firms were eager to invest. Among IronNet's biggest early boosters was C5 Capital, an investment firm started and run by Andre Pienaar, a South African who had spent years serving the needs of the ultra-rich while cultivating business relationships with former top national security officials.

C5's operating partners – essentially expert advisers — include former Chairman of the U.S. Joint Chiefs of Staff Mike Mullen and Sir Iain Lobban, who used to lead the U.K.'s signals intelligence agency equivalent to the NSA. Former C5 operating partners include National Cyber Director Harry Coker Jr. and Ronald Moultrie, who resigned earlier this year as undersecretary of defense for intelligence and security.





A DANGER  
A DANGER  
A DANGER







Prior to going into venture capital, Pienaar was a private investigator and started a firm called G3 Good Governance Group whose clients included blue chip companies, wealthy individuals and the British royal family. Pienaar also worked at the time to help Russian oligarch Viktor Vekselberg cement relationships with London's rich and famous, according to William Lofgren, a former CIA officer and G3 co-founder.

"The relationship was steady and frequent because both Andre and Vekselberg saw merit in it," said Lofgren.

Pienaar also helped Vekselberg win a share of a South African manganese mine in 2005 and then later served as one of the oligarch's representatives on the mine's board of directors until early 2018, internal G3 records and South African business records show.

Vekselberg has been sanctioned twice by the U.S. government, first in April 2018 and again in March 2022. The U.S. Treasury Department has accused him of taking part in "soft power activities on behalf of the Kremlin."

In 2014, the FBI publicly warned in an op-ed that a Vekselberg-led foundation may be "a means for the Russian government to access our nation's sensitive or classified research."

Pienaar's long association with Vekselberg should have disqualified him from investing in IronNet, which was seeking highly sensitive U.S. defense contracts, former intelligence officials said.

The company's leaders "absolutely should have known better," said Bob Baer, a former CIA officer.

He added that Russian intelligence services would have had a strong interest in a company like IronNet and have a history of using oligarchs like Vekselberg to do their bidding, either directly or through witting or unwitting proxies.

Pienaar also sponsored a swanky Russian music festival that Vekselberg and a close associate, Vladimir Kuznetsov, put on in Switzerland. Kuznetsov, who served as a key investment adviser to Vekselberg, was also an investor in Pienaar's investment firm.

Alexander and others at IronNet either did not know the details of Pienaar's relationships with Vekselberg or did not find them troubling: A month after Vekselberg was first sanctioned in 2018, Pienaar joined IronNet's board and C5 announced it was putting in a \$35 million investment.

C5's investment would grow to \$60 million by the time IronNet went public, giving the investment firm around a 7% stake in the company.

Vekselberg did not respond to requests for comment. Kuznetsov told he stopped speaking to Pienaar about five years ago but did not say why.

"I'm not commenting on that," Kuznetsov said.

Pienaar's attorneys said he has never had a relationship with Vekselberg. The lawyers said the mine's filings with the South African







government's regulatory agency that listed Pienaar as a director were incorrect and should be "viewed as suspect" because news reports indicated the agency has been hacked.

Pienaar filed a defamation lawsuit last year against a reporter who sought interviews with Pienaar's former associates. He said the suit, which remains pending, was meritless and an attempt to stifle legitimate reporting.

## THE FALL

Not long after Alexander rang the opening bell at the New York Stock Exchange in September 2021, IronNet's stock price soared, making its founders and early investors extremely wealthy on paper.

Top officials were prohibited from unloading their stock for several months, but Alexander was allowed to sell a small amount of his shares. He made about \$5 million in early stock sales and bought a Florida mansion worth the same amount.

IronNet was projecting exponential growth that required the company to land a handful of major contracts, according to confidential board documents obtained by the press.

Those prospective deals included one valued at up to \$10 million to provide cybersecurity for the U.S. Navy's contractors and a more than \$22 million deal with the government of Kuwait.

It did not take long for IronNet's promises to slam into a tough reality as it failed to land large deals and meet revenue projections. Its products simply didn't live up to the hype, according to former employees, experts and analysts.



Image: Marvin D. Lynchard



Stiennon, the cybersecurity investing expert, said IronNet's ideas about gathering threat data from multiple clients were not unique and the company's biggest draw was Alexander's "aura" as a former NSA director.

Interviews of several former IronNet employees who said the company hired well-qualified technicians to design products that showed promise, but executives did not invest the time or resources to fully develop the technology.

When IronNet tried to land contracts with the NSA, officials dismissed the company's offerings as unserious, according to a former member of U.S. Cyber Command who was at the meeting but not authorized to discuss government procurement proceedings publicly.

The failure to win large contracts quickly derailed IronNet's growth plans. In December 2021, just a few months after going public, IronNet downgraded its annual recurring revenue projections by 60%.

Another sign that things were not well: IronNet and C5 were engaging in a questionable business practice in an apparent effort to juice the cybersecurity firm's revenues, according to C5 records and interviews with former employees at both firms.

In addition to being a major investor, C5 was also one of IronNet's biggest customers, accounting for a significant part of the cybersecurity firm's revenue when it went public.

C5 had signed two multi-year customer contracts with IronNet for \$5.2 million, according to internal C5 records.

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Contracts of that size were typical for large clients with thousands of employees, not a small investment firm like C5 that had a couple dozen employees and partners, former IronNet employees said.

“That’s an inflated number,” said Eddie Potter, a former top sales executive at IronNet, when told by the press of the size of C5’s contracts with IronNet. He added there was “no way” that C5 required services “worth \$5 million.”

Indeed, one C5 internal record obtained shows it budgeted only about \$50,000 a year for IronNet’s services.

Pienaar’s attorneys said C5’s contracts with IronNet were to help protect the U.K. government’s hospitals and other entities against “escalating cyberattacks during the COVID-19 pandemic.” His attorneys said the work was coordinated through a charity Pienaar and C5 created in 2020.

Securities and Exchange Commission filings and C5 records show C5’s contracts with IronNet were signed in the summer and fall of 2019 — several months before the onset of the coronavirus pandemic. Pienaar’s attorneys said Alexander and Pienaar were “briefed on the shocking scale of hostile nation-state cyberattacks on hospitals” in 2019, which created the “foundation” for IronNet’s work with C5.

Pienaar’s charity never registered with the IRS, as one of Pienaar’s companies claimed in U.K. business filings, and former C5 and IronNet officials said they did not see it do any substantive work.

“It was marketing, fluffy crap,” said Rob Mathieson, a former IronNet vice president.

Pienaar's attorneys said his charity was successful but there was "insufficient time" for it to register with the IRS.

After reporting millions in revenue from C5 from 2020 to 2023, IronNet wrote off \$1.3 million from C5 in what the cybersecurity firm claimed was "bad debt," IronNet's filings with the SEC show. Pienaar's attorneys said the write-off represented a reduction in the cost of providing services to his charity and denied that C5 had not fulfilled its financial obligations to IronNet.

IronNet was not alone in having trouble getting money from Pienaar and his firms.

A group of nuns sued C5 in 2022, court records show, alleging it failed to return their \$2.5 million investment in a tech incubator that Pienaar had promoted as a way to boost socially conscious start-ups. C5 agreed to refund the nuns' investment, plus attorney fees and expenses, to settle the lawsuit, records show. The nuns' financial adviser, Carolyn LaRocco, told that Pienaar used the nuns' investment to pay expenses she believed were unwarranted.

An affiliate of the United States Institute of Peace, a nonprofit established by Congress, sued Pienaar in 2020 after he failed to pay a promised \$1.5 million personal donation, federal court records show. The nonprofit's affiliate then took Pienaar back to court after he failed to make payments on time as part of a settlement. Pienaar used \$500,000 from a C5 bank account to meet a court-ordered deadline for payment, court records show. C5 staff were concerned about Pienaar's use of the firm's funds to cover his personal debt, according to C5 records.





In the last year, Pienaar-controlled entities have been sued by a top former CIA executive who alleged C5 owed him back wages and a Washington landlord who accused Pienaar's firms of failing to pay more than \$140,000 in rent and associated costs. The suits were dismissed soon after they were filed, indicating the parties likely settled, court records show. A lawsuit recently filed by a financial services firm alleges C5 owes it more than \$1 million in unpaid debts.

## THE CRASH

After slashing revenue projections in December 2021, Alexander tried to project confidence and said IronNet was still on track to see its revenue rise.

It didn't work. IronNet's stock went into a prolonged skid and the company underwent multiple rounds of layoffs.

In April 2022, the company was hit with a class-action lawsuit from investors who alleged IronNet had fraudulently inflated its revenue projections to boost its stock price.

The company has denied any wrongdoing but recently agreed to pay \$6.6 million to settle the lawsuit, according to a proposed settlement filed in federal court. Alexander told Bloomberg News this past January that IronNet's troubles stemmed in part from his naivety about how the business world worked.

C5 began loaning money to IronNet to keep it afloat starting at the end of 2022 while Pienaar continued to try and boost the company's brand.

In September of last year, IronNet announced it had run out of money and was closing its doors.





A Pienaar-controlled entity stepped in shortly afterwards with \$10 million in loans to allow the company to restructure via bankruptcy.

A dramatically scaled-down version of IronNet led by Pienaar's allies went private in February and announced Alexander had stepped down as chairman of the board.

Pienaar remains bullish on the company, which he said continues to successfully protect clients in the U.S. and Europe from cyber threats. IronNet's more recent activities have included looking to partner with the government of Ukraine.

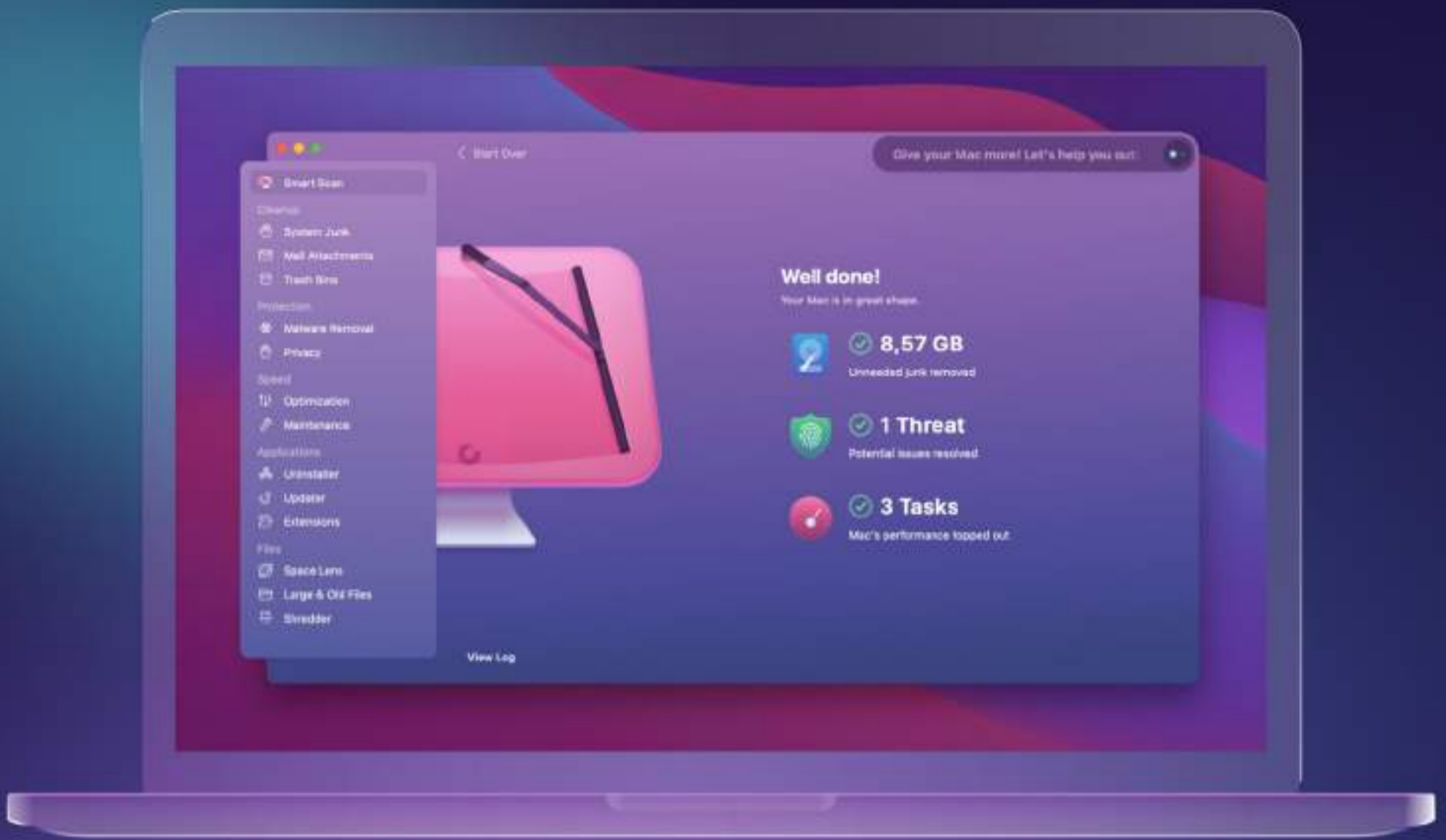
"Any accusation that IronNet has been anything other than successful is categorically false," his attorneys told.

Many of C5's investors and former employees are baffled by Pienaar's continued heavy bets on IronNet after it has been soundly rejected by the market.

During bankruptcy proceedings earlier this year, an investment bank approached 114 prospective buyers for IronNet, federal court records show. None of them made an offer.







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**A DRIVER'S  
TEST FOR  
AUTONOMOUS  
VEHICLES? A  
LEADING EXPERT  
SAYS US SHOULD  
HAVE ONE**





At a time of growing concern about the safety of self-driving vehicles, a leading expert is calling on the federal government to develop a national driver's test that such vehicles would have to pass before they could travel on public roads.

Such a regulation would set minimum standards to ensure that the vehicles display basic skills and competence in traffic situations where their manufacturers want to use them, said Henry Liu, who leads the University of Michigan's autonomous vehicle testing center.

"Ensuring safety is important for consumers, for autonomous vehicle developers, for the federal government as well," Liu said in an interview.

"The federal government has the responsibility to help set the minimum standard, to help provide guidance in terms of safety testing."

In recent years, autonomous vehicles have been involved in a number of high-profile crashes, and surveys have revealed widespread public uncertainty about their safety. Successful testing of the vehicles' ability to master a variety of traffic situations, Liu suggested, would strengthen the public's confidence in them.

Liu said significant research is still needed before autonomous vehicles could be rolled out safely nationwide. But he said he agreed with their manufacturers that in the long run, self-driving vehicles could potentially save lives and improve the efficiency of the nation's transportation system.

At present, no specific federal regulations cover self-driving vehicles, and only a few states have their own such requirements. The National Highway Traffic Safety Administration, which is part of the Department of Transportation, has









been gathering data about crashes involving autonomous vehicles. But it has so far issued only voluntary guidelines that don't include driving tests.

Messages were left seeking comment from the Transportation Department.

Self-driving cars still must meet federal safety standards that apply to all passenger vehicles, which means the government investigates them only after serious incidents.

"Our current safety regulation for vehicles is reactive, so we depend upon self-regulation," Liu said.

At the University of Michigan testing center, Liu runs a mock town, called Mcity, containing a traffic light and a roundabout that is used by companies and the government to test self-driving vehicles.

A regulation, or perhaps a voluntary test, is needed because "we don't want to create a public hazard," said Liu, who made his remarks Tuesday and announced that Mcity can now be used by researchers remotely.

Liu suggested that a driver's test should be able to determine whether a self-driving vehicle can make a left turn at an intersection without the protection of a traffic light with a green arrow. He said it should also ensure that the vehicle will halt at a stop sign and detect and yield to a small pedestrian crossing a road.

A test, he said, would prevent a poorly performing robot vehicle from being turned loose on society, much as a human driver's test would keep an incompetent driver off the road.





But he acknowledged that no test could prevent all crashes involving self-driving vehicles.

The driver's tests, Liu said, would help robot vehicle developers "so that when they are moving in to deploy into the U.S., into certain cities, they will face less resistance from the cities."

Tesla CEO Elon Musk has long complained that federal regulation is impeding innovation. Tesla is developing a robotaxi system called "Full Self-Driving," but the robotaxis cannot drive themselves, and Tesla owners who use them must be ready to intervene at any time.

Liu said basic driving standards would actually contribute to innovation and enhance the deployment of autonomous vehicles. If companies are confident enough for large-scale deployment of their systems, he said, a basic competency test should be "small cake," for them to pass.

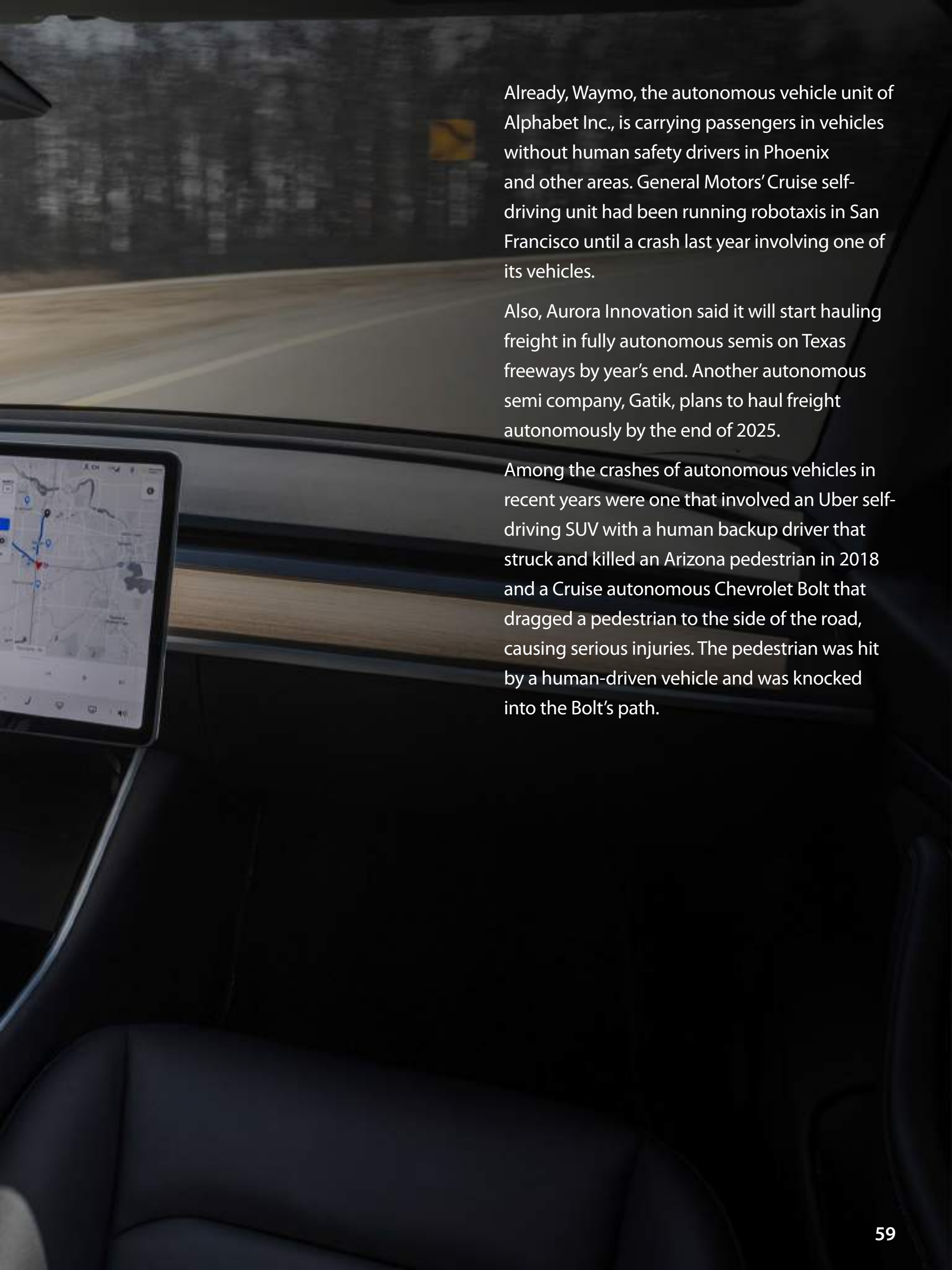
"So why could this be a hindrance for the deployment?" he asked.

Europe and China, Liu noted, already have basic tests that put autonomous vehicles through third-party testing. But the U.S. has continued to rely on self-certification by the companies.

Liu said he is acting now to propose the driver's test because autonomous vehicles are making progress in using "machine learning" computers to make decisions on the road. He predicts that they will be widely deployed on U.S. roads in five to 10 years.

"Large-scale deployment is on the horizon, and that's why the federal government should take action," Liu said.



A photograph showing the interior of a car from the driver's perspective. A navigation screen is visible on the left, displaying a map with a blue route. The road ahead is visible through the windshield, showing lane markings and a yellow sign. The text is overlaid on the right side of the image.

Already, Waymo, the autonomous vehicle unit of Alphabet Inc., is carrying passengers in vehicles without human safety drivers in Phoenix and other areas. General Motors' Cruise self-driving unit had been running robotaxis in San Francisco until a crash last year involving one of its vehicles.

Also, Aurora Innovation said it will start hauling freight in fully autonomous semis on Texas freeways by year's end. Another autonomous semi company, Gatik, plans to haul freight autonomously by the end of 2025.

Among the crashes of autonomous vehicles in recent years were one that involved an Uber self-driving SUV with a human backup driver that struck and killed an Arizona pedestrian in 2018 and a Cruise autonomous Chevrolet Bolt that dragged a pedestrian to the side of the road, causing serious injuries. The pedestrian was hit by a human-driven vehicle and was knocked into the Bolt's path.



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# STATES SUE TIKTOK, CLAIMING ITS PLATFORM IS ADDICTIVE AND HARMS THE MENTAL HEALTH OF CHILDREN

More than a dozen states and the District of Columbia have filed lawsuits against TikTok this week, alleging the popular short-form video app is harming youth mental health by designing its platform to be addictive to kids.

The lawsuits stem from a national investigation into TikTok, which was launched in March 2022 by a bipartisan coalition of attorneys general from many states, including New York, California, Kentucky and New Jersey. All of the complaints were filed in state courts.







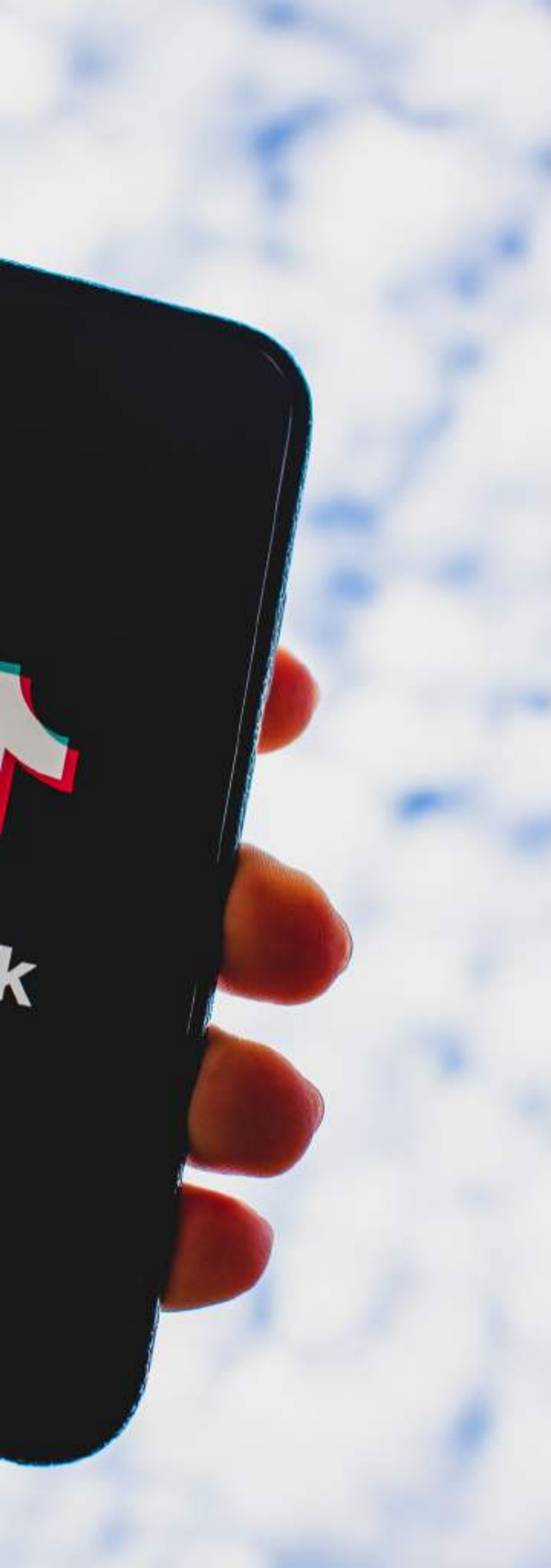
At the heart of each lawsuit is the TikTok algorithm, which powers what users see on the platform by populating the app’s main “For You” feed with content tailored to people’s interests. The lawsuits also emphasize design features that they say make children addicted to the platform, such as the ability to scroll endlessly through content, push notifications that come with built-in “buzzes” and face filters that create unattainable appearances for users.

In its filings, the District of Columbia called the algorithm “dopamine-inducing,” and said it was created to be intentionally addictive so the company could trap many young users into excessive use and keep them on its app for hours on end. TikTok does this despite knowing that these behaviors will lead to “profound psychological and physiological harms,” such as anxiety, depression, body dysmorphia and other long-lasting problems, the complaint said.

“It is profiting off the fact that it’s addicting young people to its platform,” District of Columbia Attorney General Brian Schwalb said in an interview.

“We strongly disagree with these claims, many of which we believe to be inaccurate and misleading. We’re proud of and remain deeply committed to the work we’ve done to protect teens and we will continue to update and improve our product,” said TikTok spokesman Alex Haurek in a reply to the lawsuits. “We’ve endeavored to work with the Attorneys General for over two years, and it is incredibly disappointing they have taken this step rather than work with us on constructive solutions to industrywide challenges.”





The social media firm does not allow children under 13 to sign up for its main service and restricts some content for everyone under 18. But Washington and several other states said in their filing that children can easily bypass those restrictions, allowing them to access the service adults use despite the company's claims that its platform is safe for children.

"TikTok claims that is safe for young people, but that is far from true. In New York and across the country, young people have died or gotten injured doing dangerous TikTok challenges and many more are feeling more sad, anxious, and depressed because of TikTok's addictive features," New York Attorney General Letitia James said in a statement.

Their lawsuit also takes aim at other parts of the company's business.

The district alleges TikTok is operating as an "unlicensed virtual economy" by allowing people to purchase TikTok Coins – a virtual currency within the platform – and send "Gifts" to streamers on TikTok LIVE who can cash it out for real money. TikTok takes a 50% commission on these financial transactions but hasn't registered as a money transmitter with the U.S. Treasury Department or authorities in the district, according to the complaint.

Officials say teens are frequently exploited for sexually explicit content through TikTok's LIVE streaming feature, which has allowed the app to operate essentially as a "virtual strip club" without any age restrictions. They say the cut the company gets from the financial transactions allows it to profit from exploitation.

The 14 attorneys general say the goal of their lawsuits is to stop TikTok from using these





features, impose financial penalties for their alleged illegal practices and collect damages for users that have been harmed.

Many states have filed lawsuits against TikTok and other tech companies over the past few years as a reckoning grows against prominent social media platforms and their ever-growing impact on young people's lives. In some cases, the challenges have been coordinated in a way that resembles how states previously organized against the tobacco and pharmaceutical industries.

Last week, Texas Attorney General Ken Paxton sued TikTok, alleging the company was sharing and selling minors' personal information in violation of a new state law that prohibits these practices. TikTok, which disputes the allegations, is also fighting against a similar data-oriented federal lawsuit filed in August by the Department of Justice.

Several Republican-led states, such as Nebraska, Kansas, New Hampshire, Kansas, Iowa and Arkansas, have also previously sued the company, some unsuccessfully, over allegations it is harming children's mental health, exposing them to "inappropriate" content or allowing young people to be sexually exploited on its platform. Arkansas has brought a legal challenge against YouTube, as well as Meta Platforms, which owns Facebook and Instagram and is being sued by dozens of states over allegations its harming young people's mental health. New York City and some public school districts have also brought their own lawsuits.

TikTok, in particular, is facing other challenges at the national level. Under a federal law that

took effect earlier this year, TikTok could be banned from the U.S. by mid-January if its China-based parent company ByteDance doesn't sell the platform by then.

Both TikTok and ByteDance are challenging the law at an appeals court in Washington. A panel of three judges heard oral arguments in the case last month and are expected to issue a ruling, which could be appealed to the U.S. Supreme Court.





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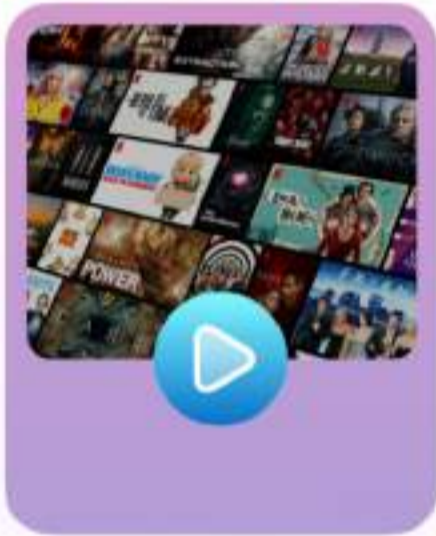
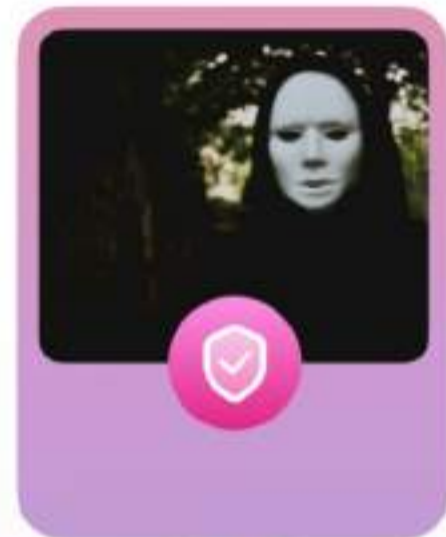
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The background of the slide features a gradient from light blue at the top to dark blue/black at the bottom. Silhouettes of several people's heads are visible, with some showing hair blowing in the wind, suggesting an outdoor setting. The text is overlaid on this background.

# AirPods 4

THE FAST EVOLUTION OF THE  
POPULAR WIRELESS EARPHONES





AirPods have transformed how we experience audio. With the introduction of the fourth generation, Apple is pushing the boundaries of innovation further, delivering immersive sound and connectivity. Building upon its legacy of seamless integration within the Apple ecosystem, the fourth generation of AirPods offers theatre-like audio, cutting-edge Active Noise Cancellation (ANC), and more.







## A REFINED EARPHONE

Apple has once again redefined the wireless earphone category **with the AirPods 4**. **Sporting a sleek, open-ear design**, these earphones are designed for comfort and immersive audio experiences. Whether you're a casual listener, a daily commuter, or a fitness enthusiast, AirPods 4 offers an adaptable fit with impressive sound quality. The **AirPods 4 features a cutting-edge acoustic architecture** that delivers clearer, richer sound, enhancing every listening experience. With advancements in hardware and software, these earphones create a spacious audio landscape, providing users with a theatre-like sound experience in the palm of their hands.

Thanks to the new low-distortion driver and high dynamic range amplifier, the audio is balanced across all frequencies—delivering deep bass, crisp mid-tones, and crystal-clear highs. This new generation also integrates Personalized Spatial Audio, which adapts sound based on the unique geometry of your ears, ensuring an even more immersive and tailored listening experience. One of the standout features of **AirPods 4 is the addition of Active Noise Cancellation (ANC) in an open-ear design**, a first for Apple. This game-changing feature uses upgraded microphones and advanced computational audio to block out background noise, providing a more focused listening experience. Whether navigating a bustling city or traveling by plane, the AirPods 4 with ANC can reduce external noise, such as traffic and engine sounds. **Transparency Mode is also available for users** who need to stay aware of their surroundings. This feature











9:41



< Back

Can



## Hearing Aid

AirPods Pro can help with hearing loss.



Your AirPods Pro can be used as a clinical-grade hearing aid. They use the results of your hearing test to make adjustments that help you hear the voices and sounds around you.



Your AirPods Pro can also make adjustments that help you hear media like music, videos, and phone calls.

Note: If you have little to no hearing loss or severe hearing loss, Hearing Aid may not be right for you.

[Instructions for Use...](#)

Get Started



blends external noise with your audio, allowing you to hear conversations and environmental sounds without removing the earphones. For those who are always on the move, the Adaptive Audio function dynamically adjusts ANC and Transparency Mode based on environmental conditions, offering a more seamless listening experience that adjusts in real time.

## ADVANCED FEATURES

With every new AirPods release, the level of ecosystem integration improves, and AirPods 4 is no exception. Thanks to the powerful **H2 chip**, AirPods 4 enables a smooth, intuitive interaction with Apple devices and services like Siri. Whether it's controlling music, adjusting volume, or managing calls, users can simply nod to answer "yes" or shake their heads to indicate "no" in response to Siri's queries—an innovation that exemplifies Apple's focus on hands-free convenience. The H2 chip also plays a critical role in **Voice Isolation**, ensuring crystal-clear call quality even in noisy environments. AirPods 4 delivers ultra-low latency audio for gamers, making them the ideal companion for real-time gaming experiences.

AirPods 4 may not bear the "Pro" name, but it stands tall among its siblings. While the AirPods Pro and AirPods Max cater to different needs—Pro for more advanced features and Max for premium over-ear experiences—the AirPods 4 brings ANC and the immersive Spatial Audio experience to a broader audience. The critical difference lies in the design: the AirPods 4's open-ear design ensures comfort for prolonged usage, whereas the AirPods Pro offers silicone ear tips for an in-ear fit. On the other hand, the **AirPods Max**, continues to dominate in terms of over-ear comfort and audiophile-level sound quality. With **new color options and the introduction of USB-C charging**, the AirPods Max retains its top-tier position in the lineup but now offers additional aesthetic appeal for Apple users looking for the ultimate combination of style and sound.















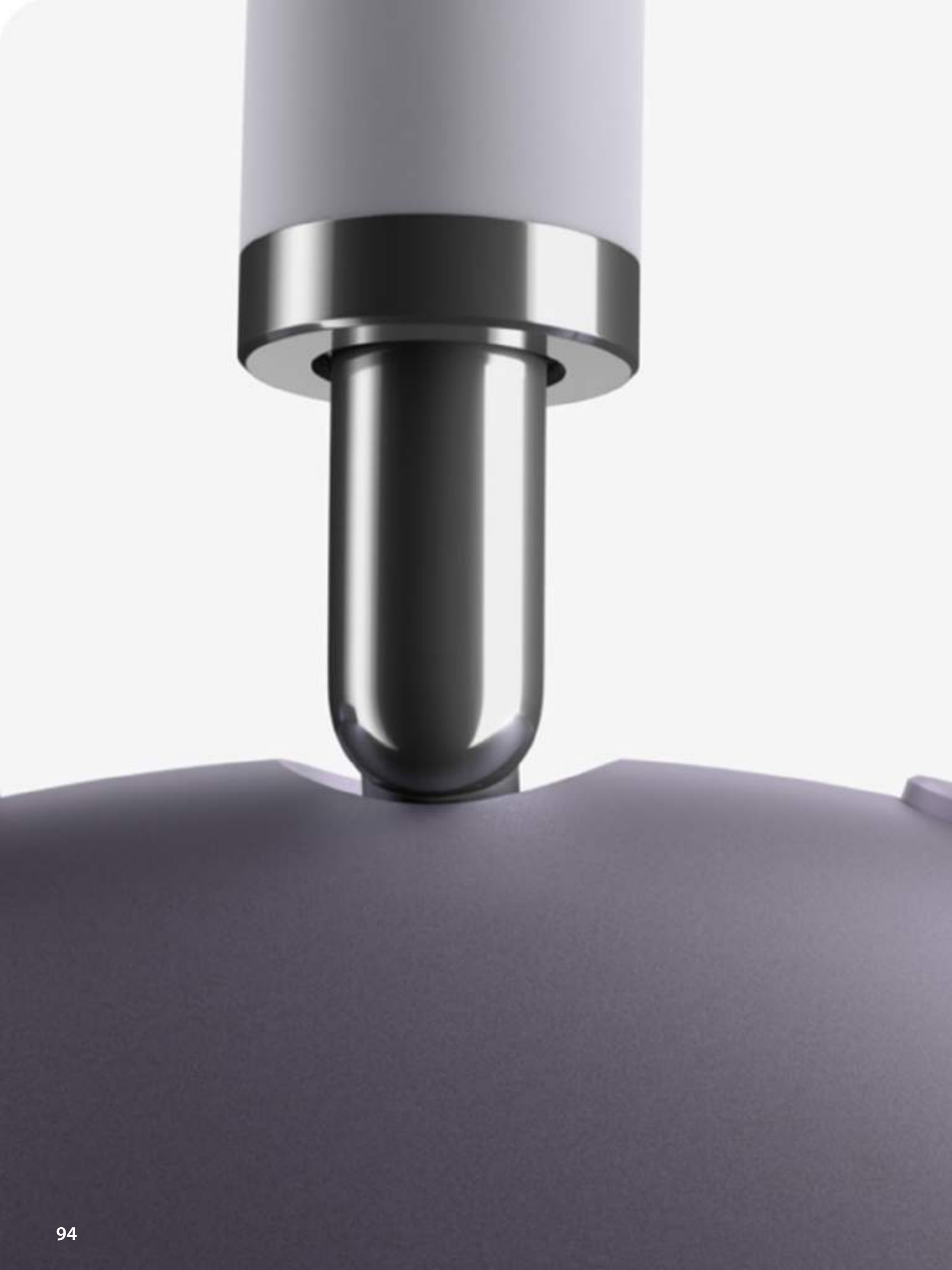
## SEAMLESS EXPERIENCE

One of the defining characteristics of the AirPods experience is their seamless integration across Apple's ecosystem, and the AirPods 4 takes this to new heights. From instant pairing with iPhones and iPads to automatic switching between Apple devices like Macs and Apple Watches, the AirPods 4 ensures you stay connected across all your devices without effort. The **H2 chip allows for faster and more reliable connections**, ensuring that whether you're watching a movie on your iPad or answering a phone call on your iPhone, the AirPods 4 respond instantly and seamlessly. With Siri interactions, users can enjoy hands-free control over media, adjust settings, and more, all powered by Apple's deep AI and machine learning systems. The AirPods 4 even introduces innovative gestures for controlling music, answering calls, and communicating with Siri—all through simple head movements or touches. Apple continues to innovate with its advancements in sound technology, and this evolution will only continue to enhance the overall experience of the AirPods series. Features such as Voice Isolation for improved call quality, **Low Latency Audio for gaming**, and the new Force Sensor for convenient playback controls amplify the AirPods' capabilities.

When it comes to the critics, it's good to know that the AirPods 4 have mainly enjoyed positive reviews, with the standout feature being the **optional Active Noise Cancellation (ANC) available for an extra \$50**. Many reviewers have claimed that ANC is a significant upgrade, bringing it closer to the level of the AirPods Pro. With the bonus of improved Transparency

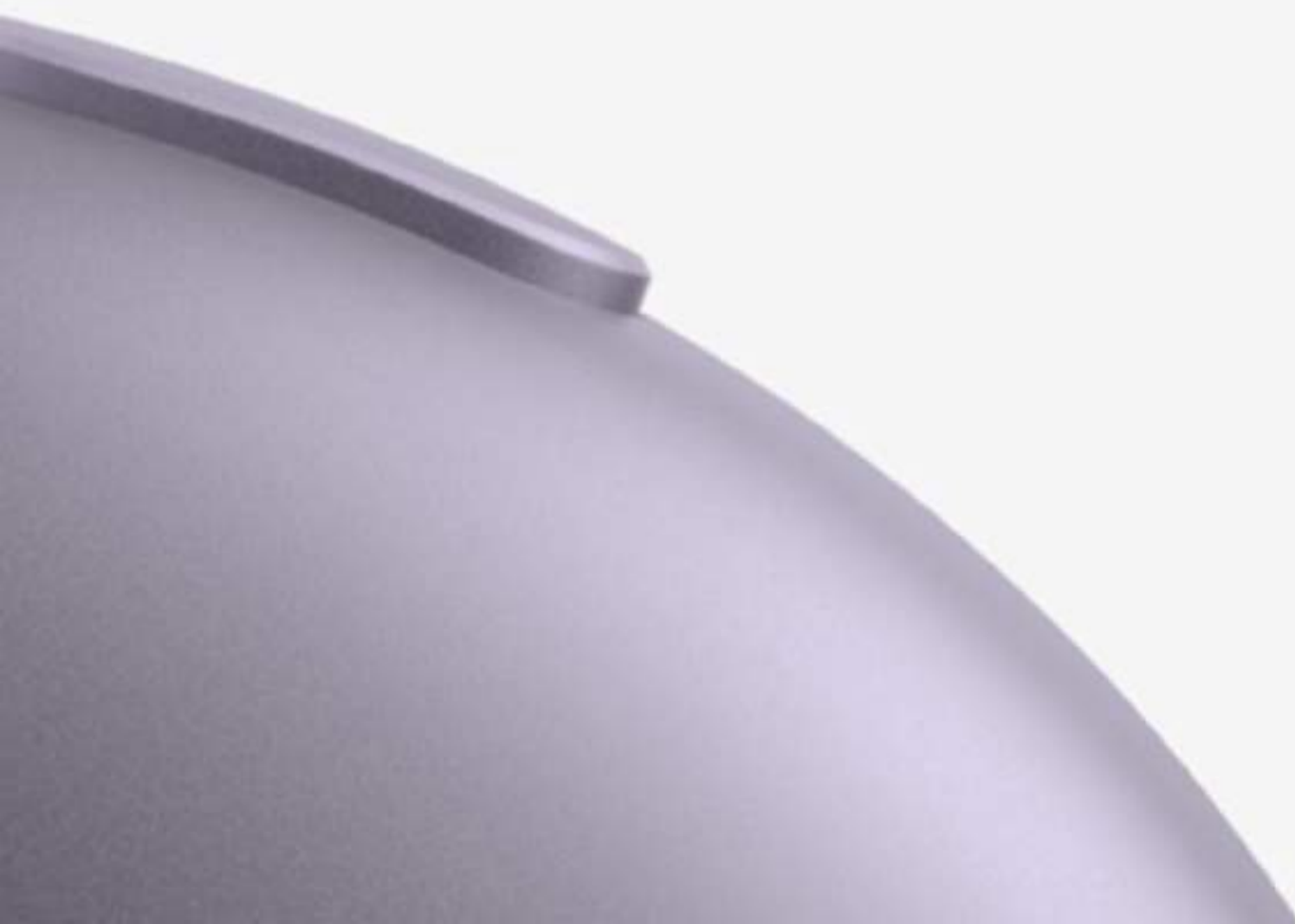







Mode and Adaptive Audio, which adjusts sound based on surroundings, the AirPods 4 delivers a more immersive audio experience than previous generations.

With Apple's strong environmental focus, the AirPods 4 are crafted with sustainability in mind. The **charging case uses 100% recycled aluminum** and Apple has significantly reduced the overall packaging volume, decreasing emissions from shipping. By 2030, Apple aims to make all its products carbon neutral, and the AirPods 4 are a significant step in this direction.







The image features a dark blue background with a gradient. On the left side, there are silhouettes of two people's profiles, one slightly behind the other, looking towards the right. The text is positioned in the upper right quadrant of the image.

*The AirPods 4 brings a significant leap forward in wireless earphone technology. Combining state-of-the-art sound quality with industry-leading ANC in an open-ear design, enhanced integration within the Apple ecosystem, and a focus on comfort and sustainability, the AirPods 4 are set to redefine how we experience audio.*

*Whether you're a long-time Apple fan or a newcomer to the brand, the AirPods 4 offers a compelling reason to upgrade and immerse yourself in Apple's evolving audio landscape. We can't wait to see what's next!*







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# ONLYOFFICE

**FEDERAL JUDGE  
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TO COMPETITION**

A close-up photograph of a hand holding a black pen, pointing it towards the Google logo on a white document. The background is a solid blue color with a green diagonal stripe in the top right corner. The Google logo is partially visible, showing the word "Google" in its characteristic font and the top part of the four-colored triangle (blue, red, yellow, green).

Google



le Play

A federal judge this week ordered Google to tear down the digital walls shielding its Android app store from competition as punishment for maintaining an illegal monopoly that helped expand the company's internet empire.

The injunction issued by U.S. District Judge James Donato will require Google to make several changes that the Mountain View, California, company had been resisting. Those include a provision that will require its Play Store for Android apps to distribute rival third-party app stores so consumers can download them to their phones, if they so desire.

The judge's order will also make the millions of Android apps in the Play Store library accessible to rivals, allowing them to offer up a competitive selection.

Donato is giving Google until November to make the revisions dictated in his order. The company had insisted it would take 12 to 16 months to design the safeguards needed to reduce the chances of potentially malicious software making its way into rival Android app stores and infecting millions of Samsung phones and other mobile devices running on its free Android software.







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The court-mandated overhaul is meant to prevent Google from walling off competition in the Android app market as part of an effort to protect a commission system that has been a boon for one of the world's most prosperous companies and helped elevate the market value of its corporate parent Alphabet Inc. to \$2 trillion.

Google said in a blog post that it will ask the court to pause the pending changes, and will appeal the court's decision.

Donato also ruled that, for a period of three years ending Nov. 1, 2027, Google won't be able to share revenue from its Play Store with anyone who distributes Android apps or is considering launching an Android app distribution platform or store. It also won't be allowed to pay developers, or share revenue, so that they will launch an app in the Google Play Store first or exclusively, and can't make deals with manufacturers to preinstall the Google Play store on any specific location on an Android device. It also won't be able to require apps to use its billing system or tell customers that they can download apps elsewhere and potentially for cheaper.

The Play Store has been earning billions of dollars annually for years, primarily through 15% to 30% commissions that Google has been imposing on digital transactions completed within Android apps. It's a similar fee structure to the one that Apple deploys in its iPhone app store — a structure that prompted video game maker Epic Games to file antitrust lawsuits four years ago in an effort to foster competition that could help drive down prices for both app makers and consumers.





A federal judge mostly sided with Apple in a September 2021 decision that was upheld by an appeals court. Still, a jury favored Epic Games after the completion of a four-week trial completed last year and delivered a verdict that tarred the Play Store as an illegal monopoly.

That prompted another round of hearings this year to help Donato determine what steps should be taken to restore fair competition. Google argued that Epic Games was seeking some extreme changes, saddling the company with costs that could run as high as \$600 billion. Epic contended Google could level the playing field for as little as \$1 million. It's unclear how much the changes ordered by Donato will cost Google.

Although Epic lost its antitrust case against Apple, Donato's ruling could still have ripple effects on the iPhone app store as another federal judge weighs whether Apple is making it easy enough to promote different ways that consumers can pay for digital transactions. Apple was ordered to allow in-app links to alternative payment systems as part of U.S. District Judge Yvonne Gonzalez Rogers' decision in that case, but Epic contends the provision is being undermined with the creation of another commission system that stifles consumer choice.

The forthcoming Play Store shakeup could be just the first unwelcome shock that antitrust law delivers to Google. In the biggest antitrust case brought by the U.S. Justice Department in a quarter century, U.S. District Judge Amit Mehta in August declared Google's dominant search engine to be an illegal monopoly, too, and is now getting ready to start hearings on how to punish Google for that bad behavior.

Google is appealing Mehta's ruling in the search engine case in hopes of warding off a penalty that could hurt its business even more than the changes being ordered in the Play Store.

"Provided the ruling survives the appeals process, Google will almost certainly take a revenue hit," said Emarketer analyst Evelyn Mitchell-Wolf. "No doubt some of the largest app developers like Epic Games will start encroaching on Google Play Store's market share, meaning Google will lose out on its usual cut of subscription and in-app purchases."

The analyst added that, while the Google Play Store will likely continue to benefit from brand recognition since it was the default Android app store for so long, "some consumers may defect if they can get better deals on their favorite apps elsewhere." And app developers will likely take advantage of the opportunity to let consumers know about direct downloads.

"So Google may see fewer Play Store revenues even among the Android users that stick to the default," Mitchell-Wolf said.

Alphabet's shares fell \$4.08, or 2.4% at \$162.98 after the announcement.







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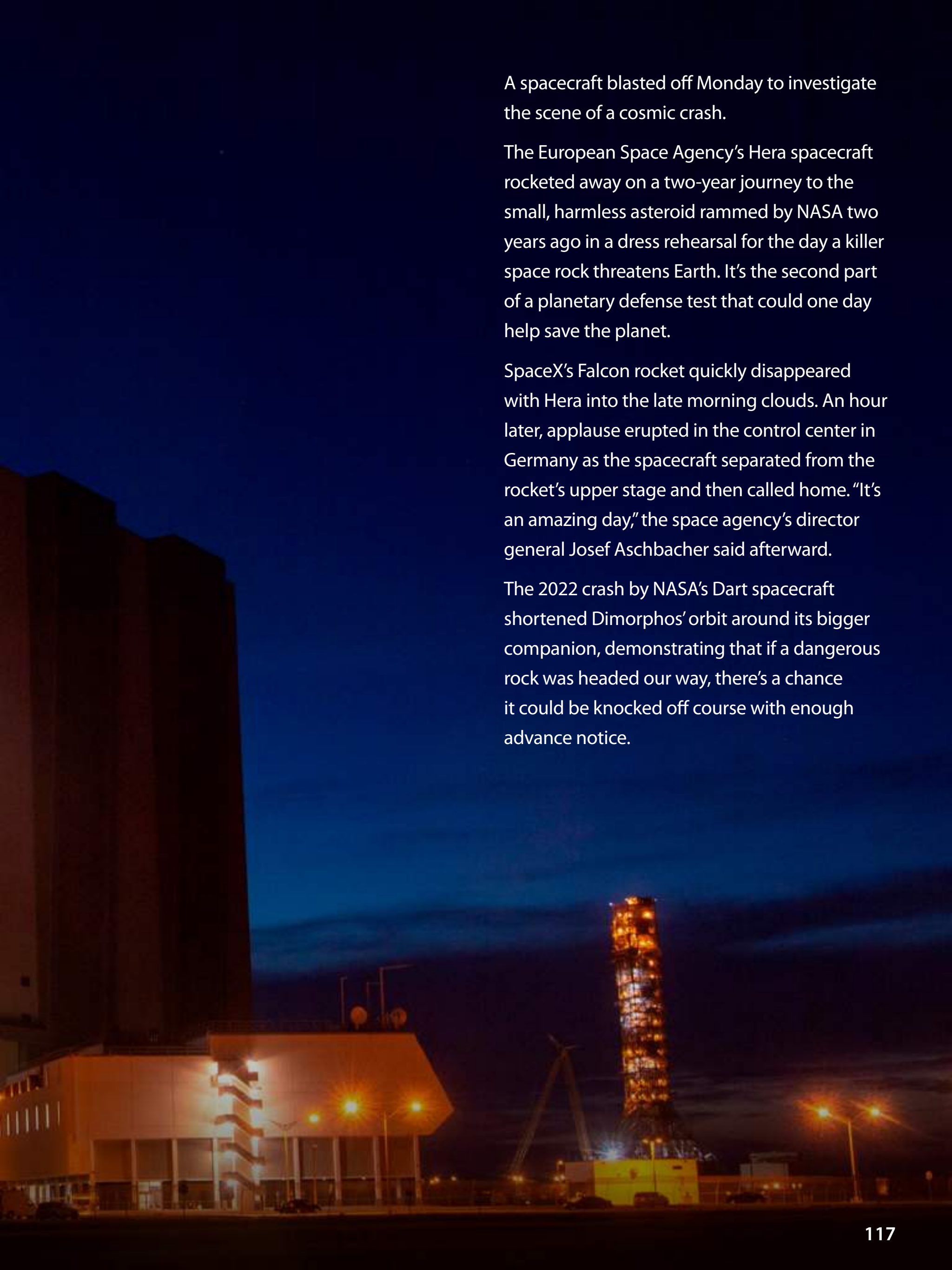
Image: John Raoux

**A SPACECRAFT IS  
ON ITS WAY TO A  
HARMLESS ASTEROID  
SLAMMED BY NASA  
IN A PREVIOUS  
SAVE-THE-EARTH TEST**





Image: Jonathan Newton



A spacecraft blasted off Monday to investigate the scene of a cosmic crash.

The European Space Agency's Hera spacecraft rocketed away on a two-year journey to the small, harmless asteroid rammed by NASA two years ago in a dress rehearsal for the day a killer space rock threatens Earth. It's the second part of a planetary defense test that could one day help save the planet.

SpaceX's Falcon rocket quickly disappeared with Hera into the late morning clouds. An hour later, applause erupted in the control center in Germany as the spacecraft separated from the rocket's upper stage and then called home. "It's an amazing day," the space agency's director general Josef Aschbacher said afterward.

The 2022 crash by NASA's Dart spacecraft shortened Dimorphos' orbit around its bigger companion, demonstrating that if a dangerous rock was headed our way, there's a chance it could be knocked off course with enough advance notice.

Scientists are eager to examine the impact's aftermath up close to know exactly how effective Dart was and what changes might be needed to safeguard Earth in the future.

"The more detail we can glean the better as it may be important for planning a future deflection mission should one be needed," University of Maryland astronomer Derek Richardson said before launch.

Researchers want to know whether Dart — short for Double Asteroid Redirection Test — left a crater or perhaps reshaped the 500-foot (150-meter) asteroid more dramatically. It looked something like a flying saucer before Dart's blow and may now resemble a kidney bean, said Richardson, who took part in the Dart mission and is helping with Hera.

Dart's wallop sent rubble and even boulders flying off Dimorphos, providing an extra kick to the impact's momentum. The debris trail extended thousands of miles (more than 10,000 kilometers) into space for months.

Some boulders and other debris could still be hanging around the asteroid, posing a potential threat to Hera, said flight director Ignacio Tanco.

"We don't really know very well the environment in which we are going to operate," said Tanco. "But that's the whole point of the mission is to go there and find out."

European officials describe the \$400 million (363 million euro) mission as a "crash scene investigation."

Hera "is going back to the crime site and getting all the scientific and technical information," said project manager Ian Carnelli.









Carrying a dozen science instruments, the small car-sized Hera will need to swing past Mars in 2025 for a gravity boost, before arriving at Dimorphos by the end of 2026. It's a moonlet of Didymos, Greek for twin, a fast-spinning asteroid that's five times bigger. At that time, the asteroids will be 120 million miles (195 million kilometers) from Earth.

Hera will attempt to go into orbit around the rocky pair, with the flyby distances gradually dropping from 18 miles (30 kilometers) all the way down to a half-mile (1 kilometer). The spacecraft will survey the moonlet for at least six months to ascertain its mass, shape and composition, as well as its orbit around Didymos.

Before the impact, Dimorphos circled its larger companion from three-quarters of a mile (1,189 meters) out. Scientists believe the orbit is now tighter and oval-shaped, and that the moonlet may even be tumbling.

Two shoebox-sized Cubesats will pop off Hera for even closer drone-like inspections, with one of them using radar to peer beneath the moonlet's boulder-strewn surface. Scientists suspect Dimorphos was formed from material shed from Didymos. The radar observations should help confirm whether Didymos is indeed the little moon's parent.

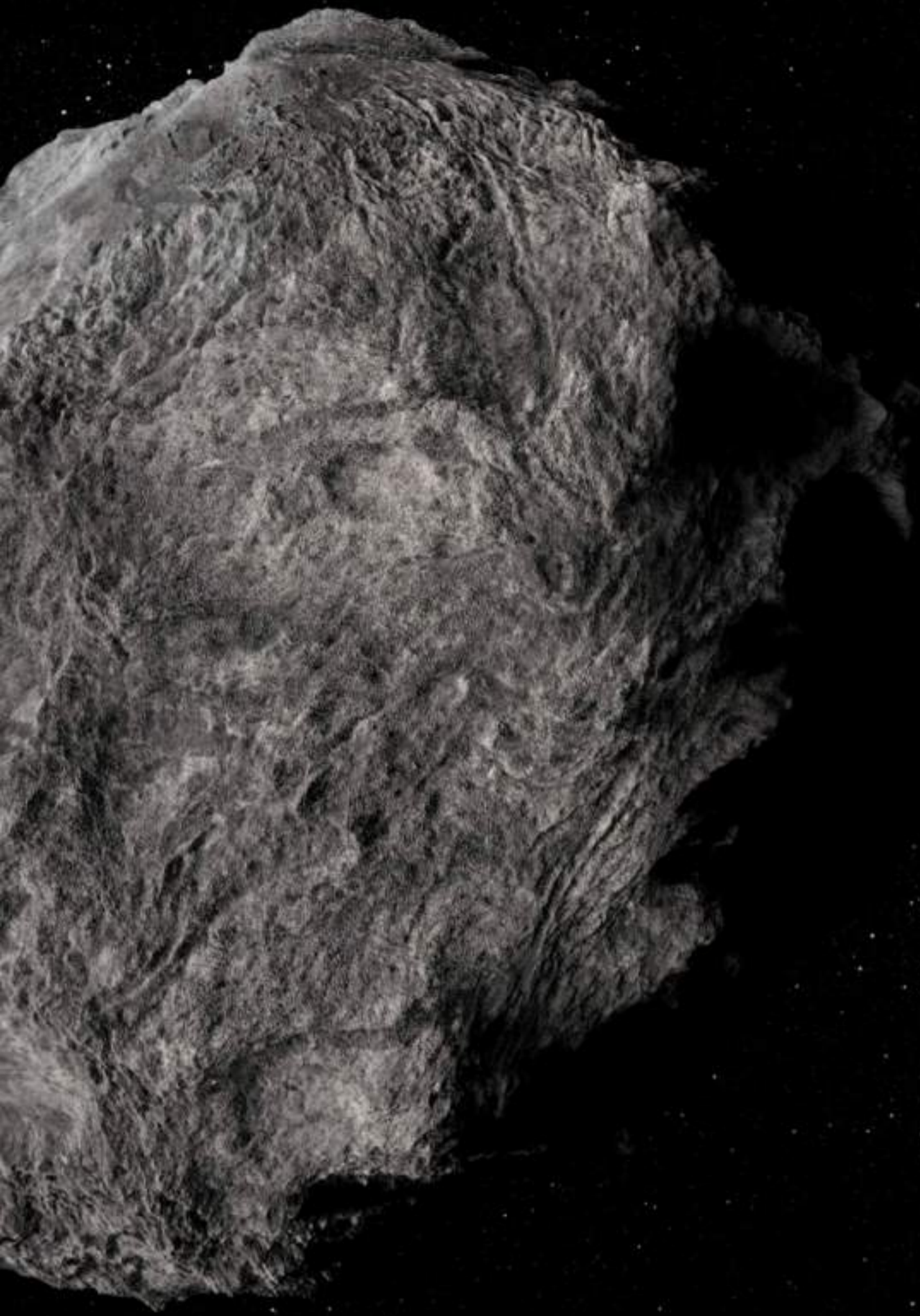
The Cubesats will attempt to land on the moonlet once their survey is complete. If the moonlet is tumbling, that will complicate the endeavor. Hera may also end its mission with a precarious touchdown, but on the larger Didymos.

Neither asteroid poses any threat to Earth — before or after Dart showed up. That's why NASA picked the pair for humanity's first asteroid-deflecting demo.

Leftovers from the solar system's formation 4.6 billion years ago, asteroids primarily orbit the sun between Mars and Jupiter in what's known as the main asteroid belt, where millions of them reside. They become near-Earth objects when they're knocked out of the belt and into our neck of the woods.

NASA's near-Earth object count currently tops 36,000, almost all asteroids but also some comets. More than 2,400 of them are considered potentially hazardous to Earth.



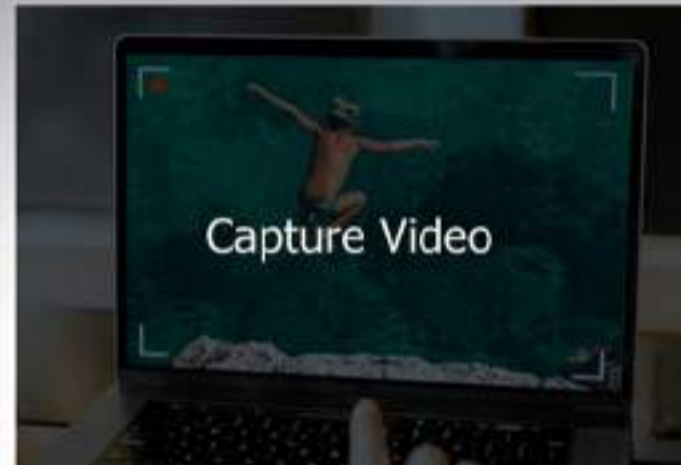
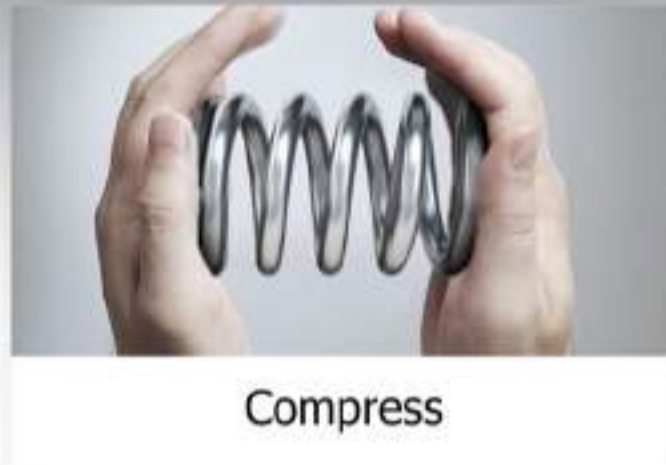
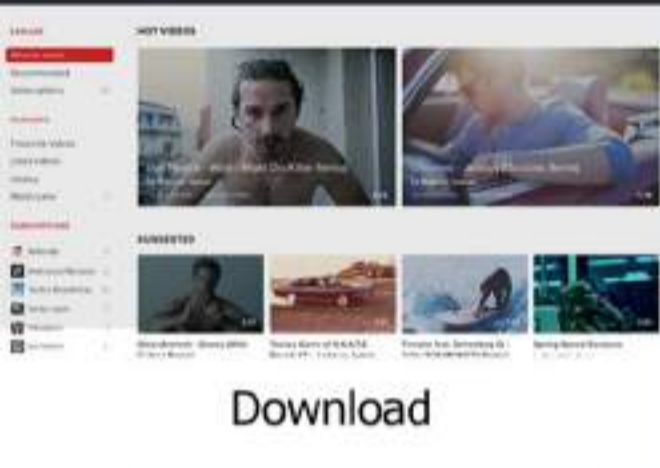




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**HYUNDAI  
HAS BEGUN  
PRODUCING  
ELECTRIC  
SUVS AT ITS  
\$7.6 BILLION  
PLANT IN  
GEORGIA**





Hyundai has begun producing electric SUVs in Georgia less than two years after breaking ground on its sprawling, \$7.6 billion manufacturing plant west of Savannah.

Hyundai's factory in Georgia held an "employee-focused celebration" as its first EV for commercial sale rolled off the assembly line, Bianca Johnson, spokesperson for Hyundai Motor Group Metaplant America, said in a statement provided this week.

"After validating its production processes to ensure its vehicles meet Hyundai Motor Group's high quality standards, HMGMA has started initial production of customer vehicles ahead of schedule," Johnson said.

She said a grand opening celebration at the Georgia plant is expected in the first quarter of 2025.

The South Korean automaker and battery partner LG Energy Solution plan to employ 8,500 total workers at the Bryan County site, about 50 miles (80 kilometers) west of Savannah, once the plant is fully operational. Hyundai has said it will produce up to 300,000 EVs per year in Georgia, as well as the batteries that power them.

The plant's vehicle production areas have been completed and are being staffed by more than 1,000 workers, Johnson said. Its battery-making facilities remain under construction.

The first vehicles being produced at the Georgia site are 2025 models of Hyundai's Ioniq 5 electric SUVs. Johnson said those American-made EVs will arrive at U.S. dealerships before the end of this year.







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During the first half of 2024, the Ioniq 5 was America's second-best-selling electric vehicle not made by industry leader Tesla.

Hyundai broke ground on its Georgia plant in late October 2022. It's the largest economic development project the state has ever seen, and came with a whopping \$2.1 billion in tax breaks and other incentives from the state and local governments.

Hyundai rushed to start making EVs in Georgia within two years of groundbreaking, spurred by federal electric vehicle incentives that reward domestic production.

The Inflation Reduction Act, passed in 2022 with provisions intended to combat climate change, includes a tax credit that saves EV buyers up to \$7,500, but only on cars made in North America with domestic batteries. Though Hyundai executives complained the law was unfair, Hyundai President and Global Chief Operating Officer Jose Munoz has also said it caused the automaker to push to open sooner in Georgia.

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# JUDGE RULES THE FTC CAN PROCEED WITH ANTITRUST LAWSUIT AGAINST AMAZON, TOSSES OUT FEW STATE CLAIMS

A federal judge said the Federal Trade Commission can proceed with its landmark antitrust lawsuit against Amazon. But, he also gave the company a small victory by tossing out a few claims made by states involved in the legal fight.

The order, issued last week by Judge John H. Chun and unsealed on Monday, is a major defeat for Amazon, which has tried for months



amazon



to get the case tossed out in court. A trial in the case is slated to be held in October 2026.

“We are pleased with the court’s decision and look forward to moving this case forward,” FTC spokesperson Doug Farrar said in a prepared statement. “The ways Amazon illegally maintains its monopolies and the harm they cause—including suppressed competition and higher prices for shoppers and sellers—will be on full display at trial.”

The FTC and the attorneys general of 18 states, plus Puerto Rico, have alleged in court the e-commerce behemoth is abusing its position in the marketplace to inflate prices on and off its platform, overcharge sellers and stifle competition that pops up on the market.

The lawsuit, which was filed in September 2023, is the result of a yearslong investigation into the company’s business and is one of the most significant legal challenges brought against Amazon in its nearly 30-year history.

U.S. regulators and state attorneys general are accusing the online retailer of violating federal and state antitrust and consumer protection laws.

In the order, Judge Chun, of the U.S. District Court for the Western District of Washington, allowed the federal challenges and many of the state claims to proceed. But he dismissed some claims made by New Jersey, Pennsylvania, Oklahoma and Maryland under state antitrust or consumer protection laws.

Amazon, for its part, expressed confidence that it could prove its argument in court as the case proceeds







“The ruling at this early stage requires the court to assume all facts alleged in the complaint are true. They are not,” Tim Doyle said in a statement, adding that the agency’s case “falsely” claims consumers only consider popular sites Walmart.com, Target.com, Amazon, and eBay when shopping for household products.

“Moving forward the FTC will have to prove its claims in court, and we’re confident those claims will not hold up when the FTC has to prove them with evidence,” Doyle said. He also asserted the FTC’s approach “would make shopping more difficult and costly.”

The FTC is also suing Meta Platforms over alleged monopolistic practices, while the Department of Justice has brought similar lawsuits against Apple and Google, with some success.

In August, a federal judge ruled that Google’s ubiquitous search engine is illegally exploiting its dominance to squash competition and stifle innovation.



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**CONTROL THE PATH  
AND POWER OF  
HURRICANES LIKE  
MILTON? FORGET IT,  
SCIENTISTS SAY**



Hurricanes are humanity's reminder of the uncontrollable, chaotic power of Earth's weather.

Milton's powerful push toward Florida just days after Helene devastated large parts of the Southeast likely has some in the region wondering if they are being targeted. In some corners of the internet, Helene has already sparked conspiracy theories and disinformation suggesting the government somehow aimed the hurricane at Republican voters.

Besides discounting common sense, such theories disregard weather history that shows the hurricanes are hitting many of the same areas they have for centuries. They also presume an ability for humans to quickly reshape the weather far beyond relatively puny efforts such as cloud-seeding.

"If meteorologists could stop hurricanes, we would stop hurricanes," said Kristen Corbosiero, a professor of atmospheric and environmental sciences at the University at Albany. "If we could control the weather, we would not want the kind of death and destruction that's happened."

Here's a look at what humans can and can't do when it comes to weather:

## **THE POWER OF HURRICANES, HEIGHTENED BY CLIMATE CHANGE**

A fully developed hurricane releases heat energy that is the equivalent of a 10-megaton nuclear bomb every 20 minutes — more than all the energy used at a given time by humanity, according to National Hurricane Center tropical analysis chief Chris Landsea.

And scientists are now finding many ways climate change is making hurricanes worse, with warmer





oceans that add energy and more water in the warming atmosphere to fall as rain, said Chris Field, director of the Stanford Woods Institute for the Environment.

“The amount of energy a hurricane generates is insane,” said Colorado State University hurricane researcher Phil Klotzbach. It’s the height of human arrogance to think people have the power to change them, he said.

But that hasn’t stopped people from trying, or at least thinking about trying.

## **HISTORICAL EFFORTS TO CONTROL HURRICANES HAVE FAILED**

Jim Fleming of Colby College has studied historical efforts to control the weather and thinks humans have nowhere near the practical technology to get there. He described an attempt in 1947 in which General Electric partnered with the U.S. military to drop dry ice from Air Force planes into the path of a hurricane in an attempt to weaken it. It didn’t work.

“The typical science goes like understanding, prediction and then possibly control,” Fleming said, noting that the atmosphere is far more powerful and complex than most proposals to control it. “It goes back into Greek mythology to think you can control the powers of the heavens, but also it’s a failed idea.”

In the 1960s, 1970s and 1980s, the federal government briefly tried Project STORMFURY. The idea was to seed a hurricane to replace its eyewall with a larger one that would make the storm bigger in size but weaker in intensity. Tests were inconclusive and researchers realized if they made the storm larger, people who wouldn’t have been











hurt by the storm would now be in danger, which is an ethical and liability problem, the project director once said.

For decades, the National Hurricane Center and its parent agency, the National Oceanic and Atmospheric Administration, have been asked about nuclear-bombing a hurricane. But the bombs aren't powerful enough, and it would add the problem of radioactive fallout, Corbosiero said.

Bringing cooling icebergs or seeding or adding water-absorbing substances also are ideas that just don't work, NOAA scientists said.

## **CLIMATE CHANGE BEGETS ENGINEERING — AND LOTS OF QUESTIONS**

Failed historical attempts to control hurricanes differ somewhat from some scientists' futuristic ideas to combat climate change and extreme weather. That's because instead of targeting individual weather events, modern geoengineers would operate on a larger scale — thinking about how to reverse the broad-scale damage humans have already done to the global climate by emitting greenhouse gases.

Scientists in the field say one of the most promising ideas they see based on computer models is solar geoengineering. The method would involve lofting aerosol particles into the upper atmosphere to bounce a tiny bit of sunlight back into space, cooling the planet slightly.

Supporters acknowledge the risks and challenges. But it also "might have quite large benefits, especially for the world's poorest," said David Keith, a professor at the University of Chicago and founding faculty director of the Climate Systems Engineering Initiative.





Two years ago, the largest society of scientists who work on climate issues, the American Geophysical Union, announced it was forming an ethics framework for “climate intervention.”

Some scientists warn that tinkering with Earth’s atmosphere to fix climate change is likely to create cascading new problems. University of Pennsylvania climate scientist Michael Mann expressed worries on the ethics framework that just talking about guidelines will make the tinkering more likely to occur in the real world, something that could have harmful side effects.

Field, of Stanford, agreed that the modeling strongly encourages that geoengineering could be effective, including at mitigating the worst threats of hurricanes, even if that’s decades away. But he emphasized that it’s just one piece of the best solution, which is to stop climate change by cutting greenhouse gas emissions.

“Whatever else we do, that needs to be the core set of activities,” he said.



 *Law & Order: Special Victims Unit*



# TOP 10 TV SHOWS

**TRUST IN YOUR ERA**

*THE CHALLENGE*

**THE BUNKER**

*JERSEY SHORE: FAMILY VACATION*

**FRACTURED**

*LAW & ORDER: SPECIAL VICTIMS UNIT*

**YOU ARE CORDIALLY NOT INVITED**

*THE REAL HOUSEWIVES OF ORANGE COUNTY*

**NATE BARGATZE - OCTOBER 5, 2024**

*SATURDAY NIGHT LIVE*

**TAKE ME TO CHURCH**

*GREY'S ANATOMY*

**APPLE OF MY LIE**

*THE REAL HOUSEWIVES OF NEW YORK CITY*

**JEAN SMART - SEPTEMBER 28, 2024**

*SATURDAY NIGHT LIVE*

**LIFE AFTER LOCKUP: WELCOME HOME?**

*LOVE AFTER LOCKUP*

**BLOOD BLEEDS BLUE**

*CHICAGO PD*



 *Barbara Kingsolver*





# TOP 10 BOOKS

**LIES HE TOLD ME**

*JAMES PATTERSON & DAVID ELLIS*

**DEMON COPPERHEAD**

*BARBARA KINGSOLVER*

**SOCIETY OF LIES: REESE'S BOOK CLUB**

*LAUREN LING BROWN*

**COUNTING MIRACLES**

*NICHOLAS SPARKS*

**THE LIFE AND TIMES OF THE ...**

*BILL BRYSON*

**BE READY WHEN THE LUCK HAPPENS**

*INA GARTEN*

**TRIANGLE**

*DANIELLE STEEL*

**REVENGE OF THE TIPPING POINT**

*MALCOLM GLADWELL*

**THE PUMPKIN SPICE CAFÉ**

*LAURIE GILMORE*

**THE TATTOOIST OF AUSCHWITZ**

*HEATHER MORRIS*



 *Eric Church*



# TOP 10 SONGS

***DARKEST HOUR (HELENE EDIT)***

*ERIC CHURCH*

***I AM NOT OKAY***

*JELLY ROLL*

***A BAR SONG (TIPSY)***

*SHABOOZEY*

***A LOT MORE FREE***

*MAX MCNOWN*

***WE PRAY***

*COLDPLAY, LITTLE SIMZ, BURNA BOY, ELYANNA & TINI*

***LIAR***

*JELLY ROLL*

***FIGHTER***

*JON KAHN*

***LONELY ROAD***

*MKG & JELLY ROLL*

***LOSE CONTROL***

*TEDDY SWIMS*

***BIRDS OF A FEATHER***

*BILLIE EILISH*





# TOP 10 ALBUMS

**DARKEST HOUR (HELENE EDIT)**

ERIC CHURCH

**I AM NOT OKAY**

JELLY ROLL

**A BAR SONG (TIPSY)**

SHABOOZEY

**A LOT MORE FREE**

MAX MCNOWN

**WE PRAY**

COLDPLAY, LITTLE SIMZ, BURNA BOY, ELYANNA & TINI

**LIAR**

JELLY ROLL

**FIGHTER**

JON KAHN

**LONELY ROAD**

MGK & JELLY ROLL

**LOSE CONTROL**

TEDDY SWIMS

**BIRDS OF A FEATHER**

BILLIE EILISH





# TOP 10 MUSIC VIDEOS

**PASSPORT JUNKIE**

*ROD WAVE*

**FALL FAST IN LOVE**

*ROD WAVE*

**A FILM FOR THE FUTURE (TRAILER)**

*COLDPLAY*

**SATURDAY NIGHT GONE WRONG...**

*CROOKED CREEK*

**TURN UP A NOTCH**

*LIL DURK*

**TEMPORARY**

*EMINEM & SKYLAR GREY*

**HOUDINI**

*EMINEM*

**NOBODY BUT JESUS (FEAT. GENAVIEVE...)**

*MAVERICK CITY MUSIC & SONG HOUSE*

**REBOOT II**

*BROOKS & DUNN*

**FOREVER COUNTRY**

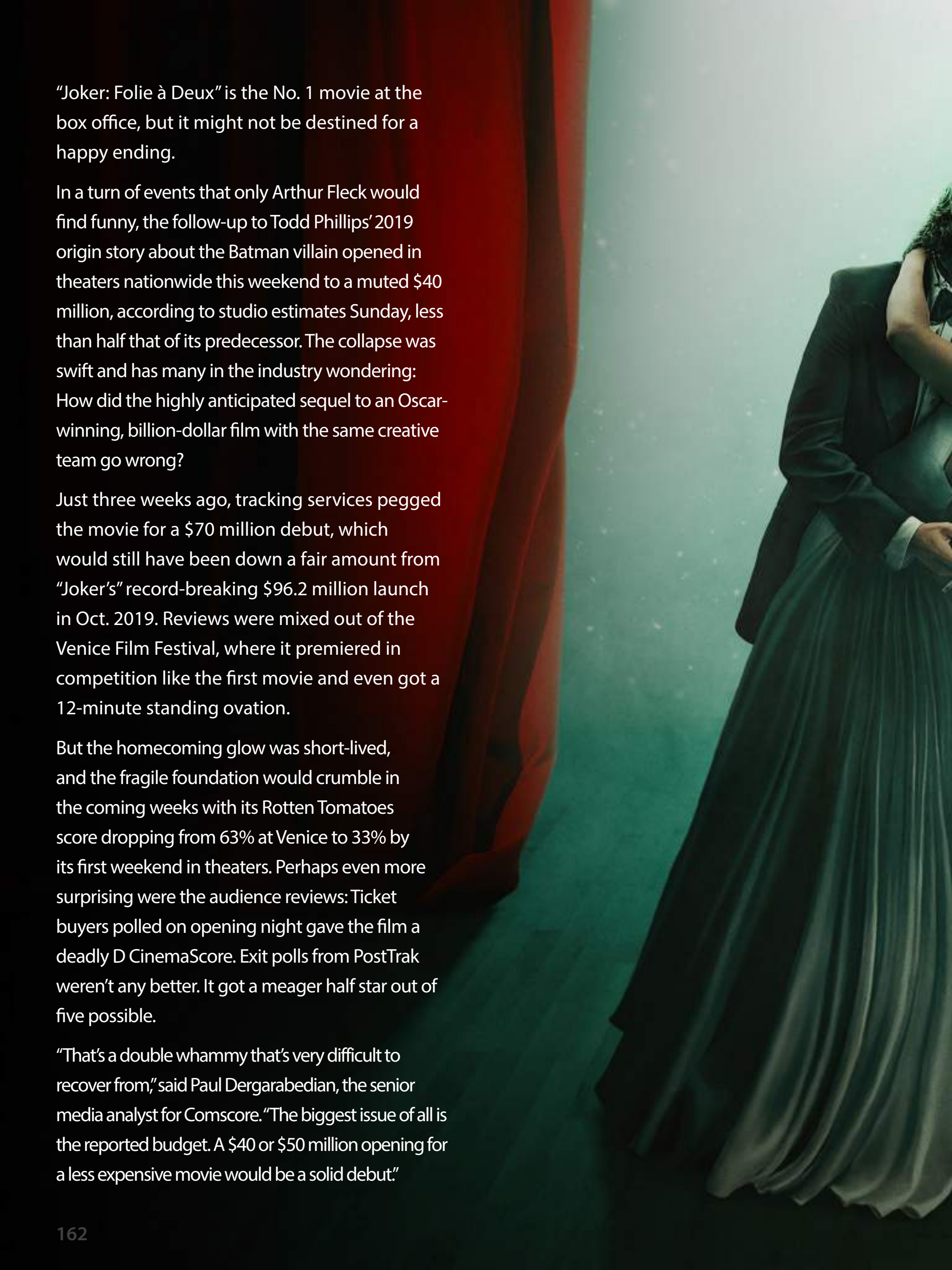
*ARTISTS OF THEN, NOW & FOREVER*

**'JOKER 2'  
STUMBLES AT  
BOX OFFICE AMID  
POOR REVIEWS  
FROM AUDIENCES  
AND CRITICS**







A woman in a dark, long-sleeved gown stands on a stage. To her left is a large, flowing red curtain. The background is a soft, teal-colored wall. The lighting is dramatic, highlighting the woman's silhouette and the texture of the curtain.

“Joker: Folie à Deux” is the No. 1 movie at the box office, but it might not be destined for a happy ending.

In a turn of events that only Arthur Fleck would find funny, the follow-up to Todd Phillips’ 2019 origin story about the Batman villain opened in theaters nationwide this weekend to a muted \$40 million, according to studio estimates Sunday, less than half that of its predecessor. The collapse was swift and has many in the industry wondering: How did the highly anticipated sequel to an Oscar-winning, billion-dollar film with the same creative team go wrong?

Just three weeks ago, tracking services pegged the movie for a \$70 million debut, which would still have been down a fair amount from “Joker’s” record-breaking \$96.2 million launch in Oct. 2019. Reviews were mixed out of the Venice Film Festival, where it premiered in competition like the first movie and even got a 12-minute standing ovation.

But the homecoming glow was short-lived, and the fragile foundation would crumble in the coming weeks with its Rotten Tomatoes score dropping from 63% at Venice to 33% by its first weekend in theaters. Perhaps even more surprising were the audience reviews: Ticket buyers polled on opening night gave the film a deadly D CinemaScore. Exit polls from PostTrak weren’t any better. It got a meager half star out of five possible.

“That’s a double whammy that’s very difficult to recover from,” said Paul Dergarabedian, the senior media analyst for Comscore. “The biggest issue of all is the reported budget. A \$40 or \$50 million opening for a less expensive movie would be a solid debut.”



“Joker: Folie à Deux” cost at least twice as much as the first film to produce, though reported figures vary at exactly how pricey it was to make. Phillips told Variety that it was less than the reported \$200 million; Others have it pegged at \$190 million. Warner Bros. released the film in 4,102 locations in North America. About 12.5% of its domestic total came from 415 IMAX screens.

Internationally, it’s earned \$81.1 million from 25,788 screens, bringing its total global earnings estimate to \$121.1 million. In the next two weeks, “Joker 2” will also open in Japan and China.

Second place went to Universal and DreamWorks Animation’s “The Wild Robot,” which added \$18.7 million in its second weekend, bringing its domestic total to nearly \$64 million. Globally, it’s made over \$100 million. Warner Bros.’ “Beetlejuice Beetlejuice” took third place in weekend five, Paramount’s “Transformers One” landed in fourth and Universal and Blumhouse’s “Speak No Evil” rounded out the top five.

The other big new release of the weekend, Lionsgate’s “White Bird,” flopped with just \$1.5 million from just over 1,000 locations, despite an A+ CinemaScore.

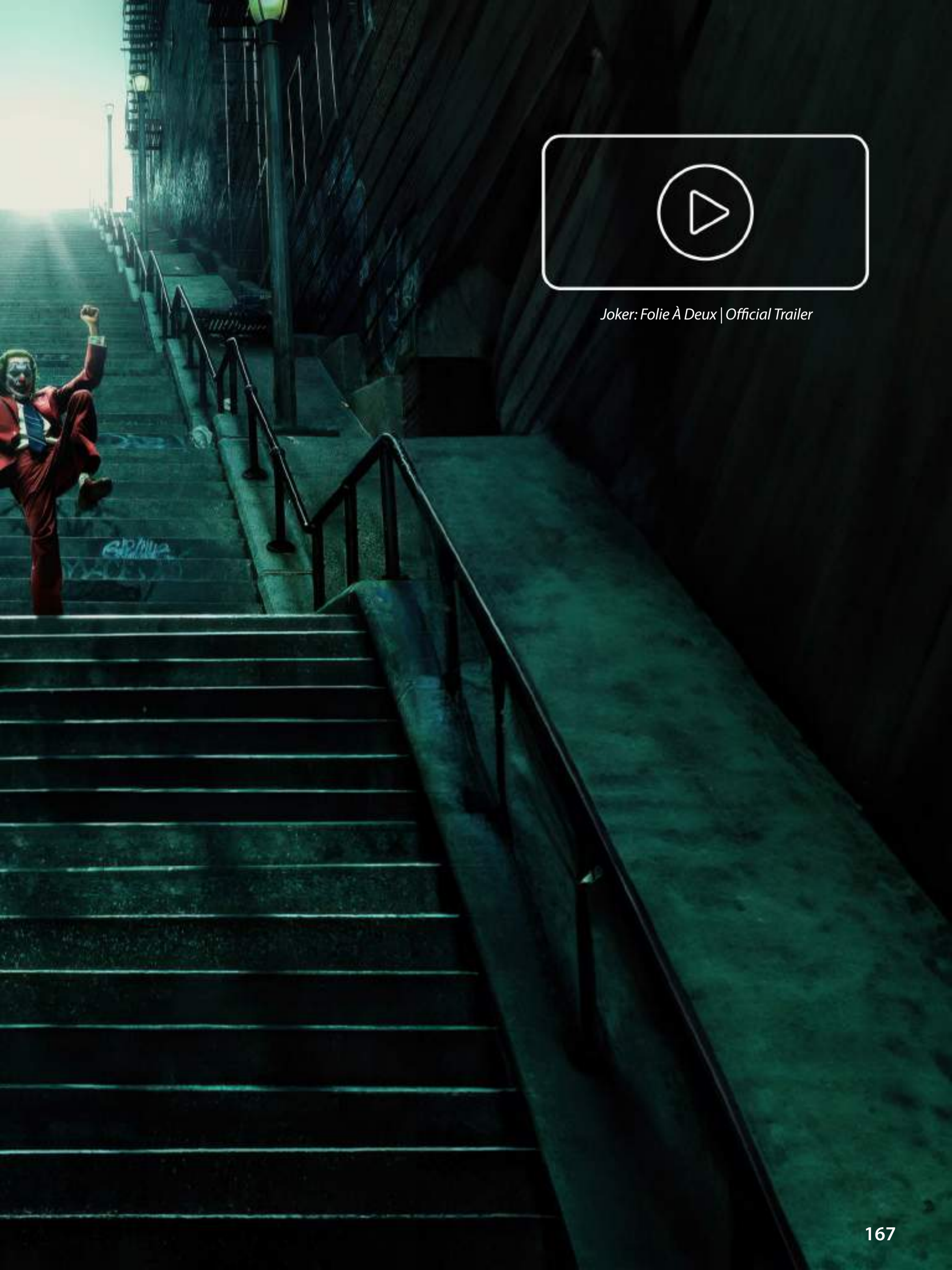
Overall, the weekend is up from the same frame last year, but “Joker’s” start is an unwelcome twist for theater owners hoping to narrow the box office deficit.

Phillips and star Joaquin Phoenix have said they aspired to make something as “audacious” as the first film. The sequel added Lady Gaga into the fold, as a Joker superfan, and delved further into the mind of Arthur Fleck, imprisoned at Arkham and awaiting trial for the murders he committed in the first. It’s also a musical, with










*Joker: Folie À Deux | Official Trailer*







elaborately imagined song and dance numbers to old standards. Gaga even released a companion album called “Harlequin,” alongside the film.

In his review, Jake Coyle wrote that “Phillips has followed his very antihero take on the Joker with a very anti-sequel. It combines prison drama, courthouse thriller and musical, and yet turns out remarkably inert given how combustible the original was.”

The sequel has already been the subject of many think pieces, some who posit that the sequel was deliberately alienating fans of the first movie. In cruder terms, it’s been called a “middle finger.” But fans often ignore the advice of critics, especially when it comes to opening their wallets to see revered comic book characters on the big screen.

“They took a swing for the fences,” Dergarabedian said. “But except for a couple of outliers, audiences in 2024 seem to want to know what they’re getting when they’re going to the theater. They want the tried and true, the familiar.”

It has some high-profile defenders too: Francis Ford Coppola, who last week got his own D+ CinemaScore for his pricey, ambitious and divisive film “Megalopolis,” entered the Joker chat with an Instagram post.

“@ToddPhillips films always amaze me and I enjoy them thoroughly,” Coppola wrote. “Ever since the wonderful ‘The Hangover’ he’s always one step ahead of the audience never doing what they expect.”

“Megalopolis,” meanwhile, dropped a terminal 74% in its second weekend with just over \$1 million, bringing its total just shy of \$6.5 million against a \$120 million budget.

Deadline editor Anthony D'Alessandro thinks the problem started with the idea to make the Joker sequel a musical. "No fan of the original movie wanted to see a musical sequel," he wrote.

The first film was also divisive and the subject of much discourse, then about whether it might send the wrong message to the wrong type of person. And yet people still flocked to see what the fuss was about. "Joker" went on to pick up 11 Oscar nominations, including best picture and best director, and three wins. It also made over \$1 billion and was the highest-grossing R-rated film of all time, until this summer when Marvel's "Deadpool & Wolverine" took the crown.

Estimated ticket sales for Friday (04) through Sunday (06) at U.S. and Canadian theaters, according to Comscore.

1. "Joker: Folie à Deux," \$40 million.
2. "The Wild Robot," \$18.7 million.
3. "Beetlejuice Beetlejuice," \$10.3 million.
4. "Transformers One," \$5.4 million.
5. "Speak No Evil," \$2.8 million.
6. "Sam and Colby: The Legends of Paranormal," \$1.8 million.
7. "White Bird," \$1.5 million.
8. "Deadpool & Wolverine," \$1.5 million.
9. "The Substance," \$1.3 million.
10. "Megalopolis," \$1.1 million.









**FACEBOOK,  
YOUTUBE AND  
TIKTOK USERS  
IN EUROPE  
GET FORUM  
TO CHALLENGE  
SOCIAL MEDIA  
CONTENT DECISIONS**

Social media users in the European Union will soon have a new forum to challenge decisions by platforms to remove posts and videos for breaking their rules or leave up others that may violate them.

An “out of court dispute settlement body” named the Appeals Center Europe said this week it has been certified by Irish regulators to act as a referee on content moderation disputes across the 27-nation EU, starting with cases involving Facebook, YouTube and TikTok.

The center is similar to Meta’s Oversight Board, a quasi-independent body set up in 2020 that acts like a supreme court for thorny decisions about content moderation issues on Facebook, Instagram and Threads submitted by users around the world.

Under the EU’s digital rulebook known as the Digital Services Act, or DSA, tech companies and social media platforms are required to work with dispute settlement bodies and comply with any decisions they make. EU officials in Brussels wanted to give EU citizens a way to challenge any decisions made by Big Tech companies as they sought to balance the right to free speech against the goal of curbing online risks.







The center will hear appeals from users or groups located in the EU about “everything from violence and incitement to hate speech to bullying and harassment,” CEO Thomas Hughes said.

“It could be everything from a case that relates to a head of state all the way through to a neighborly dispute,” Hughes said.

The Digital Services Act is a sweeping set of regulations that requires tech and social media companies operating in Europe to clean up their platforms under threat of hefty fines.

The Appeals Center, based in Dublin, where many Silicon Valley companies have their European headquarters, will start hearing cases from users before the end of the year. It’s initially dealing with Facebook, YouTube and TikTok users because it wanted to start with the biggest platforms, with plans to add others later.

Unlike the Oversight Board, which can cherry pick the biggest and most important cases, the center will have to rule on every case it gets. And decisions won’t be publicly available, unlike Oversight Board judgments that are posted online.

The Oversight Board both issues binding decisions on individual cases, such as ruling in September on three separate posts with the controversial Palestinian rallying cry “from the river to the sea,” and also weighs in on wider policy issues with non-binding recommendations, such as guidance in July on updating Meta’s policies on non-consensual deepfakes after reviewing a case involving deepfake intimate images of two women.


The Appeals Center’s decisions, in contrast, aren’t binding and will be limited to whether content such as a post, photo or video violates each platform’s rules.

Hughes said the center will hire staff from across the EU to handle what he said could be up to tens of thousands of cases each year. The staff will have expertise in specific regions, languages and policy areas.

Beyond the individual decisions on cases, data on the disputes will help regulators and researchers map out any “systemic risks” to social media users.







The Real Facebook Oversight Board, a group of civil rights leaders and tech experts that has been critical of Meta and its oversight panel, gave a cautious welcome to the new centre.

“We don’t know a lot about the appeals center and how it will work, but moderation enforcement under the DSA has promise that other approaches do not,” said spokesman Ben Wyskida. While the DSA “hasn’t been perfect ... it is still far and away superior to anything in the United States.”

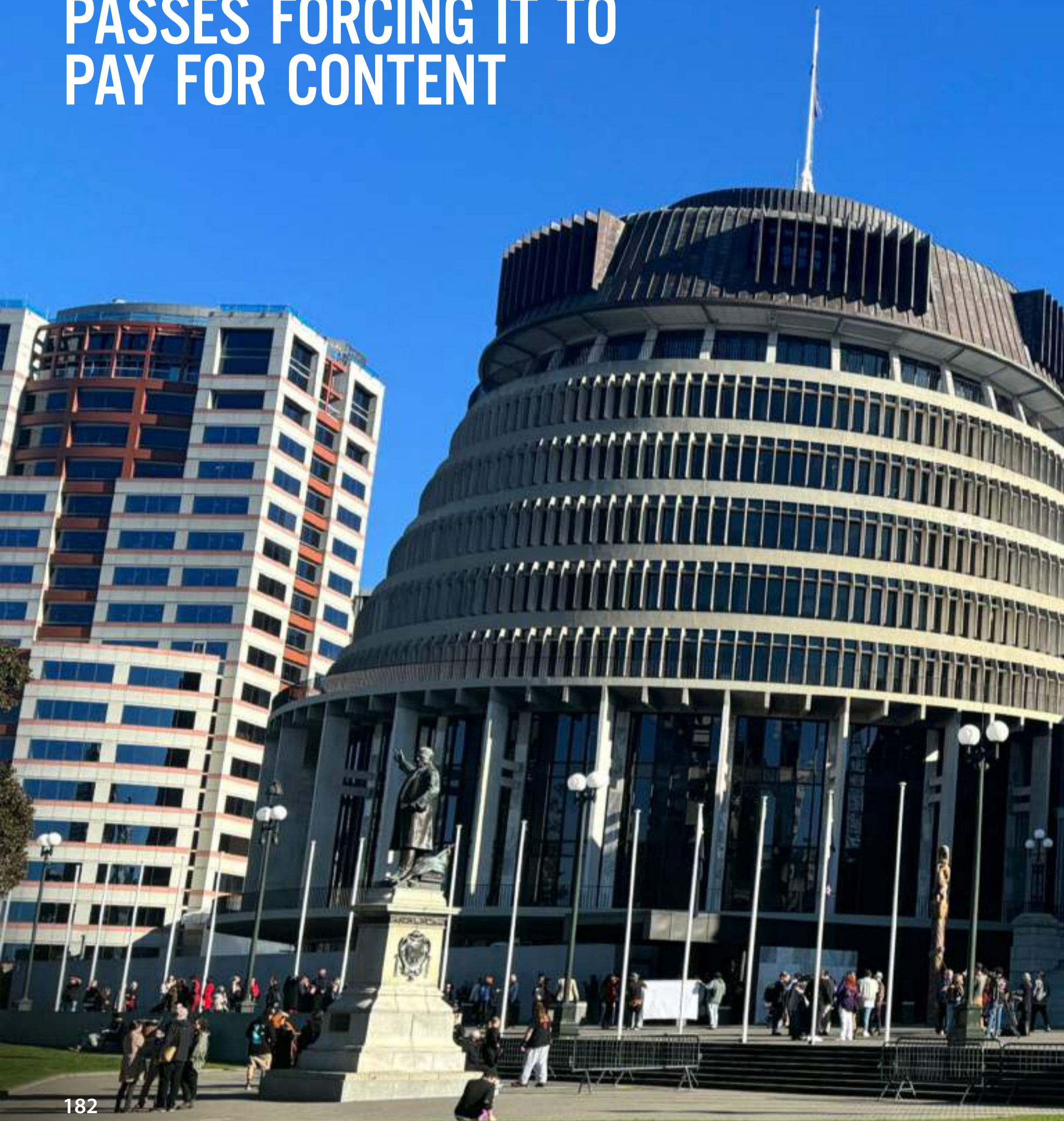
Meta’s Oversight Board is providing 15 million euros (\$16.5 million) in startup funding, said Hughes, who was previously the Oversight Board’s director. He added that the two bodies will operate separately but will “point in the same direction in terms of platform accountability and transparency, user rights” and applying a human rights framework to online speech.

The Appeals Center will fund its ongoing operations by charging tech companies 95 euros for every case it hears, as well as a 5 euro fee from users who raise disputes. This “nominal” fee is intended to stop people from “gaming or abusing” the system and will be refunded if a user wins, Hughes said.

Even though decisions aren’t binding, users will still get their money back if the center rules in favor of their disputes, regardless of whether or not the platform takes any action.

There’s a 90-day deadline for decisions, but in most cases they will be made much more quickly, he said.

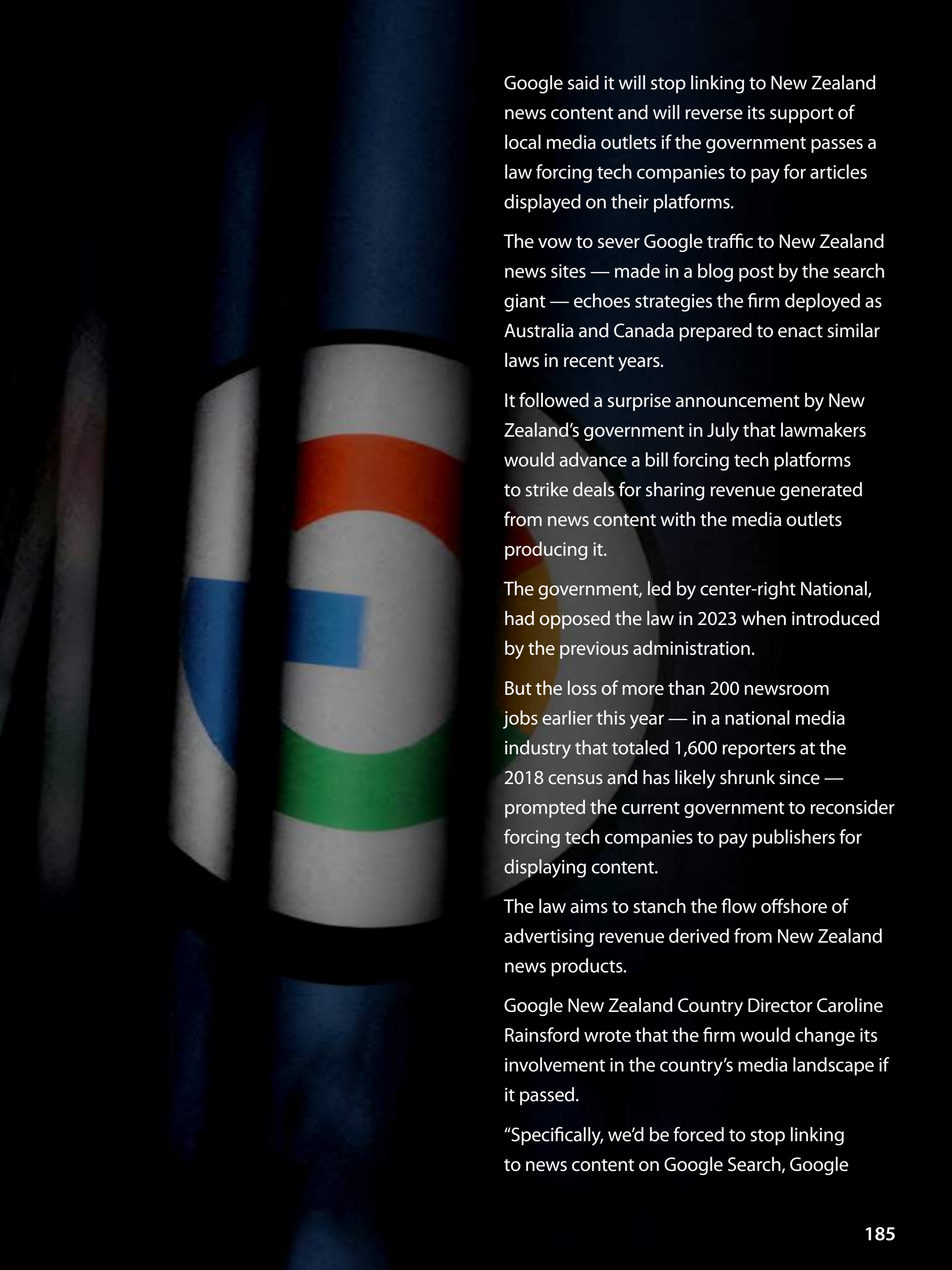
# GOOGLE SAYS IT WILL STOP LINKING TO NEW ZEALAND NEWS IF A LAW PASSES FORCING IT TO PAY FOR CONTENT











Google said it will stop linking to New Zealand news content and will reverse its support of local media outlets if the government passes a law forcing tech companies to pay for articles displayed on their platforms.

The vow to sever Google traffic to New Zealand news sites — made in a blog post by the search giant — echoes strategies the firm deployed as Australia and Canada prepared to enact similar laws in recent years.

It followed a surprise announcement by New Zealand's government in July that lawmakers would advance a bill forcing tech platforms to strike deals for sharing revenue generated from news content with the media outlets producing it.

The government, led by center-right National, had opposed the law in 2023 when introduced by the previous administration.


But the loss of more than 200 newsroom jobs earlier this year — in a national media industry that totaled 1,600 reporters at the 2018 census and has likely shrunk since — prompted the current government to reconsider forcing tech companies to pay publishers for displaying content.

The law aims to stanch the flow offshore of advertising revenue derived from New Zealand news products.

Google New Zealand Country Director Caroline Rainsford wrote that the firm would change its involvement in the country's media landscape if it passed.

"Specifically, we'd be forced to stop linking to news content on Google Search, Google





News, or Discover surfaces in New Zealand and discontinue our current commercial agreements and ecosystem support with New Zealand news publishers," she wrote.

Google's licensing program in New Zealand contributed "millions of dollars per year to almost 50 local publications," she added.

The News Publishers' Association, a New Zealand sector group, said in a written statement that Google's pledge amounted to "threats" and reflected "the kind of pressure that it has been applying" to the government and news outlets, Public Affairs Director Andrew Holden said.

The government "should be able to make laws to strengthen democracy in this country without being subjected to this kind of corporate bullying," he said.

Australia was the first country to attempt to force tech firms — including Google and Meta — to the bargaining table with news outlets through a law passed in 2021. At first, the tech giants imposed news blackouts for Australians on their platforms, but both eventually somewhat relented, striking deals reportedly worth 200 million Australian dollars (\$137 million) a year, paid to Australian outlets for use of their content.

But Belinda Barnet, a media expert at Swinburne University in Melbourne, said Meta has refused to renew its contracts with Australian news media while Google is renegotiating its initial agreements.

As Canada prepared to pass similar digital news bargaining laws in 2023, Google and Meta again vowed to cease their support for the country's

media. Last November, however, Google promised to contribute 100 million Canadian dollars (\$74 million) — indexed to inflation — in financial support annually for news businesses across the country.

Colin Peacock, an analyst who hosts the Mediawatch program on RNZ, New Zealand's public radio broadcaster, said Google "doesn't want headlines around the world that say another country has pushed back" by enacting such a law.

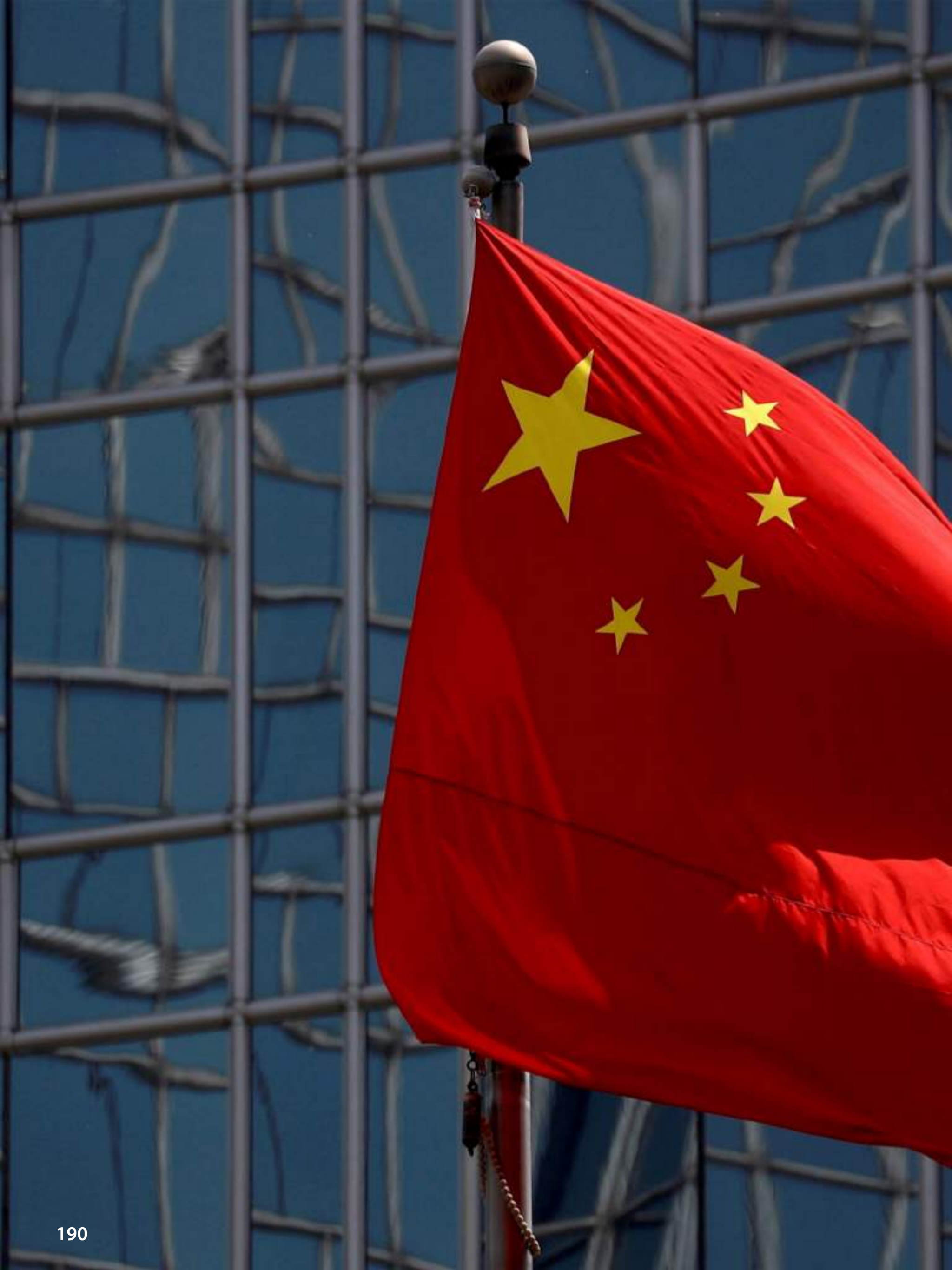
While Google pointed to its support of local outlets, Peacock said one of its funding recipients — the publisher of a small newspaper — had told a parliamentary committee this year that the amount he received was "a pittance" and not enough to hire a single graduate reporter.

Minister for Media and Communications Paul Goldsmith told in a written statement that he was still consulting on the next version of the bill.

"My officials and I have met with Google on a number of occasions to discuss their concerns, and will continue to do so," he said.

Goldsmith said in July that he planned to pass the law by the end of the year.







**CHINA  
ANNOUNCES  
MORE SUPPORT  
FOR ECONOMY  
BUT HOLDS  
BACK ON MAJOR  
SPENDING  
PACKAGE**

China's economic planning agency outlined details of measures aimed at boosting the economy this week but refrained from major spending initiatives.

The piecemeal nature of the plans announced appeared to disappoint investors who were hoping for bolder moves, and Shanghai's benchmark gave up a 10% initial gain as markets reopened after a weeklong holiday to trade just 3% higher.

The head of the National Development and Reform Commission said the government will frontload 100 billion yuan (\$14.1 billion) in spending from the government's budget for 2025 in addition to another 100 billion yuan for construction projects.

The scale of spending overall was well below the multi-trillion yuan levels that analysts said might be expected.

The NDRC's chairman, Zheng Shanjie, said China was still on track to attain its full-year economic growth target of around 5%. But he acknowledged the economy faces difficulties and an increasingly "more complex and extreme" global environment.

China's leaders have been struggling to rev up growth since the COVID-19 pandemic ended. A downturn in the property market has deepened that challenge, as consumer spending has lagged and global demand also has slowed.

In a note, UBS chief China economist Tao Wang said that the market was "likely expecting a significant fiscal stimulus."

A modest package of 1.5 to 2 trillion yuan (\$210 billion to \$280 billion) is more reasonable to







expect in the near-term, she said, with another 2 to 3 trillion yuan (\$280 billion to \$420 billion) in 2025.

In September, China unveiled a monetary stimulus package including cuts to mortgage rates and in the amount of reserves are required to keep on deposit with the central bank. Those and other measures were the most aggressive efforts so far to try to pull the property industry out of the doldrums and spur faster growth.

On Tuesday, the NDRC said that new measures would focus on boosting investment and spending and supporting small and medium-sized businesses that operate at a disadvantage to large, state-corporations.

But much of the information focused on technical issues such as payment regulations, management of projects and deployment of bonds for financing.

To counter falling housing sales and home prices, Zheng said there would be “comprehensive policy measures to help stop the decline in the real estate market.”

“In response to volatility and declines in the stock market, we will introduce a series of powerful and effective measures to strive to boost the capital market,” he said, without giving details.





# A TOP ENERGY STRATEGIST IS OPTIMISTIC ABOUT CLIMATE CHANGE. AND HE HAS THE DATA TO BACK THAT UP

When it comes to energy, Jarand Rystad is the numbers guy. The former McKinsey & Company partner founded Oslo-based Rystad Energy, an independent research and energy intelligence company that sells data and analysis on oil, gas, coal and renewable forms of energy.

A physicist by training, Rystad is an optimist about the chance of containing climate change through introducing new technologies. He brings numbers to back up his views, based on the company's extensive databases.





## **WHEN ARE WE GOING TO SEE PEAK OIL CONSUMPTION, PEAK FOSSIL FUEL CONSUMPTION?**

I think peak coal is very soon. It could even be this year or next year. We are close to peak thermal in China, most likely this year or next, meaning coal and gas electricity generation. China is half of the coal market, so it's very relevant.

In Europe and the U.S. coal has been trending down for many years. The trend down in Europe and America is balancing the trend up in India and Indonesia and a few other countries and Pakistan, and then China's peaking. So they are very close to peak coal.

Peak oil, we were in a very good place with EV adoption in Europe and America though it has stalled a little bit due to lack of subsidies. And then we have peak gas, which as you know, consumption is going down in Europe much faster than anyone believed. So taking these three fossil fuels - coal, oil and gas - in aggregate, I think we are talking about maybe the end of this decade will be a peak for fossil, maybe even slightly before.

## **IS THAT GOOD NEWS?**

I think it's good news, of course. The only way to get rid of oil, gas and coal is to compete with the use of oil, gas and coal through introducing new technologies. So what you need to work on is solar, wind, batteries, geothermal, EVs, etc. All these technologies will make the use of fossil fuel no longer competitive.





McKinsey & Com





## **WHERE ARE OIL PRICES GOING?**

OPEC is managing the market because there's actually too much oil in the market. So OPEC is cutting 3 million barrels, without that there would be an even bigger difference between the fundamental supply and demand.

I see weaker fundamentals meaning I see weaker prices and with a small risk of asset price collapse as well. The price collapse will not last for very long, but typically it is almost a V-shape and these could go deep down and they could go up again.

## **YOU SAID THERE WERE 24 KEY TECHNOLOGIES. WHAT ARE THE TOP FIVE?**

So let's say that it's 38 gigatons of emissions that you need to mitigate. Solar photovoltaic alone will mitigate 11 gigatons. Batteries and EVs separately are the next important, which is about 5.5 gigatons each. And CCUS (carbon capture, utilization and storage) also has the potential to mitigate 5.5 gigatons. The fifth is wind, which is also like 5.5 gigatons.

## **WHAT'S THE ONE TECHNOLOGY NO ONE HAS HEARD ABOUT YET?**

For instance, high temperature energy storage. One is called "the sun in the box," this big block of graphite, or black carbon, and you can heat the block to 2,000 degrees, and you do that when the wind is blowing and the sun is shining.

You can have solar panels inside producing electricity from the wavelength radiation from the block, and you have pipes into it with super hot high pressure water, so you

can choose whether you want to take out the energy as electricity or as hot over-pressurized water, for instance for metal production... Just one example of a new long duration storage technology.

### **I HAVEN'T HEARD THE WORD "HYDROGEN" IN OUR CONVERSATION.**

It's very inefficient to take it from electricity to hydrogen and back to electricity. This will only be a special application, more a niche than a pillar for applications like steel, chemicals, shipping fuel, ammonia production. I don't believe we're going to be driving hydrogen cars because it's not competitive with electricity.

### **THE ENERGY TRANSITION IS SOMETIMES VIEWED AS A MATTER OF BANNING THINGS AND INTRODUCING THINGS THAT ARE GOING TO COST MORE. CAN YOU SPEAK TO THAT?**

If you look at those technologies that are really taking off like solar and batteries, they are taking off because they are cheaper and better than thermal. So they're already past a tipping point...The cheapest option by far will be solar. Even if you are installing batteries to deal with the intermittency, it will be competitive versus building new thermal plants.

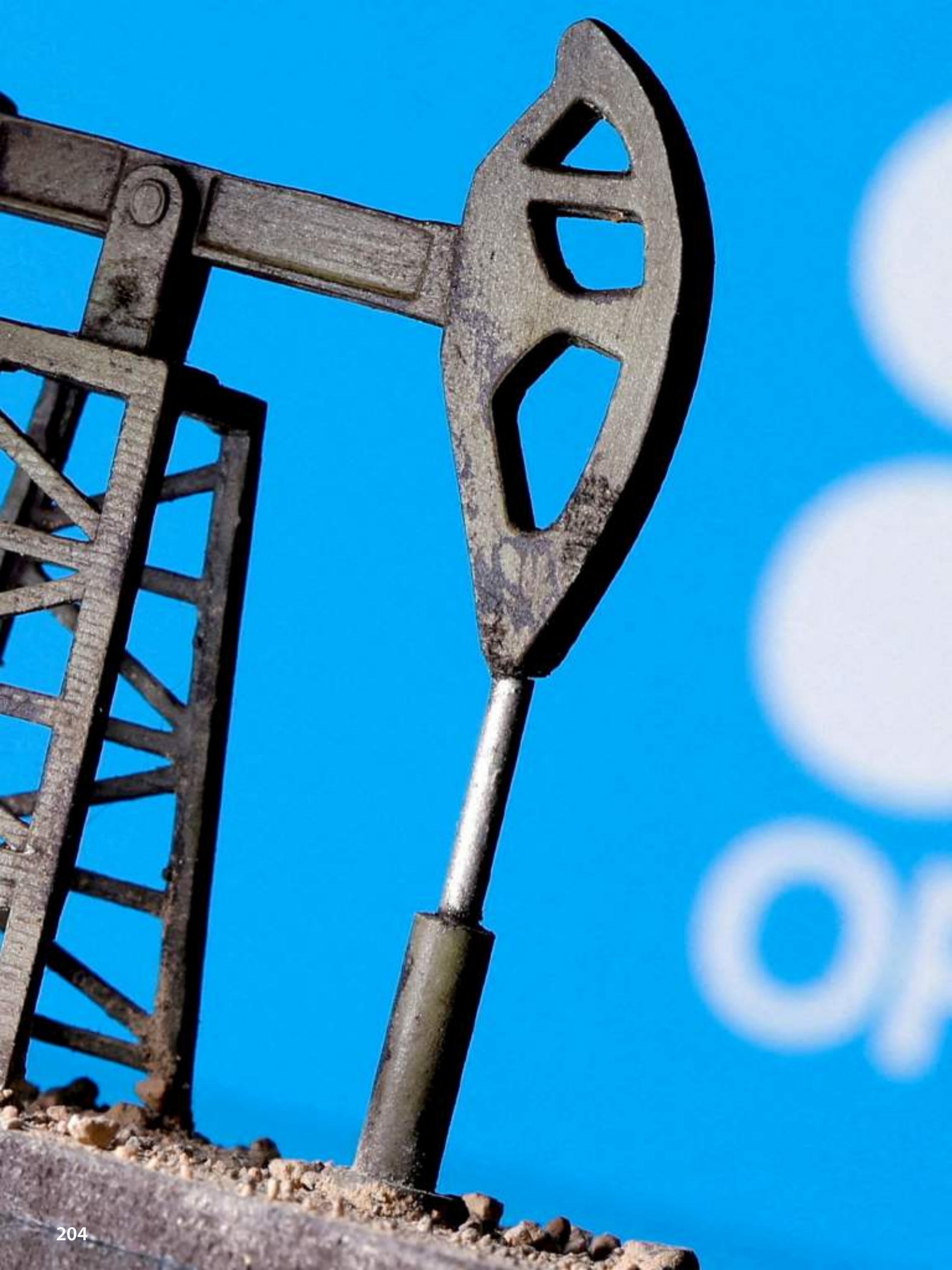
### **WHAT CAN BE EXPECTED FROM THE UNITED NATIONS CLIMATE CONFERENCE IN AZERBAIJAN NEXT MONTH?**

Some countries like Germany for instance have suddenly slowed down their incentives for electric vehicle adoption. They need to keep





RYSTAD ENERGY



up these kinds of measures. And you need this kind of international pressure. The difference between active policies and weak policies is at least 0.4 degree of global warming. We have a lot of technologies that will drive a green shift regardless of policies. But with policies, you drive it faster.

### **ARE YOU AN OPTIMIST OR A PESSIMIST ABOUT HOLDING GLOBAL WARMING TO 1.5 DEGREES CELSIUS BY THE END OF THE CENTURY?**

Some people call me climate optimistic but I'm quite fact-based on this. It is possible, for CO<sub>2</sub> alone, to limit emissions to 650 gigatons, which corresponds to 1.6 degrees warming, and if you do something with methane on top of that, 1.5 degrees is still within reach.

The iPhone disrupted the media, and solar and batteries will be such a disruptive technology, because they're cheaper and better. People underestimate how fast it will go. In 1945 it was all steam locomotives and by 1960 they were all diesel electric, only 15 years to change a gigantic system, because the new technology was cheaper and better.

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