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*Monday, January 17, 2022*

Top 10 risk and compliance related news stories and world events that (for better or for worse) shaped the week's agenda, and what is next

Dear members and friends,

I have just read the word *materiality* in the new Regulatory Technical Standard (RTS) of the European Banking Authority (EBA), on a central database on anti-money laundering and countering the financing of terrorism (AML/CFT) in the EU.



I have spent so many hours considering materiality in real, demonstrative, documentary, and testimonial evidence. The basic prerequisites of admissibility in evidence are relevance, *materiality*, and competence.

According to the new Regulatory Technical Standard from the EBA, the central Anti-Money Laundering/Combating the Financing of Terrorism (AML/CFT) database will contain information on *material* AML/CFT weaknesses in financial sector operators that competent authorities have identified. It will also contain information on the measures competent authorities have taken in response to those *material weaknesses*.

A weakness shall be *considered material* where it reveals or could lead to significant failures in the compliance of the financial sector operator, or of the group to which the financial sector operator belongs, with its AML/CFT-related requirements.

*At least all* of the following criteria shall be assessed to consider a weakness as material:

- (a) It occurs repeatedly;
- (b) It has persisted over a significant period of time (duration);
- (c) It is serious or egregious (gravity);
- (d) The management body or the senior management of the financial sector operator either appear to have a knowledge of the weakness and decided not to remediate it or they adopted decisions or deliberations directed at generating the weakness (negligence and wilful misconduct);
- (e) The weakness increases the ML/TF risk exposure of the financial sector operator or the ML/TF risk associated with the financial sector operator, or of the group to which it belongs;
- (f) The weakness has or could have a significant impact on the integrity, transparency and security of the financial system of a Member State or of the Union as a whole;
- (g) The weakness has or could have a significant impact on the viability of the financial sector operator or of the group to which the financial sector operator belongs, or on the financial stability of a Member State or of the Union as a whole;

This is a good checklist.

To ensure that the central AML/CFT database becomes an efficient tool, the quality, timeliness and completeness of the information is essential. Information on material weaknesses and measures taken shall be submitted without undue delay and that competent authorities shall respond without undue delay to any request from the EBA for additional or subsequent information.

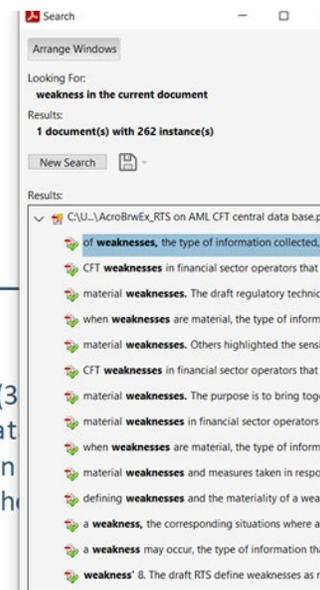
To be effective and to support early intervention with a view to mitigating risks before they crystallise, information on *material weaknesses* has to be submitted to the database without delay following its identification by competent authorities. For the same reason, these draft RTS specify that

submissions and requests made in accordance with them shall be *in English*.

When I read a document, I often use frequency analysis to understand it better. Well, how many times can we read the word *material* and the word *weakness* in the (88 pages) document?

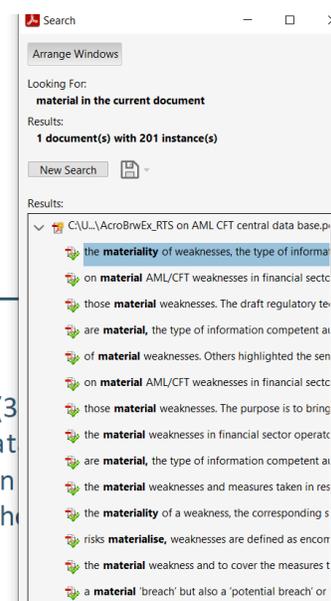
## Final report

on draft regulatory technical standards under Article 9a (1) and (3) Regulation (EU) No 1093/2010 setting up an AML/CFT central data base specifying the materiality of **weaknesses**, the type of information the practical implementation of the information collection and the and dissemination of the information contained therein



## Final report

on draft regulatory technical standards under Article 9a (1) and (3) Regulation (EU) No 1093/2010 setting up an AML/CFT central data base specifying the **materiality** of weaknesses, the type of information the practical implementation of the information collection and the and dissemination of the information contained therein



There are 262 instances of the word *weakness* and 201 instances of the word *material*.

It is interesting that *weaknesses* are defined as encompassing not only breaches or suspected breaches, but also situations where the application by a financial sector operator of the AML/CFT-related requirements or policies falls short of supervisory expectations.

There are also 123 instances of the word *measure* in the document. The definition covers the various type of measures taken by a competent authority on a financial sector operator in response to the material weakness, and covers the measures taken in response not only to a material 'breach' but also a 'potential breach' or 'ineffective or inappropriate application'.

After United States v. Gaudin, (1995), *materiality* is an issue to be determined by the jury. The jury must find *materiality beyond a reasonable doubt* to convict. In the AML/CFT-related requirements there is no jury, we live in a different world.

Read more at number 1 below. Welcome to our Top 10 list.

Best regards,

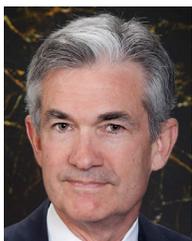
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*Number 1 (Page 7)*[Central database on anti-money laundering and countering the financing of terrorism](#)*Number 2 (Page 9)*[Nomination hearing](#)

Chair Jerome H. Powell, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, Washington, D.C.

*Number 3 (Page 12)*[Looking through higher energy prices? Monetary policy and the green transition](#)

Isabel Schnabel, Member of the Executive Board of the ECB, at a panel on “Climate and the Financial System” at the American Finance Association 2022 Virtual Annual Meeting, Frankfurt am Main

*Number 4 (Page 26)*[Report on the application of the Insurance Distribution Directive \(IDD\)](#)*Number 5 (Page 29)*[Erica Y. Williams Sworn in as PCAOB Chair](#)

*Number 6 (Page 30)*

## SEC Awards Over \$13 Million To Whistleblower



*Number 7 (Page 32)*

## Log4Shell Vulnerabilities in VMware Horizon Targeted to Install Web Shells

Attackers are actively targeting Log4Shell vulnerabilities in VMware Horizon servers in an effort to establish web shells.



*Number 8 (Page 34)*

## The Cyber Defense Review: Addressing Critical Unlearned Lessons

Colonel Jeffrey M. Erickson



*Number 9 (Page 36)*

## Introducing Privacy Center



*Number 10 (Page 38)*

## NIST Helps Next-Generation Cell Technology See Past the Greenery

Measurements of trees' impact on 5G transmissions could prove vital to using a new class of signal.



*Number 1*

## Central database on anti-money laundering and countering the financing of terrorism



The European Banking Authority (EBA) published its draft Regulatory Technical Standards (RTS) on a central database on anti-money laundering and countering the financing of terrorism (AML/CFT) in the EU.

The European Reporting system for material CFT/AML weaknesses (EuReCA) will be a key tool for coordinating efforts to prevent and counter money laundering and terrorism financing (ML/TF) in the Union.

The EBA is legally required to establish and keep up to date a central AML/CFT database.

This database, also known as EuReCa, will contain information on material weaknesses in individual financial institutions that make them vulnerable to ML/TF. Competent authorities across the EU will have to report such weaknesses, as well as the measures they have taken to rectify them.

The EBA's draft RTS specify when weaknesses are material, the type of information competent authorities will have to report, how information will be collected and how the EBA will analyse and disseminate the information contained in EuReCa.

They also set out the rules necessary to ensure confidentiality, protection of personal data and the effectiveness of EuReCa.

In this context, the EBA also published technical specifications that detail the data points and a list of competent authorities that will be indirectly submitting information to EuReCA.

The EBA will use EuReCA to provide information on ML/TF risk affecting the EU's financial sector. It will also share information from the database with competent authorities as appropriate, to support them at all stages of the supervisory process, and in particular if specific risks or trends emerge.

EuReCA will be an early warning tool, which will help competent authorities to act before the ML/TF risk crystallise. As such, EuReCA will be key to strengthening AML/CFT supervision and to coordinating efforts to prevent and counter ML/TF in the EU.

## *Legal basis and background and next steps*

The proposed RTS have been developed in fulfilment of the mandates conferred on the EBA in Articles 9a(1) and (3) of the EBA Regulation. As part of the mandate to lead, coordinate and monitor AML/CFT in Europe, said Articles require the EBA to develop two RTSs to establish and keep up to date an AML/CFT central database. Given the complementary character of those RTS, the EBA has drafted them as a single instrument.

The EBA has performed a Data Protection Impact Assessment (DPIA) in accordance with Article 35 of Regulation (EU) 2018/1725 (EUDPR). The DPIA analyses the risks arising from the processing of personal data and establishes the controls that will be put in place by the EBA to mitigate the risks identified. A summary of this DPIA is published on the EBA's website. The DPIA continues to be updated as the database is being set up.

The EBA will submit these draft RTS to the European Commission for approval. Once approved, the RTS will be directly applicable in all Member States. EuReCA will start to receive data in Q 1 2022.

## Final report

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on draft regulatory technical standards under Article 9a (1) and (3) of Regulation (EU) No 1093/2010 setting up an AML/CFT central database and specifying the materiality of weaknesses, the type of information collected, the practical implementation of the information collection and the analysis and dissemination of the information contained therein

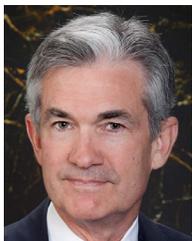
To read more:

[https://www.eba.europa.eu/sites/default/documents/files/document\\_library/Publications/Draft%20Technical%20Standards/2021/1025576/RTS%20on%20AML%20CFT%20central%20data%20base.pdf](https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Draft%20Technical%20Standards/2021/1025576/RTS%20on%20AML%20CFT%20central%20data%20base.pdf)



*Number 2***Nomination hearing**

Chair Jerome H. Powell, before the Committee on Banking, Housing, and Urban Affairs, U.S. Senate, Washington, D.C.



Chairman Brown, Ranking Member Toomey, and other members of the Committee, thank you for the opportunity to appear before you today.

I would like to thank President Biden for nominating me to serve a second term as Chair of the Board of Governors of the Federal Reserve System.

I would also like to thank my colleagues throughout the Federal Reserve System for their dedication, perseverance, and tireless work on behalf of the American people.

Their commitment and expertise were essential to the Fed's response to the COVID-19 crisis and remain vital to the implementation of monetary policy as our economy continues to progress. Particular thanks go to my wife, Elissa Leonard, and our three children, Susie, Lucy, and Sam. Their love and support make possible everything I do. My five siblings are all watching, and we are thinking of each other and of our parents today with love and gratitude.

Four years ago, when I sat before this Committee, few could have predicted the great challenges that would soon become ours to meet.

On the eve of the pandemic, the U.S. economy was enjoying its 11th year of expansion, the longest on record. Unemployment was at 50-year lows, and the economic benefits were reaching those most on the margins.

No obvious financial or economic imbalances threatened the ongoing expansion. But this attractive picture turned virtually overnight as the virus swept across the globe.

The initial contraction was the fastest and deepest on record, but the pain could have been much worse. As the pandemic arrived, our immediate challenge was to stave off a full-scale depression, which would require swift and strong policy actions from across government.

Congress provided by far the fastest and largest response to any postwar economic downturn. At the Federal Reserve, we used the full range of policy tools at our disposal. We moved quickly to restore vital flows of credit to households, communities, and businesses and to stabilize the financial system.

These collective policy actions, the development and availability of vaccines, and American resilience worked in concert, first to cushion the pandemic's economic blows and then to spark a historically strong recovery.

Today the economy is expanding at its fastest pace in many years, and the labor market is strong.

As always, challenges remain. Both the initial shutdown and the subsequent reopening of the economy were without precedent.

The economy has rapidly gained strength despite the ongoing pandemic, giving rise to persistent supply and demand imbalances and bottlenecks, and thus to elevated inflation.

We know that high inflation exacts a toll, particularly for those less able to meet the higher costs of essentials like food, housing, and transportation.

We are strongly committed to achieving our statutory goals of maximum employment and price stability.

We will use our tools to support the economy and a strong labor market and to prevent higher inflation from becoming entrenched.

We can begin to see that the post-pandemic economy is likely to be different in some respects. The pursuit of our goals will need to take these differences into account. To that end, monetary policy must take a broad and forward-looking view, keeping pace with an ever-evolving economy.

Over the past four years, my colleagues and I have continued the work of our predecessors to ensure a strong and resilient financial system.

We increased capital and liquidity requirements for the largest banks—and currently, capital and liquidity levels at our largest, most systemically important banks are at multidecade highs.

We worked to improve the public's access to instant payments, intensified our focus and supervisory efforts on evolving threats such as climate change

and cyberattacks, and expanded our analysis and monitoring of financial stability. We will remain vigilant about new and emerging threats.

We also updated our monetary policy framework, drawing on insights from people and communities across the country, to reflect the challenges of conducting policy in an era of persistently low interest rates.

Congress has assigned the Federal Reserve important goals and has given us considerable independence in using our tools to achieve them. In our democratic system, that independence comes with the responsibility of transparency and clear communication, to keep the public informed and enable effective legislative oversight.

That duty takes on even greater significance when the Fed must take extraordinary actions in times of crisis. In order to facilitate that transparency, and to earn your trust and that of the American people, I have made it a priority to meet regularly and frequently with you and your elected colleagues. I commit to continuing that practice if I am confirmed to another term.

The Federal Reserve works for all Americans. We know our decisions matter to every person, family, business, and community across the country. I am committed to making those decisions with objectivity, integrity, and impartiality, based on the best available evidence, and in the long-standing tradition of monetary policy independence.

That pledge lies at the heart of the Fed's mission and is one we all make when we answer the call to public service. I make it here again, with force and without reservation.

Everything we do at the Federal Reserve is in pursuit of the goals set for us by Congress. I am honored to have worked in service to those ends since I joined the Fed in 2012, and as Chair for the past four years.

Thank you. I look forward to your questions.



*Number 3***Looking through higher energy prices? Monetary policy and the green transition**

Isabel Schnabel, Member of the Executive Board of the ECB, at a panel on “Climate and the Financial System” at the American Finance Association 2022 Virtual Annual Meeting, Frankfurt am Main

**Looking through higher energy prices?  
Monetary policy and the green transition**

Isabel Schnabel, Member of the ECB's Executive Board

*Remarks at a panel on “Climate and the Financial System”  
at the American Finance Association 2022 Virtual Annual Meeting,  
8 January 2022*

Though last year's events were extraordinary on many levels, spikes in energy prices are a common phenomenon. Since the 1970s, sharp movements in energy prices have been a recurring source of economic dislocations and volatility.

And yet, the roots of today's shock are likely to go deeper. While in the past energy prices often fell as quickly as they rose, the need to step up the fight against climate change may imply that fossil fuel prices will now not only have to stay elevated, but even have to keep rising if we are to meet the goals of the Paris climate agreement.

In my remarks today, I will discuss the challenges that such prospects pose to both fiscal and monetary policymakers in an environment in which the supply of cheaper and greener sources of energy will only gradually be able to meet rapidly rising demand.

I will argue that governments will need to push the energy transition forward, while at the same time protecting the most vulnerable members of society from energy poverty.

Central banks, in turn, will have to assess whether the green transition poses risks to price stability and to which extent deviations from their inflation target due to a rise in the contribution from energy to headline inflation are tolerable and consistent with their price stability mandates.

I will explain that there are instances in which central banks will need to break with the prevailing consensus that monetary policy should look through rising energy prices so as to secure price stability over the medium term.

#### *Fast rise in carbon prices helps accelerate the green transition*

The world economy will have to undergo a far-reaching transformation to be able to live up to the Paris agreement to limit the increase in the global average temperature to 1.5° Celsius above pre-industrial levels.

At the heart of these efforts is the need to radically cut greenhouse gas emissions. According to the United Nations, global emissions would need to drop by 7.6% each year between 2020 and 2030 to reach the Paris target.

By way of comparison, in 2020, when global economic activity came to a virtual standstill, emissions fell by only 5.8%.

There is broad agreement that meeting these ambitious targets requires putting a global price on carbon, and it requires doing so swiftly.

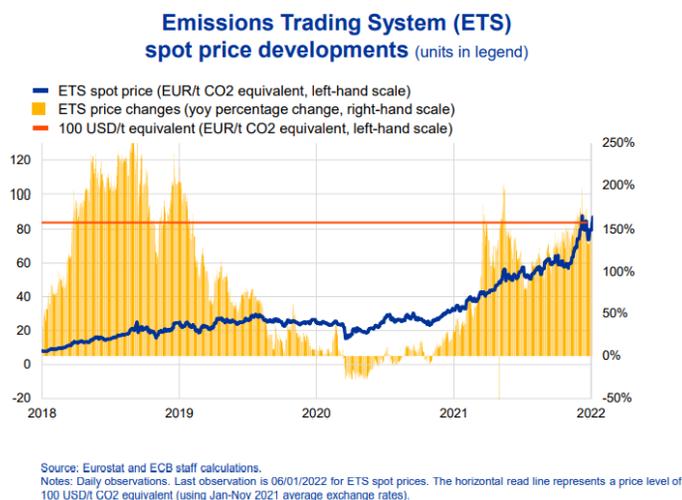
At present, only 21.5% of global emissions are covered by carbon pricing instruments and only 4% are covered by a price of more than USD 40.

According to a recent survey, most climate economists think the price of carbon should be above USD 75 to reach net zero emissions by 2050.

The median response of USD 100 is consistent with what Nicholas Stern and Joseph Stiglitz recently estimated to be the carbon price in 2030 necessary to achieve the goals of the Paris Agreement.

In the EU, prices under the Emissions Trading System (ETS) have recently started to rapidly approach these levels, in part reflecting expectations that the EU is committed to delivering on the clean energy transition (Slide 2).

### EU carbon price increased sharply in 2021, accelerating the green transition



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In early December, ETS prices reached a new record high of nearly €90 per tonne of carbon, almost three times as high as at the beginning of 2021, and a multiple of their level a few years ago.

The measurable rise of carbon prices will help accelerate the green transition. If persistent, it strongly disincentivises new investments in fossil fuel energy carriers.

Two parallel developments are reinforcing the effects of a higher carbon price.

One is the European Commission's Fit for 55 package – an ambitious set of reform proposals, which was presented in July last year.

It includes a recommendation to significantly strengthen the ETS and widen its scope, which currently covers only around 40% of the EU's greenhouse gas emissions.

The Fit for 55 package also proposes a review of the EU Energy Taxation Directive, with the aim of raising the minimum tax rate for inefficient and polluting fuels, and lowering those for efficient and clean fuels.

The second development is the ongoing transformation in financial markets.

Sustainable investment is no longer a “nice to have” policy but has become an essential ingredient in most investor portfolios. Many institutional investors have started to materially reduce their exposures to fossil fuel energy producers and have redirected capital to more environmentally acceptable low-carbon alternatives.

ECB analysis shows that financial markets are increasingly serving as a corrective device.

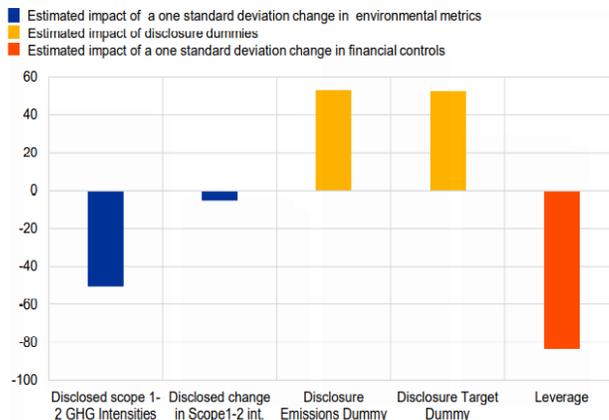
It finds that market prices have started to reflect the premium demanded by investors for exposures to climate-related risks. There is a positive relationship between the greenhouse gas emissions resulting from a firm’s operations and credit risk estimates, as measured by credit ratings and market-implied distance to default.

The magnitude of the effect is economically relevant. On average, it is comparable to that of traditional determinants of credit ratings, such as leverage (Slide 3). The analysis also finds that disclosing emissions and emission reduction targets helps lower credit risk premia.

### Financial markets as a corrective device, with high emissions implying higher credit risk

#### Impact of transition risk metrics on credit ratings vis-a-vis leverage

(y-axis: percentage of a credit notch)



Source: Carbone, Giuzio, Kapadia, Krämer, Nyholm and Vozian (2021), “The low-carbon transition, climate commitments and firm credit risk”, ECB Working Paper No 2631. Notes: The first two columns represent the estimated magnitude of a one standard deviation increase in disclosed Scope 1 and 2 GHG intensities and disclosed changes in Scope 1 and 2 GHG intensities, respectively. The third and fourth columns reflect the impact of the decision to disclose GHG emissions and make a forward-looking commitment, respectively. The fifth column shows the impact of a one standard-deviation increase in leverage. The coefficients are obtained via a panel regression of credit ratings on environmental variables, firm-level, sectoral and country controls as well as time fixed effects. Ordered logit estimators lead to similar results.

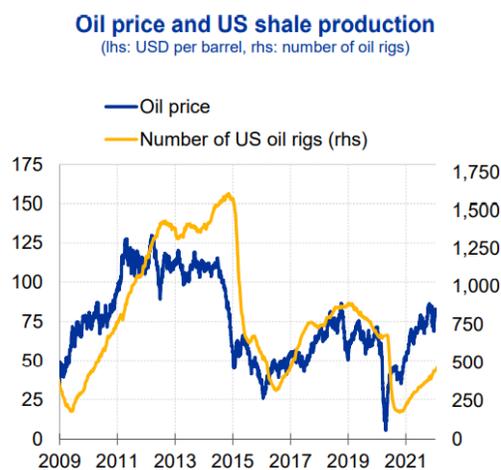
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Since financial markets are global, these developments seem to have started to produce tangible climate-related effects even in countries that do not yet have a national carbon price, such as the United States.

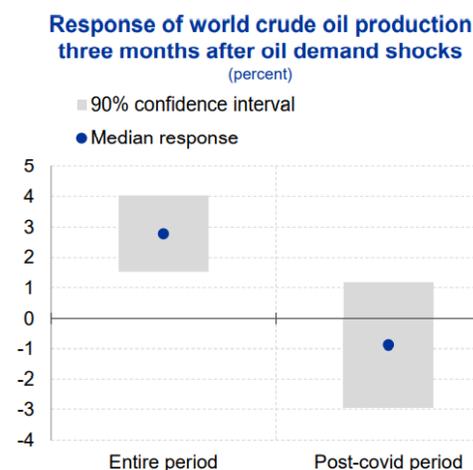
Last year’s strong economic expansion, for example, was characterised by an atypically slow response of US shale oil production to rising oil prices, as such investments may no longer prove profitable to investors over the

medium term – at least not to the same extent as they have done in the past, or as returns may become even more volatile (Slide 4).

### Oil production is responding more slowly to rising oil prices



Sources: Bloomberg and Baker Hughes.  
Latest observation: 06/01/2022 (oil price), 31/12/2021 (rig count).



Sources: Bloomberg, Refinitiv, IEA and ECB staff calculations.  
Notes: "Entire period": 06/2015 – 08/2021, "Post-covid period": 06/2020 – 08/2021.  
Latest observation: August 2021

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In other words, even in the absence of a global carbon price, which remains essential, there are growing signs that the green transition is accelerating around the globe.

### *Transition phase may bring protracted period of higher energy inflation*

While such relative price changes are desirable and intended, they may weigh on the economy if firms and households cannot substitute more expensive carbon-intensive energy with greener and cheaper alternatives.

Higher carbon prices work in part by stimulating investments and innovation in low-carbon technologies. But these investments will take time. At present, renewable energy has not yet proven sufficiently scalable to meet rapidly rising demand.

In the EU, renewable energies currently account for only around 20% of energy consumption. The Fit for 55 package proposes increasing this share in the EU to 40% by 2030.

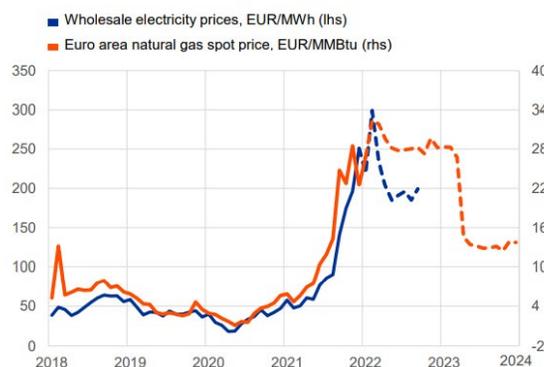
The combination of insufficient production capacity of renewable energies in the short run, subdued investments in fossil fuels and rising carbon prices means that we risk facing a possibly protracted transition period during which the energy bill will be rising.

Gas prices are a case in point.

Last year's adverse weather conditions, which constrained the production of renewable energy, have led to significant demand and supply imbalances in the gas market as global growth accelerated, pushing gas prices to new record highs (Slide 5).

### Gas and electricity prices may stay elevated as green transition accelerates

**Wholesale and future prices for electricity and natural gas in the euro area**  
(units in legend)



Sources: Bloomberg for electricity and gas futures, ICE for gas spot prices, OMIO, Gestore Mercati Energetici, Fraunhofer ISE and ENTSOE for wholesale electricity prices.  
Note: Cut-off date for futures is 06/01/2022. Electricity wholesale prices is a weighted average of electricity prices in Germany, France, Spain, Italy and the Netherlands.  
Latest observation: November 2021 for electricity wholesale prices and December 2021 for gas spot prices.

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The green transition may reinforce these imbalances in the future. In many countries, especially in Asia but also in the euro area, gas – being half as polluting as coal – is seen as a stopgap solution in the secular shift to a greener energy system.

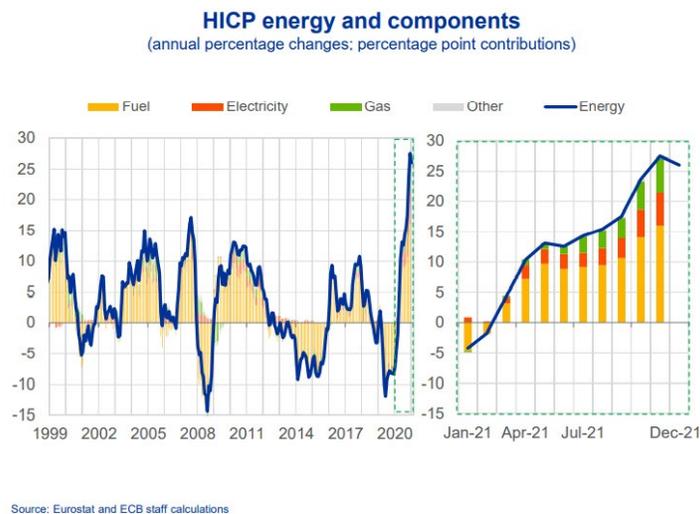
In the EU, rising gas prices have a direct and immediate impact on wholesale electricity prices, which are linked to the short-run marginal costs of gas-fired power plants.

In November, wholesale electricity prices in the euro area reached €196 per megawatt hour, nearly four times as much as the average in the two years preceding the outbreak of the pandemic (Slide 5).

As a result, energy price inflation in the euro area, as measured by the energy sub-index of the harmonised index of consumer prices (HICP), reached a historical high in November last year, with electricity and gas jointly accounting for more than a third of the total increase, also a new historical high (Slide 6).

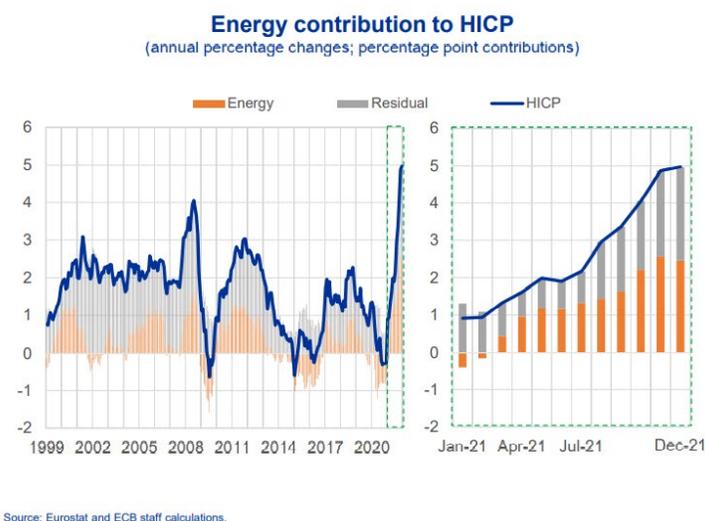
Energy, in turn, has been the prime factor behind the sharp rise in overall consumer price inflation in the euro area, with the HICP standing at 5.0% in December 2021 according to Eurostat's flash estimate, which was the highest level recorded since the euro was introduced in 1999 (Slide 7).

## Energy price inflation reached record high in 2021



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## More than half of the recent rise in HICP inflation reflects higher energy price inflation



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Between April and December 2021, energy contributed, on average, more than 50% to HICP inflation.

*Governments need to advance the green transition and protect the most vulnerable*

These developments pose significant challenges to policymakers – both governments and central banks. On the fiscal side, many governments have responded to rising energy prices by imposing tax cuts, price caps or rebates to shield the most vulnerable households from the sharp rise in gas, fuel and electricity prices.

Because energy expenditures are typically highly inelastic and constitute a particularly large share of income for less well-off households, carbon taxes tend to be regressive.

Already in 2020, 8% of the population in the European Union (EU), or around 36 million people, said that they were unable to keep their home adequately warm.

Energy poverty is a serious threat to the cohesion of our society and to the support for climate-related policies. Compensation measures are therefore important.

But such measures need to be designed in a way that does not reduce the incentives to lower carbon emissions.

It would be a serious mistake if governments, faced with rising energy prices, would backtrack from their commitment to reduce emissions. Governments should also not slow down the pace of the transition or delay the phasing out of fossil fuel subsidies.

Two recent proposals by the European Commission go in the right direction.

One is the introduction of the Social Climate Fund, which aims to address the social impact of higher energy prices resulting from the proposed broadening of the scope of the ETS towards the building and transport sectors, both of which will affect households in particular.

The other is the proposed system for EU countries to jointly procure strategic reserves of gas that can be released in the event of supply shortages. At present, capacity utilisation of gas storage facilities in Europe is just under two-thirds, almost 20% below seasonal norms. Energy buffers will help limit the volatility of gas prices.

### *Green transition poses upside risks to medium-term inflation*

For central banks, the challenges are equally profound. In the past, central banks have typically looked through energy shocks, for good reasons.

Most of the time, such shocks have been short-lived, meaning that a policy response would have amplified the negative effect of rising energy prices on aggregate demand and output and, given the long lags in policy transmission, exerted downward pressure on inflation at a time when the shock is likely to have already faded.

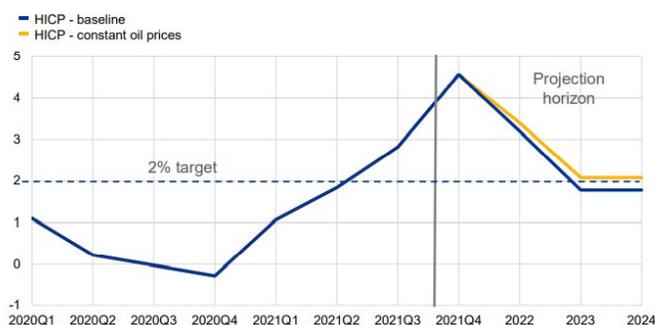
Temporary supply-side shocks therefore typically warrant a deviation from the target in the short run, provided price stability is restored over the medium term and inflation expectations remain anchored.

This insight also motivates our policy response today. In our baseline scenario, the current energy shock is expected to fade over the projection horizon.

The Eurosystem staff projections are based on gas and oil futures prices, which suggest that energy prices should decline measurably this year, thereby significantly contributing to the projected decline in HICP headline inflation over the medium term (Slides 5 and 8).

Medium-term inflation projected to be near target, with upside risks from energy prices

**Past and projected HICP inflation**  
(annual percentage changes)



Source: Eurostat, Eurosystem staff projections (December 2021) and ECB staff calculations.  
Notes: Quarterly values are reported until 2021Q4, annual values from 2022 onwards. The vertical line indicates the start of the projection horizon.

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Such technical assumptions, however, are surrounded by significant uncertainty. In the past, futures prices have often significantly under- or overpredicted energy price inflation. These risks are arguably even larger today.

To see this, it is enough to look at the profile of the projected inflation path: the decline of headline inflation to levels below 2% at the end of the projection horizon hinges on the assumption, derived from futures curves, that in 2023 and 2024 energy is not expected to contribute to headline inflation.

History suggests that such a profile would be unusual. Since 1999, energy has contributed, on average, 0.3 percentage points to annual headline inflation. Sensitivity analysis conducted by Eurosystem staff suggests that it

is enough for oil prices to remain at November 2021 levels for HICP inflation in 2024 to reach our target (Slide 8).

The scale of the energy transition, and the political determination behind it, implies that these estimates could be conservative.

Potentially protracted supply and demand imbalances related to “transition fuels”, such as gas, as well as the fact that carbon prices are likely to rise further, and to extend to more economic sectors, mean that the contribution of energy and electricity prices to consumer price inflation could be above – rather than below – its historical norm in the medium term.

The energy transition therefore poses measurable upside risks to our baseline projection of inflation over the medium term.

At our Governing Council meeting in December, such risks were one factor in deciding on a step-by-step reduction in the pace of asset purchases over the coming quarters.

The pace of the adjustment, with net purchases under our asset purchase programme (APP) falling back to €20 billion by October, is consistent with what Alan Greenspan previously called a “risk-management approach” to monetary policy.

It prescribes that central banks should not only consider the most likely future path of the economy, but the entire distribution of risks around that path with a view to keeping sufficient optionality to address all inflation contingencies.

*Rising energy prices may require a departure from a “looking through” policy*

The question, then, is: if energy inflation were to prove more persistent than currently anticipated under our baseline scenario, at what point could we no longer afford to look through such a shock?

I see two scenarios where monetary policy would need to change course.

*A deanchoring of inflation expectations*

The first would occur if we were to detect signs that inflation expectations have become deanchored. Consumer price expectations are particularly susceptible to changes in the prices of goods that we purchase frequently. Energy, and petrol in particular, are part of this basket of goods.

Over the past year, consumer price expectations for the next 12 months have increased sharply (Slide 9). In October, when energy accounted for more than half of the rise in measured inflation, they reached the highest level since the euro was introduced in 1999 and have remained close to record highs since then.

### Consumer price expectations hit record high in 2021



9

The experience of the 1970s, when rising energy prices triggered a harmful price-wage spiral, emphatically demonstrated that allowing inflation expectations to drift away from the target makes it significantly costlier to bring inflation back to target, both in terms of lost output and higher unemployment.

So far, however, there are no signs of broader second-round effects. Wage growth and demands by unions remain comparatively moderate. But in an environment of large excess savings and protracted supply disruptions, the energy transition may lead to inflation remaining higher for longer, thereby potentially raising the risks of inflation expectations destabilising.

In this case, monetary policy would need to respond to, rather than look through, higher inflation to preserve price stability over the medium term.

*Not all energy shocks are alike*

The other scenario in which policy would require adjustment is if the nature of the shock were to change.

More than a decade ago, the seminal paper by Lutz Kilian established that not all oil price shocks are alike. Their effects on the economy critically depend on the underlying source of the shock.

Rising oil prices due to stronger aggregate demand, for example, are associated with an increase in real economic activity, calling for a different monetary policy response than if oil prices were to rise in response to supply disruptions in the oil market.

A carbon tax may share some of the characteristics of an adverse oil supply shock. Higher energy prices could weigh on economic activity and thereby put downward pressure on consumer price inflation in the medium term. In this case, monetary policy should “look through” temporary deviations of inflation from its target.

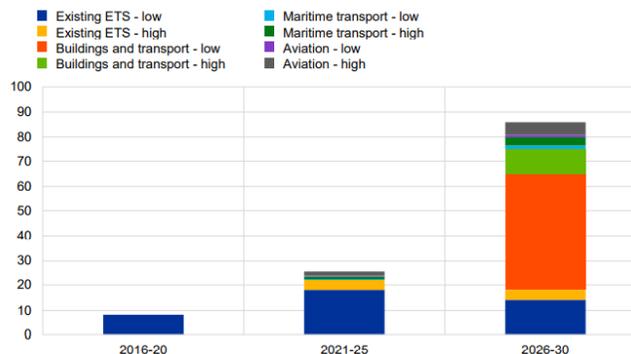
But a carbon tax differs from an adverse oil supply shock in two fundamental ways.

One is that the transformation of our economies through large-scale public and private investment programmes and the subsequent adoption of more efficient and greener technologies is expected to boost, rather than weigh on, economic growth and thereby support wages and aggregate demand.

The second aspect is that, for an energy-importing economy such as the euro area, oil supply shocks are negative terms-of-trade shocks, raising inflation and transferring wealth abroad. But a carbon tax is ultimately a domestic levy that shifts financial resources from the private to the public sector.

Revenues from higher carbon price are expected to increase measurably

**Average expected annual revenue from ETS  
auctions in the EU**  
(EUR billion)



Source: ECB calculation based on European Commission impact assessments.  
Note: Low stands for the lower bound of the estimates, high indicates the additional revenue for the upper bound of the estimates.

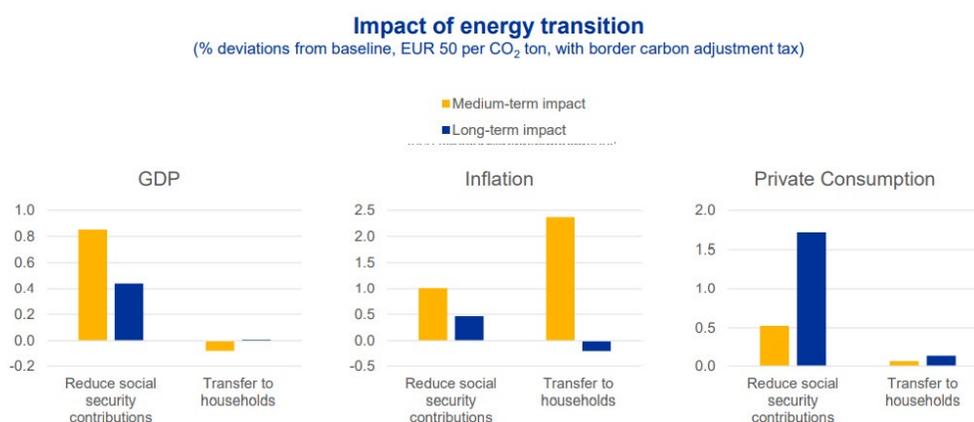
In the EU, for example, the coming years are expected to see significant increases in ETS revenues. ECB calculations, based on European Commission data, suggest that they will rise from €14 billion in 2019 to up to €86 billion annually in the period 2026-30 (Slide 10).

The proposed carbon border adjustment tax, which will put a carbon price on selected imports, as well as higher minimum tax rates on fossil fuels and other national tax initiatives, will further raise revenues.

Eurosystem economists show, based on the example of Spain, that what governments would do with such revenues will shape the response of the economy to the energy transition.

For example, lump-sum transfers to households and electricity bill subsidies, as currently implemented by many governments, can largely cushion the negative short-term effects of rising energy prices on consumption and GDP (Slide 11).

### Energy transition does not necessarily weigh on growth and inflation in the medium term



Source: Estrada, A. and Santabárbara, D. (2021), "Recycling Carbon Tax Revenues in Spain. Environmental and Economic Assessment of Selected Green Reforms", Banco de España Working Paper No 2119.

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Alternatively, if revenues are used to cut other distorting taxes, such as social security contributions, thereby reducing the labour tax wedge, a carbon tax may in fact boost economic activity, even in the short term. And since new activity will likely arise in greener sectors, part of the increase in GDP will be permanent, potentially raising inflation both over the short and medium term.

These findings are not just hypothetical. An emerging strand of empirical evidence finds no robust negative effects of carbon taxes on GDP growth

and employment. If anything, the evidence is consistent with a modest positive impact.

As such, if the future path of energy prices threatens to push headline inflation above our target in the medium term, and if growth and demand prospects remain consistent with firm underlying price pressures, monetary policy needs to act to defend price stability.

### *Conclusion*

Let me conclude.

Carbon prices in the EU and elsewhere increased sharply last year, reinforcing efforts to reduce carbon emissions as fast as possible and accelerating investments in green technologies.

As the shift in the energy mix towards cheaper and less carbon-intensive fuels will take time, a rising carbon price, higher tax rates across a range of fossil fuels, and relatively inelastic energy demand may lead to continuous upward pressure on consumer prices in the transition period.

These developments pose challenges to both fiscal and monetary policy.

Governments will have to protect the most vulnerable parts of society from higher energy prices in a way that does not delay the green transition. Monetary policy, for its part, cannot afford to look through energy price increases if they pose a risk to medium-term price stability.

This could be the case if prospects of persistently rising energy prices contribute to a deanchoring of inflation expectations, or if underlying price pressures threaten to lift inflation above our 2% target as rising carbon prices and the associated shifts in economic activity boost rather than suppress growth, employment and aggregate demand over the medium term.

Thank you.



*Number 4***Report on the application of the Insurance Distribution Directive (IDD)**

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The Insurance Distribution Directive (IDD) has been in application since 1 October 2018, but in some cases, transposition of the Directive only occurred over the course of the past year.

Given the short period of application of the IDD and the fact that the impact of legislative change takes time to bed in, it is too early to draw robust conclusions about the application of the IDD, especially with regard to Member States where there has been a delay in application.

In addition, a number of other factors, such as COVID-19 and digitalisation, have been affecting the market, making it challenging to distinguish the impact of the IDD from other factors.

It will therefore be important to reassess the application of the IDD at later stage, prior to proposing any major changes to the legal framework. EIOPA plans to publish a further report on the application of the IDD in two years' time, to help prepare the Commission in their future review of the Directive.

Despite the limitations in terms of evidence and experience on the application of the IDD, this report is intended to provide a preliminary picture of the impact of the IDD on consumers, insurance distributors and supervisory activities.

EIOPA ran a survey on the application of the IDD and these responses, along with input from national competent authorities (NCAs), were used in helping to prepare this report.

### *Changes in the EU insurance distribution market*

The IDD has sought to harmonise how insurance is distributed to consumers, yet the insurance distribution market in the EU remains diverse and widely fragmented.

There is a wide variety of national distribution channels, registration requirements and reporting frameworks across the EU.

This makes it challenging to provide conclusive findings at the European level and assess whether consistent outcomes are achieved for consumers purchasing insurance in the single market.

EIOPA has sought to gather as much data as possible from NCAs to examine the changes in the EU insurance distribution market.

While the data comparability is better than in the Report on the Structure of Insurance Intermediaries Markets in Europe published in 2018, significant gaps exist.

Despite the gaps and specific limitations, the following general trends can be observed:

- The decrease in the number of registered intermediaries continued over the period 2016-2020. Possible reasons for the decrease are diverse, ranging from consolidation in the sector, the increasing age of intermediaries, reorganisation in distribution models, stricter professional requirements at national level and deletion of inactive intermediaries from national registers.
- The decline in the number of insurance intermediaries is reflected in a sharp drop in the number of intermediaries registered as natural persons over the period 2016-2020. In contrast, the number of intermediaries registered as legal persons increased slightly. There could be different reasons for these developments, such as the further professionalisation of the sector and digitalisation.

- While there is significant diversity in terms of national categories of insurance intermediaries, in 2020, the average European insurance intermediary was a natural person, acted on behalf of one or more insurance undertakings, exclusively sold insurance and was paid in relation to the insurance contract on the basis of a commission.
- With regard to the relative importance of different distribution channels in terms of business written, it can be noticed that, in 2020, bancassurers played a significant role in the distribution of life insurance while other intermediaries such as agents were very relevant for the distribution of non-life insurance. The amount of online sales, although currently relatively low based on available data, seems to be increasing on a yearly basis, a trend that was further enhanced by the COVID-19 pandemic as intermediaries were operating remotely.
- Despite the decrease in the number of registered insurance intermediaries over the period 2016-2020, the number of insurance intermediaries with a passport has increased in most Member States over the same period. However, no indication can be made on the evolution of the amount of business being written on a cross-border basis as there is currently no European framework for reporting such data.

The report:

[https://www.eiopa.europa.eu/sites/default/files/working\\_groups/reports/eiopa-bos-21-581\\_report\\_on\\_the\\_application\\_of\\_the\\_idd.pdf](https://www.eiopa.europa.eu/sites/default/files/working_groups/reports/eiopa-bos-21-581_report_on_the_application_of_the_idd.pdf)



*Number 5***Erica Y. Williams Sworn in as PCAOB Chair**

The Public Company Accounting Oversight Board (PCAOB) announced that Erica Y. Williams was sworn in as Chair. The U.S. Securities and Exchange Commission (SEC) conducted the swearing-in ceremony virtually.

“In our dynamic and evolving capital markets, the PCAOB’s mission to protect investors and further the public interest is extremely important,” said Chair Williams.

“I am honored to take up this mission and to lead this organization’s dedicated, talented staff. Together, we have an extraordinary opportunity to build trust through robust oversight and engagement.”

Appointed by the SEC on November 8, 2021, Chair Williams’ initial term will run through **October 24, 2024**.

Chair Williams joins the PCAOB from Kirkland & Ellis LLP, where she was a litigation partner. Previously, she was a Special Assistant and Associate Counsel to President Barack Obama, advising the president and his senior advisors on legal and constitutional issues involving economic policy, financial regulation and reform, financial technology, trade, intellectual property, and data protection and privacy.

Before that, Chair Williams spent 11 years at the SEC serving as Deputy Chief of Staff for three chairs. In this role, she oversaw all aspects of the SEC’s operations and served as a senior legal advisor to the SEC chair on regulatory policy and rulemakings, enforcement, compliance examinations, agency management and strategy.

Earlier in her career, Chair Williams served as Assistant Chief Litigation Counsel in the SEC’s Division of Enforcement Trial Unit, where she investigated and litigated numerous complex, high-profile matters. Chair Williams earned both a J.D. and a B.A. from the University of Virginia.

“On behalf of all of my PCAOB colleagues, I offer sincere thanks to Board Member DesParte for his steady leadership as Acting Chairperson,” added Chair Williams. “I look forward to working with Duane and my other fellow Board members as we continue the critical work of the PCAOB.”

*Number 6***SEC Awards Over \$13 Million To Whistleblower**

The Securities and Exchange Commission announced an award of more than \$13 million to a whistleblower whose information and assistance prompted the opening of an investigation and significantly contributed to the success of an SEC enforcement action.

The whistleblower promptly alerted SEC staff to an ongoing fraud and provided extensive assistance to SEC staff by meeting in person and helping the staff understand the mechanics of the fraudulent scheme. The whistleblower's information also helped the Commission obtain emergency relief to minimize investor losses.

"Today's whistleblower provided significant information that alerted SEC staff to ongoing fraud, which had caused and was likely to continue to cause substantial injury to the financial interests of investors," said Creola Kelly, Chief of the SEC's Office of the Whistleblower. "Whistleblowers who provide information swiftly can not only save SEC staff's time and resources, but also help minimize potential investor losses."

The SEC has awarded approximately \$1.2 billion to 238 individuals since issuing its first award in 2012. All payments are made out of an investor protection fund established by Congress that is financed entirely through monetary sanctions paid to the SEC by securities law violators.

No money has been taken or withheld from harmed investors to pay whistleblower awards. Whistleblowers may be eligible for an award when they voluntarily provide the SEC with original, timely, and credible information that leads to a successful enforcement action.

Whistleblower awards can range from 10 percent to 30 percent of the money collected when the monetary sanctions exceed \$1 million.

As set forth in the Dodd-Frank Act, the SEC protects the confidentiality of whistleblowers and does not disclose any information that could reveal a whistleblower's identity.

For more information about the whistleblower program and how to report a tip, visit [www.sec.gov/whistleblower](http://www.sec.gov/whistleblower)

## *Office of the Whistleblower*

Assistance and information from a whistleblower who knows of possible securities law violations can be among the most powerful weapons in the law enforcement arsenal of the Securities and Exchange Commission.

Through their knowledge of the circumstances and individuals involved, whistleblowers can help the Commission identify possible fraud and other violations much earlier than might otherwise have been possible.

That allows the Commission to minimize the harm to investors, better preserve the integrity of the United States' capital markets, and more swiftly hold accountable those responsible for unlawful conduct.

The Commission is authorized by Congress to provide monetary awards to eligible individuals who come forward with high-quality original information that leads to a Commission enforcement action in which over \$1,000,000 in sanctions is ordered. The range for awards is between 10% and 30% of the money collected.

The Office of the Whistleblower was established to administer the SEC's whistleblower program. We understand that the decision to come forward with information about securities fraud or other wrongdoing is not one taken lightly, and we are here to answer any questions you may have. You can reach the Office of the Whistleblower at (202) 551-4790.



*Number 7***Log4Shell Vulnerabilities in VMware Horizon Targeted to Install Web Shells**

Attackers are actively targeting Log4Shell vulnerabilities in VMware Horizon servers in an effort to establish web shells.



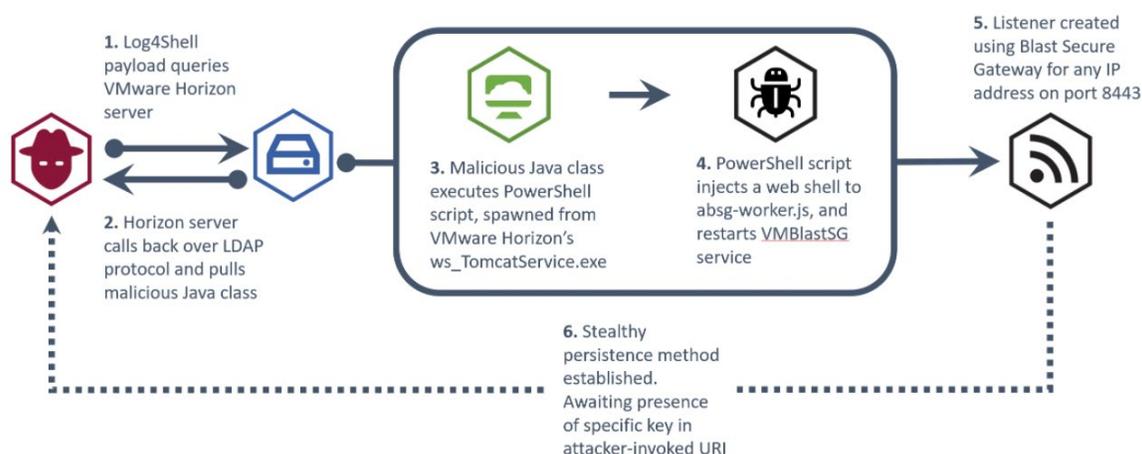
An unknown threat group has been observed targeting VMware Horizon servers running versions affected by Log4Shell vulnerabilities in order to establish persistence within affected networks.

The attack likely consists of a reconnaissance phase, where the attacker uses the Java Naming and Directory Interface (JNDI) via Log4Shell payloads to call back to malicious infrastructure.

Once a weakness has been identified, the attack then uses the Lightweight Directory Access Protocol (LDAP) to retrieve and execute a malicious Java class file that injects a web shell into the VM Blast Secure Gateway service.

The web shell can then be used by an attacker to carry out a number of malicious activities such as deploying additional malicious software, data exfiltration, or deployment of ransomware.

*A representative diagram of the attack is provided below:*

*Image description*

1. Log4Shell payload queries VMware Horizon server.
2. Horizon server calls back over LDAP protocol and pulls malicious Java class.

3. Malicious Java class executes PowerShell script, spawned from VMware Horizon's ws\_tomcatService.exe
4. PowerShell script injects a web shell to absg-worker.js, and restarts VMBlastSG service.
5. Listener created using Blast Secure Gateway for any IP address on port 8443.
6. Stealthy persistence method established. Awaiting presence of specific key in attacker-invoked URI.

Affected organisations should review the VMware Horizon section of the VMware security advisory VMSA-2021-0028. You may visit: <https://www.vmware.com/security/advisories/VMSA-2021-0028.html>

They must apply the relevant updates or mitigations immediately or subsequently consult the NHS Digital High Severity Cyber Alert CC-3995. You may visit: <https://digital.nhs.uk/cyber-alerts/2021/cc-3995>

To read more: <https://digital.nhs.uk/cyber-alerts/2022/cc-4002>



*Number 8***The Cyber Defense Review: Addressing Critical Unlearned Lessons**

Colonel Jeffrey M. Erickson



SPECIAL  
EDITION

VOLUME 7 ♦ NUMBER 1

WINTER 2022

# THE CYBER DEFENSE REVIEW

Welcome to a unique Special Edition of The Cyber Defense Review (CDR). For the last decade, those who have worked in the cyberspace domain will likely agree that some persistent issues and problems continue to be debated with no clear resolution. These include ideas and solutions that may have been identified but did not gain the necessary traction to achieve positive outcomes.

This issue focuses on those “Unlearned Lessons” from the last decade with the intent of encouraging action.

The variety of topics covered in the special edition are wide. In this issue, you will find articles on diplomacy, international relations, adversaries, alliances, emerging threats, economics, and beyond.

These are not just technical issues, but also societal and governmental challenges exacerbated through the dramatic nature of cyber technology.

Each article is kept intentionally short and to the point for maximum effect. It is also worth pointing out that just because the US may not have learned these lessons, our adversaries may not be in the same situation.

Differences in government, priorities, and cultures may not be a hindrance to our adversaries. The “Unlearned Lessons” may have given our adversaries a first-mover advantage in the cyberspace domain, which further increases the need for us to consider, understand, and potentially act on these topics.

The special edition authors represent a diverse group of leaders from the cyberspace domain. They have all dedicated a significant portion of their professional careers wrestling with these challenging issues, and it is prudent that we all think about what they are saying.

When these authors speak, it is incumbent upon members of government, the military, academia, and industry to take the time and pay heed to their words.

A special thank you to Dr. Chris Demchak (Naval War College) and Prof. Francesca Spidalieri (University of Maryland) as the Guest Editors for crafting this critically important issue.

Their time and effort in making this issue a success and a must-read for the community are apparent throughout. We hope that continued dialogue with key leaders in the community will lead to decisive action.

As much as I look forward to future issues of the CDR, I hope that we do not have to see a “Lessons (Still) Unlearned from the Second Decade of Cyber Conflict” special edition ten years from now.

We can avoid ending up with that future issue by turning the page, considering the thoughtful points made by these authors, and then working to address these challenges within the larger community.

To read more:

[https://cyberdefensereview.army.mil/Portals/6/Documents/2022\\_winter/CDR\\_V7N1\\_WINTER\\_2022\\_Special\\_Edition\\_r7.pdf](https://cyberdefensereview.army.mil/Portals/6/Documents/2022_winter/CDR_V7N1_WINTER_2022_Special_Edition_r7.pdf)



*Number 9*

## Introducing Privacy Center



- We're introducing Privacy Center, a new place to learn more about our approach to privacy across our apps and technologies.
- Privacy Center provides helpful information about five common privacy topics: sharing, security, data collection, data use and ads.
- Privacy Center is now available to a limited number of people using Facebook on desktop in the US, and we plan to roll it out to more people and more of our apps in the coming months.

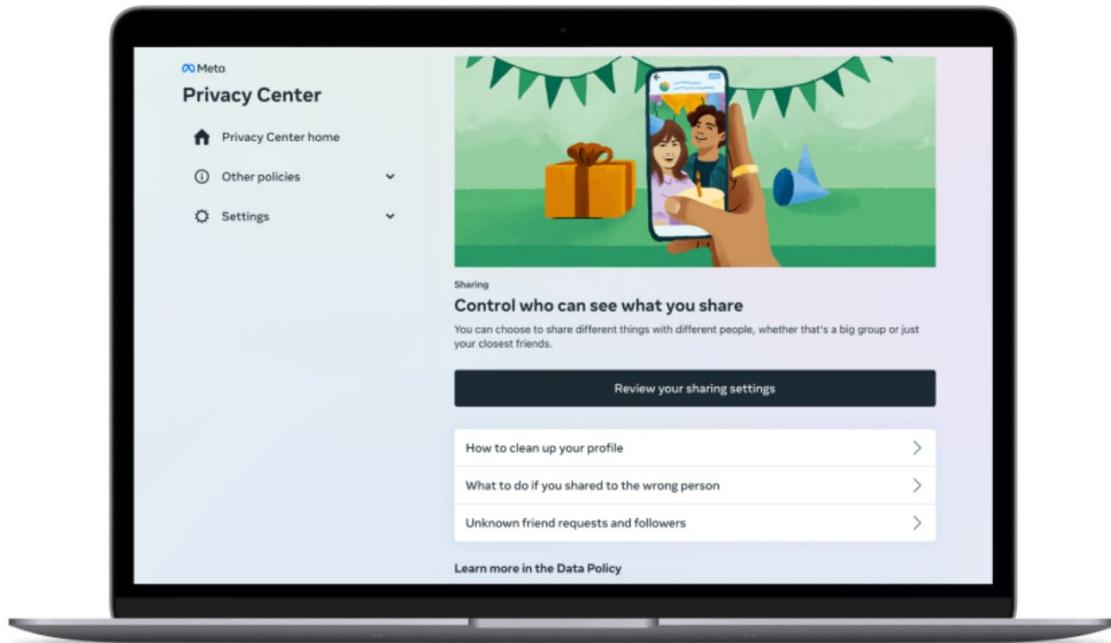
Today, we're introducing Privacy Center to educate people on their privacy options and make it easier to understand how we collect and use information. In Privacy Center, you can learn about our approach to privacy, read up on our Data Policy and learn how to use the many privacy and security controls that we offer.

To start, Privacy Center is now available to some people using Facebook on desktop, and we will roll it out to more people and apps in the coming months. We've built a number of privacy and security controls across our apps and technologies over the years, and our goal is for Privacy Center to serve as a hub for those controls and privacy education.

The current version of Privacy Center has five modules, each containing guides and controls related to a common privacy topic:

- **Security:** You can brush up on account security, set up tools like two-factor-authentication or learn more about how Meta fights data scraping.
- **Sharing:** You can visit this guide if you have questions about who sees what you post, or how you can clean up old posts on your profile using tools like Manage Activity.
- **Collection:** Learn about the different types of data that Meta collects, and how you can view that data through tools like Access Your Information.
- **Use:** Learn more about how and why we use data, and explore the controls we offer to manage how your information is used.

- Ads: Learn more about how your information is used to determine the ads you see, and make use of ad controls like Ad Preferences.



People who have access to this initial launch can find Privacy Center by navigating to Settings and Privacy on the desktop version of Facebook. As we expand Privacy Center, we will add more ways to access it in places where you may have privacy concerns.

We'll continue to update Privacy Center and add more modules and controls to help people understand our approach to privacy across our apps and technologies.

To read more:

<https://about.fb.com/news/2022/01/introducing-privacy-center/>



*Number 10*

## NIST Helps Next-Generation Cell Technology See Past the Greenery

Measurements of trees’ impact on 5G transmissions could prove vital to using a new class of signal.



“The tree study is one of the few out there that looks at the same tree’s effect on a particular signal frequency through different seasons. Even the shape of leaves affects whether a signal will reflect or get through.”

Nada Golmie, NIST researcher

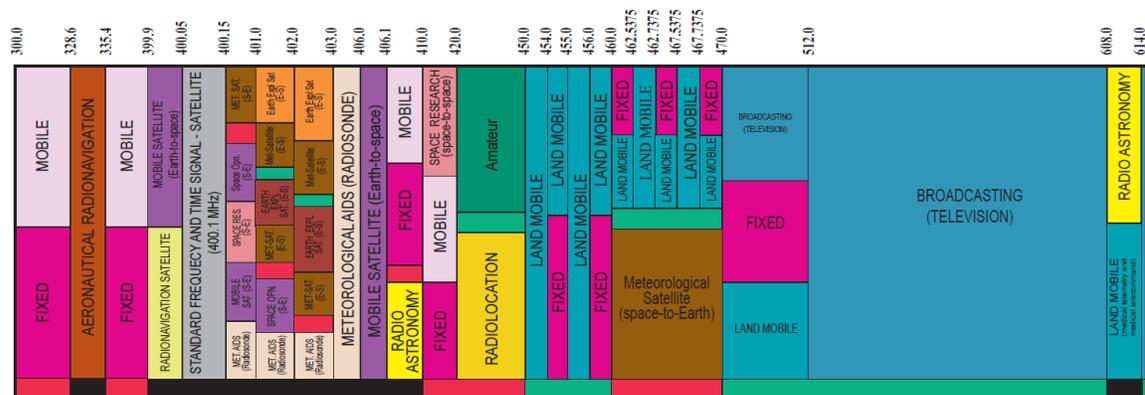
As 5G technology gets fully implemented over the next several years, cellphones and other wireless tech will grow more powerful with increased data flow and lower latency. But along with these benefits comes a question: Will your next-generation cellphone be unable to see the forest for the trees?

That’s one way to describe the problem confronting cell network designers, who have to embrace both the benefits and shortcomings of a new class of signals that 5G will use: millimeter waves.

Not only can these waves carry more information than conventional transmissions do, but they also usefully occupy a portion of the broadcast spectrum that communication technologies seldom use — a major concern in an age when broadcasters vie for portions of spectrum like prospectors staking out territory.

You may visit:

[https://www.ntia.doc.gov/files/ntia/publications/january\\_2016\\_spectrum\\_wall\\_chart.pdf](https://www.ntia.doc.gov/files/ntia/publications/january_2016_spectrum_wall_chart.pdf)



300 MHz

However, millimeter waves also have drawbacks, including their limited ability to penetrate obstacles. These obstacles include buildings, but also the trees that dot the landscape. Until recently little was known about how trees affected millimeter wave propagation. And just as few of us would want to imagine a landscape without greenery, few designers would be able to plan networks around it without such a crucial fundamental detail.

The National Institute of Standards and Technology (NIST) has set out to solve this problem by measuring trees' effect on millimeter waves. The effort could make a profound difference in our next-generation devices' ability to see the 5G antennae that may soon sprout.

The 5G era will feature wireless communication not only between people but also between devices connected to the Internet of Things. The increased demand for larger downloads by cell customers and lag-free network response by gamers has spurred the wireless industry to pursue speedier, more effective communication. Not only could our current devices and services work more effectively, but we could realize new ones: Autonomous vehicles will depend on such quick network response to function.

“We will be able to do new things if our machines can exchange and process information quickly and effectively,” said Nada Golmie, head of NIST’s Wireless Networks Division in the Communications Technology Laboratory. “But you need a good communication infrastructure. The idea is to connect, process data in one place and do things with it elsewhere.”

Millimeter waves, which are new turf for the wireless industry, could be part of the solution. Their wave crests are just a few millimeters apart — a very short distance compared with radio waves that can be several meters long. And their frequencies are very high, somewhere between 30 and 300 gigahertz, or billion wave crests per second.

Compared with conventional radio transmissions, which are in the kilohertz (for AM) and megahertz (for FM) ranges, new 5G signals will be very high frequency indeed — something like a bird tweeting at the upper range of human hearing compared with radio’s deep, low bass.

It is millimeter waves' high frequency that makes them both tantalizing as data carriers and also hard to harness.

On the one hand, more wave crests per second means the waves can carry more information, and our data-hungry era craves that capability to provide those faster downloads and network responses. On the other, high-frequency waves have trouble traveling through obstructions.

Anyone who has passed near a house or car whose occupants are playing loud dance music knows that the throbbing bass frequencies are most of what reaches the outdoors, not the treble of a lilting soprano.

For 5G networks, the obstructing wall can be no more than an oak leaf. For that reason, NIST scientists embarked on a somewhat unusual task in September 2019: They set up measurement equipment near trees and shrubs of different sizes around the agency's Gaithersburg, Maryland, campus. The study continued for months, in part because they needed seasonal perspective.

“The tree study is one of the few out there that looks at the same tree's effect on a particular signal frequency through different seasons,” Golmie said. “We couldn't only do the survey in the winter, because things would have changed by summer. It turns out that even the shape of leaves affects whether a signal will reflect or get through.”

The team worked with the wireless community to develop the mobile equipment that was needed to take the measurements. The researchers focused it on single trees and aimed millimeter-wave signals at them from a range of angles and positions, to simulate waves coming from different directions.

They measured the loss, or attenuation, in decibels. (Each 10 dB of loss is a reduction by a power of 10; a 30 dB attenuation would mean the signal is reduced by a factor of 1,000.)

For one type of leafy tree, the European nettle, the average attenuation in summer was 27.1 dB, but it relaxed to 22.2 dB in winter when the tree was bare. Evergreens blocked more of the signal. Their average attenuation was 35.3 dB, a number that did not change with the season.

(As a measure of comparison, the team also looked at different types of building materials. Wooden doors, plasterboard walls and interior glass showed losses of up to 40.5 dB, 31.6 dB and 18.1 dB, respectively, while exterior building materials exhibited even larger losses, up to 66.5 dB.)

While NIST's contributions to 5G network development effort could end up as ubiquitous as trees themselves, for most of us they will be considerably less visible.

The measurements the team made are intended mainly for companies that create models of how different objects affect millimeter waves. Part of the effort was a collaboration with Ansys Inc. The company used the

measurement data NIST shared with it to tune the tree simulation models, which cell companies use to plan out their networks of antennas in detail.

“Most models don’t include measurement-based information about trees,” said NIST’s David Lai, one of the scientists who conducted the study. “They might simply say that for a given tree-like shape, we should expect a certain amount of signal loss. We want to improve their models by providing accurate measurement-based propagation data.”

NIST’s collaboration with Ansys contributed to guidance issued by the International Telecommunication Union (ITU), the organization that creates guidelines for telecom standards. The results now appear as a new section on trees in ITU’s Recommendation ITU-R P.833-10. This publication serves as a reference for signal propagation models, which others will develop.

To read more:

<https://www.nist.gov/news-events/news/2022/01/nist-helps-next-generation-cell-technology-see-past-greenery>



## Disclaimer

The Association tries to enhance public access to information about risk and compliance management.

Our goal is to keep this information timely and accurate. If errors are brought to our attention, we will try to correct them.

This information:

- is of a general nature only and is not intended to address the specific circumstances of any individual or entity;
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- Experience leading & executing SOX 404 compliance programs is required.
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