



# Addressing Climate-Related Financial Risk Through Bank Capital Requirements

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By Gregg Gelzins    May 2021

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# Introduction and summary

The climate crisis has profound implications for every sector of the economy, every corner of society, and every aspect of public policy. Several years ago, it may have been acceptable for U.S. financial regulators to brush climate change aside as an issue left to other government departments and agencies. Today, improved data and climate-risk economic analysis, coupled with strong international consensus, make it untenable for financial regulators to ignore the critical nexus of climate change and the financial system. Even some of the conservative regulators appointed by President Donald Trump now view climate change as an important priority that falls within their remit.<sup>1</sup>

Attention has rightfully shifted from merely identifying and analyzing climate risk to actively addressing it through regulatory and supervisory levers.<sup>2</sup> There are a range of policy levers that regulators could use under existing authority to mitigate climate-related financial risks and ensure the financial system serves as a source of strength to the economy during the clean energy transition. Regulators could use disclosure rules to help investors and the public better understand the climate-related risks faced by financial institutions and corporations more broadly, as well as these organizations' contributions to the climate crisis.<sup>3</sup> They could integrate climate risk into fiduciary requirements and require investment advisers to develop and implement sustainable investment policies. From credit rating agency oversight to using the Community Reinvestment Act to drive mitigation and adaptation investments in communities of color, there are many other policies that financial regulators could deploy to green the financial system. Moreover, Congress could go even further than financial regulators' significant, but constrained, authority and more directly phase out fossil fuel financing in an orderly fashion to mitigate these risks.<sup>4</sup>

One of the most powerful tools in financial regulators' arsenal is the bank capital framework, and it should be at the heart of efforts to improve the resilience of the financial system to climate-related risks. Capital requirements dictate the level of equity—stock and retained earnings—banks must use to fund their assets,

thereby restricting the amount of debt, or leverage, they can employ. Since equity capital does not have the same type of contractual repayment requirements as debt, it can be used to absorb losses in times of financial difficulty. Strong capital requirements help ensure banks can weather periods of stress while continuing to provide the credit and payment services upon which businesses and households rely. A banking system with too little capital is fragile and prone to crises that cause severe damage to workers, communities, and the broader economy.

This report advances a strategy for integrating climate risk into the capital framework—a strategy that deploys the type of cautious approach to financial stability that justifies vigorous and proactive action now, while acknowledging that some additional valuable—but more intricate—policies may take longer to develop and implement. Specifically, there are five capital-related steps financial regulators should take to mitigate climate-related financial risks:

- Adjust capital risk weights for bank exposures that face acute transition risks.
- Implement a macroprudential climate risk contribution capital surcharge.
- Establish long-term climate stress tests and add near-term climate variables to existing stress tests.
- Integrate additional transition risks and physical risks into capital risk weights.
- Follow climate risks into the shadow banking sector.

The policy recommendations included in this report can all be implemented under existing statutory authority, as Congress has granted the banking regulators broad discretion to develop capital standards that they deem appropriate.<sup>5</sup> Stronger capital rules for climate exposures would increase the capacity of the banking system to withstand future climate-related losses, limiting the chances of a climate-driven banking crisis and positioning the banking system to support economywide decarbonization. Moreover, higher capital requirements for certain carbon-intensive financial activities would require banks to internalize the systemic costs their activities are placing on the financial system and broader economy, while providing meaningful social benefits to the economy by further lowering the chances of distress in the financial system.

# Climate-related financial risks and the precautionary principle

Physical risks and transition risks are the two primary transmission channels through which climate change could impair financial institutions and markets. Physical risks stem from the increase in frequency and severity of extreme weather events and long-term environmental changes.<sup>6</sup> More frequent and brutal wildfires, floods, hurricanes, droughts, and other extreme weather events threaten to damage physical assets and could impair the value of associated financial assets. For example, sea-level rise and extreme weather could cause significant losses for a commercial real-estate (CRE) company with damaged or possibly unusable properties along the coast. If the company is unable to meet its financial obligations due to the repair costs and lost tenant cash flows, it could then transmit losses to commercial mortgage-backed securities investors or banks with CRE loans on their balance sheets. Transition risks refer to the potential impact that clean energy technological advancements, shifts in consumer and investor sentiment, and inevitable policy interventions can have on risky carbon-intensive financial exposures.<sup>7</sup> For example, in anticipation of policies that restrict and raise the cost of emissions, investors could severely reprice carbon-intensive financial instruments, triggering losses for exposed financial institutions and investors.

These risks have both microprudential and macroprudential implications. Microprudential risks involve the safety and soundness of individual financial firms. Climate change poses varying degrees of credit, market, liquidity, reputational, and operational risks to banks depending on the types of assets they hold and the geographic location of those assets, as well as the geographic location of the bank's operations. A bank that finances agricultural loans could face losses if droughts, floods, and pests decrease the crop yield for a farmer who then cannot meet her financial obligations. A bank that focuses on reserve-based lending to oil and gas exploration and production companies could face losses if hydrocarbon reserves are devalued as a result of the clean energy transition, increasing both the likelihood of default on the loan and the loss to the bank if the loan does, in fact, default.

Macroprudential risks concern the stability of the financial system as a whole. From a macroprudential standpoint, the Federal Reserve has developed a framework that analyzes risks to financial stability that stem from both shocks and vulnerabilities.<sup>8</sup> Shocks are endogenous or exogenous events that trigger losses or create disruptions for the financial system, such as a cyberattack, a trade war, or the bursting of an asset price bubble. Vulnerabilities in the financial system are structural characteristics that could amplify and transmit the negative impact of shocks, such as leverage, interconnectedness, inflated asset valuations, and short-term funding. Climate change has implications for both types of macroprudential considerations, as it will drive more frequent and severe physical shocks and as the transition to a low-carbon economy could create shocks for carbon-intensive assets.<sup>9</sup> Climate change also contributes to structural vulnerabilities for the financial system. For example, asset prices exposed to physical or transition risks are likely inflated due to opacity, underestimation of the risk, and the potentially correlated nature of the risks.<sup>10</sup> As a result, financial institutions exposed to these assets could be more leveraged than they presently appear.<sup>11</sup> As the original authors of this financial stability dichotomy admit, the line between shocks and vulnerabilities can be blurry.<sup>12</sup> Inflated asset values for carbon-intensive assets are a vulnerability, while the bursting of the carbon bubble would be a shock.

Climate change rises to the level of a systemic threat given the magnitude of the risk, the wide array of financial firms with exposure to the risk, and the speed with which losses could materialize. If climate-related transition shocks or physical shocks cause severe losses at a systemically important financial institution or correlated losses among smaller financial firms, stress could be propagated throughout the financial system. Such a situation could trigger fire sales of impaired assets and creditor runs from exposed institutions, as well as create contagion—all of which would infect other financial institutions and markets that were not directly exposed to the initial climate event. A particularly troubling financial stability scenario could entail the materialization of both physical shocks and transition shocks in rapid succession. A brutal string of unprecedented natural disasters could spur idling policymakers to finally act aggressively to stabilize global temperatures. The more time that elapses without robust policy efforts to facilitate the clean energy transition, the more likely it becomes that this transition is conducted in a disorderly fashion to meet emissions targets. Under such a scenario, the financial system could face severe physical losses from the extreme weather events and losses related to the repricing of high-carbon assets almost simultaneously. It's important to note that physical and transition shocks, and an abrupt repricing of affected assets, could also be triggered by the anticipation of



physical and transition events—before any such event actually occurs. Climate-related financial sector vulnerabilities such as inflated asset valuations and excessive leverage would exacerbate the severity of these shocks and the extent to which they are amplified and transmitted throughout the financial system. Another macroprudential concern, short of a systemic crisis, is that physical and transition risk-related losses could chronically erode the resilience of financial institutions over time and leave the system vulnerable to other shocks.

One of the most important lessons policymakers should have learned from the 2008 financial crisis is the importance of deploying a precautionary principle when regulating the financial system. As Professor Hilary Allen describes it, “This principle is essentially a more sophisticated version of the old adage, ‘better safe than sorry,’ counseling regulators to err on the side of regulating an activity when the outcome of that activity is uncertain, but potentially irreversible and catastrophic.”<sup>13</sup> In the run-up to the 2008 crisis, many policymakers assumed financial crises were a thing of the past and did not cast a skeptical eye toward the development of new complex financial products and systemic interconnections.<sup>14</sup> A laissez-faire deregulatory approach, the opposite of the precautionary principle, dominated the three decades leading up to the crisis and set the stage for the resulting catastrophe. Regulators must have humility about their ability to predict the precise causes and complex effects of financial crises, which are high-impact and low-probability events that carry substantial inherent uncertainty. Regulators must act to ensure the financial system is resilient to extreme, but plausible, tail-risk scenarios. The severe and lasting economic and social damage wrought by instability in the financial system warrants this type of precautionary approach to regulation—one that favors proactive and robust safeguards in the face of uncertain, but potentially catastrophic, risks.

Certainty regarding the near-term private costs of regulation and uncertainty regarding the precise value of social benefits—which are no doubt to be large in magnitude—should not unduly hamstring regulators. Climate-related financial risks are a special case that warrants a particularly proactive approach.<sup>15</sup> Climate change is itself a high-impact and high-probability occurrence. It is clear that climate change will have, and is having, significant negative effects on the planet, economy, and financial system. There is no doubt about the likelihood of climate change and no doubt about the general magnitude of its damaging impacts under various warming scenarios. It is also clear that the transition to a low-carbon economy, necessary to stabilize global temperatures, is going to affect financial institutions and markets, depending on in how orderly a manner such a transition

is executed. There is significant uncertainty, however, regarding the timeline of climate-related financial stability risks; the precise magnitude of the economic value at risk; and the exact manifestation of those risks on a range of financial assets, markets, and institutions. The answers to many of these questions hinge on emissions going forward and the resulting warming pathway, as well as the future actions taken by policymakers, technological advancements, and shifts in market sentiment. The uncertainty is also fueled by difficulties modeling climate change and its impacts, including its nonlinear nature, the existence of tipping points, and the interactions with complex environmental systems.<sup>16</sup> It is clear, however, that climate-related risks could have a catastrophic impact on financial institutions and markets, and ultimately disrupt financial stability.

Moreover, regulators globally have only started to collect the data necessary to carefully evaluate these risks and are just now engaging with scientists and climate economists to gain their insights. It would be quite easy for financial regulators to spend the next decade collecting more data, researching the issue, improving modeling approaches, and better mapping climate-related risks onto the financial system—avoiding any actual steps to safeguard the financial system from these risks. It's true that all of the aforementioned actions are critical and necessary, but regulators should not allow uncertainty surrounding precise climate effects or the exact future course of the clean energy transition to halt action today.<sup>17</sup> The potential damage to the financial system is too great for regulators to wait, and a significant level of uncertainty will persist given the complex nature of this risk. These risks are only intensifying, and the perfect cannot be the enemy of the good. As Federal Reserve Governor Lael Brainard recently stated:

*Despite the challenges, it will be critical to make progress, even if initially imperfect, in order to ensure that financial institutions are resilient to climate-related financial risks and well-positioned for the opportunities associated with the transition to a more sustainable economy.<sup>18</sup>*

Regulators know enough about climate-related risks, their causes, and potential consequences to take some powerful immediate steps to safeguard the financial system from this impending risk. The longer regulators wait, the higher the potential costs. While a granular cost-benefit analysis is not possible, it is clear that the long-term social benefits of meaningfully reducing the likelihood of a climate-driven financial crisis far exceed the relatively minor private costs that come with stronger financial regulation. Strong financial regulatory policies that bolster the resilience of the financial system to climate-related risks would be a form of financial stability insurance.



Some commentators have argued that focusing on climate change could threaten financial regulators' independence and credibility (particularly the Federal Reserve's), as well as democratic legitimacy.<sup>19</sup> Members of the Fed's Board of Governors appointed by both Democrats and Republicans now agree that climate change intersects with the agency's statutory mandates.<sup>20</sup> The evidence is clear that climate-related risks have both microprudential and macroprudential implications for financial institutions and markets.<sup>21</sup> A failure to evaluate and mitigate these risks simply because some members of one political party in Congress deny the existence of the underlying source of the risk would be the real threat to the Fed's independence and credibility. The Fed should not let fear of political backlash prevent it from executing its mission. The Fed and other financial regulators are not charged with "solving climate change," and proponents of aggressive climate-related financial regulatory action do not make such a claim. Tackling the climate crisis requires an all-of-government approach. Agencies across the policy spectrum, including financial regulators, must act to address climate-related issues that fall within their respective jurisdictions. Integrating climate considerations into financial regulatory and supervisory frameworks isn't a silver bullet, but it's a necessary step to mitigate the devastating economic effects wrought by climate change. These actions would also put the financial system in a position of strength to facilitate economywide decarbonization and limit the chances that the much-needed clean energy transition instead destabilizes the financial system.

International regulators have acknowledged the severity of these climate-related risks and the need for financial regulators to act. The Network for Greening the Financial System (NGFS) was established in December 2017 by eight central banks as a coordinating body for those central banks and supervisors committed to tackling climate-related financial risks.<sup>22</sup> Since then, NGFS membership has expanded to 90 members and 13 observers, representing more than 85 percent of global gross domestic product and the vast majority of the world's systemically important financial institutions.<sup>23</sup> Many NGFS members have begun to adapt their core regulatory and supervisory frameworks accordingly. The United States, however, remains painfully behind. The Federal Reserve announced that it finally joined the NGFS in December 2020, but it remains the only federal financial regulator from the United States to have joined the coalition.<sup>24</sup> The lack of engagement on this issue internationally undermines the U.S. role as a leader both on climate policy and financial services policy. U.S. federal regulators have not yet taken any meaningful steps to embed climate risk considerations into their regulatory and supervisory frameworks. To the contrary, some Trump-appointed regulators actually advanced policies that would actively prevent financial institutions from accounting for climate risk.<sup>25</sup>

There are a range of policy tools that regulators should use under existing authority to bolster the resilience of the financial system to climate-related risks and to prevent financial institutions from further exacerbating these risks.<sup>26</sup> One less-discussed, but powerful, regulatory tool that should be part of such an agenda is the bank capital framework—arguably the most important pillar of banking regulation. There are several ways climate risk should be integrated into bank capital requirements, as outlined in the following sections.

# Target acute microprudential transition risks

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**The problem:** Financial assets tied to the fossil fuel sector could lose significant value as the economy decarbonizes and transitions to a reliance on clean energy. Transition-related losses could threaten the safety and soundness of banks that are invested in fossil fuel assets, posing risks to public funds and the communities served by the banks.

**The solution:** Regulators should increase the risk weights for fossil fuel assets in the capital framework so banks have to fund these riskier exposures with more loss-absorbing equity capital and less debt. The exact increase in risk weights for a range of different fossil fuel assets should be determined by the level of revenue the borrower or counterparty derives from fossil fuel-related activities; the different transition risk intensities among oil, gas, and coal; the length of the exposure; and other variables.

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In order to stabilize global temperatures and mitigate the chances of catastrophic climate impacts on the planet, climate policymakers have to take legal and regulatory steps to drastically decrease greenhouse gas emissions. The Paris Agreement, signed by the United States and more than 190 parties in 2015, aims to limit global temperatures to well below 2 degrees Celsius above preindustrial levels, and ideally 1.5 degrees Celsius.<sup>27</sup> The Paris Agreement also commits signatories to aligning finance flows with the low-carbon transition. The Intergovernmental Panel on Climate Change's special report in 2018 underscored the imperative to keep warming to 1.5 degrees Celsius, given the severe consequences associated with even 2 degrees Celsius of warming.<sup>28</sup> The scientific projections suggest that global emissions must reach net zero by 2050 to plausibly hit the 1.5-degree target.<sup>29</sup> Achieving these climate goals will require a fundamental restructuring of the economy. This low-carbon transition isn't several decades away. In many respects it has already begun, but further robust policy changes are required in the near term to hit these targets. Emissions must decline by at least 45 percent from 2010 levels by 2030 to remain on track.<sup>30</sup> The United States presently derives roughly 20 percent of its energy from clean sources, while 80 percent is derived from fossil fuels.<sup>31</sup> President Joe Biden has committed to putting the United States on a path to achieve 100 percent clean energy by 2050.<sup>32</sup>

Financial regulators are not responsible for setting climate policy, but they do have a responsibility to prepare the financial system for the financial impacts triggered by the large-scale decarbonization of the economy. If policymakers implement the legal and regulatory actions necessary to meet these emission and temperature targets, banks whose risky carbon-intensive balance sheets do not align with the transition could face significant losses. Financial instruments tied to carbon-intensive sectors, such as fossil fuel companies, fossil-driven utilities, transportation, agriculture, chemical and metal production, and mining, could face a severe repricing as policies restrict and raise the costs of emissions.

Companies engaged in high-carbon activities would face increased costs and the potential for fully or partially stranded assets.<sup>33</sup> For example, the implementation of rigorous energy efficiency standards and other policy interventions that limit emissions would severely diminish the value of hydrocarbon reserves. According to one estimate, 80 percent of current coal reserves, 50 percent of gas reserves, and 33 percent of oil reserves would have to remain unused to have a 50 percent chance of keeping warming below 2 degrees Celsius.<sup>34</sup> Those figures would be even higher under a 1.5-degree warming target. Fossil fuel companies would have to write down the value of those fully or partially stranded assets on their balance sheets, impairing their financial condition and reducing their ability to meet their financial obligations. This dynamic would create losses for their equity investors, creditors, and counterparties, including banks. Moreover, bank loans to fossil fuel companies are often secured by hydrocarbon reserves. Transition-related risks can therefore increase the likelihood of default on a loan, as well as the loss to the bank if the loan does default, since the collateral would lose value.<sup>35</sup>

This risk is not theoretical, as companies are beginning to face the prospects of transition-related write-downs. For example, BP wrote down \$17.5 billion in assets in June 2020 after lowering its long-term fossil fuel price assumptions, and Total SE took a \$7 billion hit on Canadian oil sands assets in July 2020.<sup>36</sup> Regulators are also increasingly requiring fossil fuel companies to post additional financial resources to cover the eventual retirement costs associated with safely decommissioning their assets.<sup>37</sup> This type of collateral requirement is intended to limit the chances that fossil fuel companies create stranded liabilities by leaving the decommissioning costs to the government after the company fails. Requiring companies to appropriately bear these costs upfront, instead of letting the public foot the bill later, will likely speed up the stranding of assets and further strain their financial condition.<sup>38</sup>

The magnitude of potential financial losses and the prospect for broader stability issues in the banking system increase if the transition is disorderly. Under such a scenario, policymakers would slow-walk the actions necessary to meet emission and temperature targets, before eventually taking more aggressive and rapid actions to make up for lost time. Financial losses in the energy sector alone could reach \$1 trillion to \$4 trillion, depending on the extent to which the transition is disorderly.<sup>39</sup> Taking a broader view of transition-related risks, an estimate from the International Renewable Energy Agency suggests an abrupt and disorderly transition could cause upward of \$20 trillion in financial losses.<sup>40</sup> Technological advancements and changes in investor sentiments could also quickly trigger many of these dynamics in advance of any actual legal or regulatory changes.

In either an orderly or a disorderly scenario, banks with overly risky balance sheets that are not aligned with a low-carbon economy could face severe losses, increasing risks to the economy, communities, the Deposit Insurance Fund, and other public funds. Research suggests that the direct and indirect exposures to carbon-intensive sectors could propagate stress throughout the financial system and trigger broader instability in the banking system.<sup>41</sup> Banking regulators should ensure that banks are resilient to the heightened credit, market, operational, reputational, and liquidity risks created by the clean energy transition and are well-positioned to meet the needs of a low-carbon economy.<sup>42</sup> Immediate financial regulatory action can help prevent the carbon bubble from bursting suddenly, an event that former Governor of the Bank of England Mark Carney has referred to as a “climate ‘Minsky moment.’”<sup>43</sup> As an early and important step toward that end, banking regulators should increase the risk-weighted capital requirements for the bank exposures facing the most acute transition-related risks. Accounting for severe transition risks in the capital framework quickly would improve the resiliency of banks and prevent the inevitable clean energy transition from causing instability in the banking system.

Some commentators have argued that integrating climate-related risks into the regulatory and supervisory framework is unnecessary since these risks are already “priced into” security values. A survey of institutional investors counters that assertion, as 93 percent responded that the implications of climate change had yet to be priced into markets.<sup>44</sup> Research surrounding the projected physical impacts of climate change and scenario analyses probing transition-related impacts support this view.<sup>45</sup> There are several reasons that investors have yet to price the impacts of climate change into valuations for a range of assets, including a lack of granular, comparable, and reliable corporate disclosure of climate-related risks; backward-looking pricing models that are not fit for purpose when analyzing forward-looking risks;

and the temporal mismatch between short-term corporate thinking and medium- to long-term climate risk materialization.<sup>46</sup> Even if climate-related risks were priced in, however, that would not absolve regulators of the need to design and implement climate-related financial regulations, including integrating climate risk into capital requirements. When a risk is accurately priced in, that simply means the value of the asset reflects some appropriate distribution of probabilities. The price, to oversimplify, reflects the weighted expected outcome. But regulators' goal is not to ensure the financial system is resilient in the face of the expected outcome. Regulators must ensure that the financial system can withstand extreme but plausible scenarios—outcomes on the tail of the probability distribution. These tail events create systemic risk and naturally involve negative externalities, against which private actors do not have the incentive to self-insure. It's always better for a risk to be appropriately priced, since inflated asset valuations create additional financial sector vulnerabilities and can be the source of a shock if a bubble pops, but it doesn't eliminate the need for strong regulatory safeguards.

Banking regulators should first focus on the financial exposures that face the clearest and most direct transition-related risks: fossil fuel assets and fossil fuel infrastructure. Bonds, loans, and derivative transactions for companies that derive more than 15 percent of their revenue from the extraction, exploration, transportation, storage, exporting, or refining of oil, natural gas, or coal should be the top priority. The risk weights should be calibrated based on several factors, including: 1) the extent to which the company generates revenue from fossil fuel-related activities; 2) differentiation in transition risk intensity among oil, gas, and coal exposures; and 3) the length of the exposure. Regulators could also incorporate additional variables. One additional option is to treat financing for new and existing fossil fuel reserves and infrastructure differently, to the extent practicable. But regulators should not spend years trying to over-engineer the risk weights, adding needless complexity. As discussed later in this report, regulators should then look to adjust risk weights for additional financial exposures that also face serious transition-related risks.

The increased risk weights for bank exposures to fossil fuel assets and infrastructure should be calibrated based on the extent to which the borrower or counterparty derives its revenue from the extraction, exploration, transportation, storage, exporting, or refining of oil, natural gas, or coal. For example, a loan to an energy company that derives 80 percent of its revenue from fossil fuel-related activities should receive a higher risk weight than a loan to an energy company that derives 30 percent of its revenue from such activities. Factoring in a company's revenue breakdown would help account for the varying degrees of transition risk embed-



ded in different exposures and, as a secondary consequence, create positive incentives for diversification. An energy company that generates an ever-decreasing share of its revenue from fossil fuels is better-positioned to navigate the low-carbon transition, and its loans or bonds generally pose less credit risk or market risk as a result. If energy companies adjust and reduce the share of their revenue that stems from fossil fuel activities, the transition risk capital adjustment would automatically decrease for the banks financing them, reflecting the commensurate decrease in transition risk.

Moreover, the different types of fossil fuels have differing transition risk profiles that should be reflected in the risk-weighted capital framework. Most notably, thermal coal exposures face more acute transition-related risks relative to other fossil fuel companies, since they are the most carbon-intensive fossil fuel.<sup>47</sup> In the revenue calculation, coal could be more heavily weighted than oil and gas revenues to account for this heightened risk.

In addition, it's important for the transition-risk capital adjustment to take the length of the exposure into account. Transition-related risks for these entities, and banks financing them, increase in magnitude over time. As time goes on, companies must either adjust to the progressively lower demand for fossil fuel activities under an orderly transition path or face the increasing prospects of swift and severe restrictions under a disorderly transition path. Either way, transition risk for firms that continue to derive significant revenue from these activities increases over time. All else equal, a five-year loan to an oil and gas exploration and production company faces more transition risk than a six-month loan. Accordingly, the transition risk weights should increase with the length of the exposure. Opponents to this policy may argue that oil and gas companies need capital to transition to low-carbon activities over time. If the increased capital charge on the five-year loan to the oil and gas company receives a higher risk weight, the argument goes, the company may not have affordable access to bank credit to make these investments. Again, this is why differentiation between companies based on revenue sources is critical. The risk weight for the exposure could be recalibrated annually and updated to reflect any changes in the revenue breakdown of the company. If the company is using the proceeds of that loan to expand into renewables, the risk weight will decline during the life of the loan accordingly. The companies, and banks, most affected by these risk-weight adjustments are those that do not diversify their revenue sources away from fossil fuel-related activities. Those companies face the most severe transition-related risks.

Relatedly, the transition risk weights should automatically increase every few years to reflect the increase in transition risk that necessarily builds up over time. Both the five-year and six-month loan mentioned above would face greater transition risk if issued five years from now than if issued today. The decreased demand for fossil fuels under an orderly transition scenario would increasingly strain the profitability and creditworthiness of companies that derive significant revenue from those activities. The automatic increase in risk weights would reflect the increasing likelihood that fossil fuel-intensive companies will face acute financial difficulties as the clean energy transition progresses. In the event that the transition is imprudently delayed or that improved scientific evidence suggests climate policymakers must take even more aggressive steps to decarbonize the economy on a tighter timeline to avoid tipping points and catastrophic warming, the transition risk capital charge's automatic increase would help protect against a rapid and disorderly transition. The automatic increase also provides banks an opportunity to work with their fossil fuel-intensive clients to diversify their revenue sources away from these high-carbon activities before facing the most stringent risk weights over time.

These core variables would help regulators differentiate the capital treatment for exposures with differing levels of transition risk. Regulators could certainly factor in additional considerations to improve the transition risk sensitivity of these capital adjustments. One additional factor worth exploring is the differentiation between exploration, production, and construction of new fossil reserves and infrastructure, versus fossil fuel-related activities involving existing reserves.<sup>48</sup> Given the policy actions required to meet emission and temperature targets, expanding current fossil fuel reserves and infrastructure has an even greater risk of creating stranded assets during the transition. It may be possible to integrate this factor into some financing structures, such as reserve-based lending, while it may prove impractical to consider this variable in more general financing vehicles such as corporate bonds. Regulators should seek to calibrate these risk-weight adjustments appropriately, based on the varying levels of transition risk posed by different exposures. But regulators should not seek to overcomplicate this effort and turn this push into an overly intricate tapestry that takes years to weave.

Currently, all corporate credit exposures receive a 100 percent risk weight under the standardized risk weights applied by the prudential banking regulators.<sup>49</sup> The risk weights for qualifying fossil fuel asset and infrastructure exposures should be adjusted upward based on the transition risk factors outlined above. First, there is precedent for breaking out a riskier subset of exposures and applying higher risk weights accordingly. In the postcrisis implementation of the Basel III capital accords, for example, regulators separated high-volatility commercial real-estate exposures

(HVCRE) from other commercial exposures and assigned them a 150 percent risk weight. In the final rulemaking, regulators noted, that, “Supervisory experience has demonstrated that certain acquisition, development, and construction loans [HVCRE] . . . present particular risks for which the agencies believe banking organizations should hold additional capital.”<sup>50</sup> Similarly, exposures that could be severely affected by the transition to a low-carbon economy present additional risks, relative to other corporate exposures, and warrant higher capital requirements.

In terms of the magnitude of the upward adjustment in these risk weights, the Federal Reserve Board’s 2016 proposed rule to tighten safeguards for bank holding companies’ physical commodities activities should be instructive.<sup>51</sup> When banks own, store, transport, trade, or otherwise engage in any activity related to physical commodities, they may be exposed to significant financial risks, including credit, market, legal, operational, and reputational risks. For example, a bank that owns oil and gas infrastructure could face liability under various state and federal environmental laws in the event of an ecologically damaging spill. The monetary penalties associated with those legal violations could threaten the bank’s safety and soundness. The bank’s reputation could also take a hit among its current and prospective customers and counterparties, further disrupting its financial condition. Banks are permitted to conduct these physical commodity activities pursuant to a few different legal provisions.<sup>52</sup> The 2016 proposed rule would apply a 300 percent risk weight to physical commodities activities conducted under certain legal provisions and a 1,250 percent risk weight to riskier physical commodities activities conducted through a separate authority in banking law.<sup>53</sup> The risks associated with these activities are not easy to quantify precisely. But it is clear from past practice that the risks are significant in magnitude and warrant this type of precautionary approach. The nature of climate-related transition risks is distinct, but not dissimilar, to these particular physical commodities risks. The magnitude of potential losses could be significant, but they are uncertain and tough to quantify precisely. For these and other reasons outlined throughout this report, safeguarding banks against the microprudential transition risks these assets pose also warrants a precautionary approach. Accordingly, regulators should calibrate risk weights for fossil fuel assets and fossil fuel infrastructure exposures from 300 percent to 1,250 percent, based on the transition risk factors discussed previously.

Financial regulators must ensure the financial system is prepared to handle the transition to net zero and is positioned to support the economy during this period of decarbonization. Increasing the capital risk weights for fossil fuel assets and fossil fuel infrastructure, which face the most acute transition-related risks, would be an important step toward that end.

# Implement a macroprudential capital surcharge

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**The problem:** Large financial institutions are continuing to finance significant levels of greenhouse gas (GHG) emissions through their investing, underwriting, trading, and off-balance-sheet activities. Financing GHG emissions intensifies climate change and increases the physical and transition risk-related losses that the financial system could face in the future.

**The solution:** Regulators have a responsibility to mitigate financial risks created by financial institutions, not only the risks to which financial institutions themselves are exposed. Accordingly, regulators should implement a macroprudential climate risk contribution capital surcharge to bolster big banks' resilience to the systemic risks they are creating and to require them to bear the future costs their carbon financing activities are placing on the financial system as a whole. The capital surcharge should be calibrated based on the total GHG emissions financed by the institution.

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According to the Rainforest Action Network's 2021 Fossil Fuel Finance Report, the six largest U.S. banks have provided roughly \$1.1 trillion in financing for fossil fuel companies since the Paris Agreement was adopted.<sup>54</sup> Banks that finance fossil fuel companies up and down the supply chain are facilitating increased GHG emissions and intensifying the climate crisis. Worsening the climate crisis exacerbates the physical and transition risks of climate change, driving higher future economic losses that will be borne, in part, by the financial system. Put simply, banks' fossil fuel financing today is placing losses on other financial institutions, the economy, and the public down the line.

In order to bolster big banks' resilience to the systemic risks they are inflating, and to require them to internalize these external costs they are placing on others, banking regulators should implement a macroprudential climate risk contribution capital surcharge. This additional risk-weighted and leverage capital buffer would apply to bank holding companies with more than \$100 billion in assets

and nonbank financial companies designated as systemically important by the Financial Stability Oversight Council (FSOC). The climate risk contribution capital surcharge should be calibrated based on a firm's climate risk contribution score, which would use the bank's level of financed GHG emissions as a proxy. The score should include emissions from the banks' investment, underwriting, trading, and off-balance-sheet activities. Regulators have broad authority to set bank capital requirements and could implement this type of requirement without any additional congressional authorization.<sup>55</sup>

The capital surcharge that applies to global systemically important banks (G-SIBs) provides a useful conceptual example of how bank capital requirements can be used to mitigate a financial externality.<sup>56</sup> The basic formula for the expected losses that a bank places on the financial system and broader economy is a function of the bank's probability of default, or its likelihood of failure, and its loss-given default, or the losses that would be placed on the financial system or economy if it failed. The failure of a large, complex, and interconnected bank would have a much greater negative impact on the financial system and broader economy than the failure of a smaller bank.<sup>57</sup> Thus, the loss-given default of a larger bank is much higher than that of a smaller bank. Assuming that the probability of default is generally equal, the expected loss of a large systemic bank is therefore higher than that of a small bank. The G-SIB surcharge was designed to bring the expected loss for systemic banks in line with those of smaller banks by lowering their probability of default through raising their capital requirements. When the G-SIB surcharge rule was finalized, former Federal Reserve Chair Janet Yellen stated, "A key purpose of the [G-SIB] capital surcharge is to require the firms themselves to bear the costs that their failure would impose on others."<sup>58</sup> The Fed also noted that a related goal of the G-SIB surcharge was to "create incentives for SIFIs [systemically important financial institutions] to shrink their systemic footprint, which further reduces the risks these firms pose to financial stability."<sup>59</sup>

Increasing capital requirements reduces the probability of a firm's failure, making the tool a natural fit for an externality created by a firm's failure. Opponents to this policy proposal may argue that capital requirements should not be used to mitigate externalities created by a firm's ongoing activities. The Dodd-Frank Wall Street Reform and Consumer Protection Act makes it clear, however, that financial regulators should care about the risks created by a firm's activities, even if potential losses wouldn't be borne by the firm itself, as well as that capital requirements

are an appropriate tool to address those risks. Section 171(b)(7) of Dodd-Frank directs banking regulators, subject to an FSOC recommendation, to:<sup>60</sup>

*develop capital requirements applicable to insured depository institutions, depository institution holding companies, and nonbank financial companies supervised by the Board of Governors that address the risks that the activities of such institutions pose, not only to the institution engaging in the activity, but to other public and private stakeholders in the event of adverse performance, disruption, or failure of the institution or the activity.*

Relatedly, Section 165 of Dodd-Frank directs the Fed to develop macroprudential regulations to “prevent or mitigate risks to the financial stability of the United States that could arise from the material financial distress or failure, *or ongoing activities*, of large, interconnected financial institutions.” (emphasis added)

Banks that are major financiers of carbon-intensive activities are facilitating increased GHG emissions and intensifying climate change. Exacerbating the climate crisis will increase both the physical and transition risks of climate change and inflict larger losses on the financial system as a result. With respect to physical risks, higher GHG emissions lead to higher global temperatures, which in turn cause more frequent and severe extreme weather events and damaging environmental changes.<sup>61</sup> The more significant the physical effects of climate change, the more likely and severe the financial system’s associated losses will be. Furthermore, increased emissions today drive up projected warming pathways and increase the likelihood that a rapid and disruptive transition is required to stabilize global temperatures.<sup>62</sup> Using the expected-loss framing, financing emissions is effectively contributing to an increase in the probability of default, and expected loss, of the financial system as a whole. In order to offset the increase in the expected loss for the system, firms that are causing such an increase should have their own probability of default decreased through higher capital requirements. Instead of the G-SIB surcharge’s goal of requiring firms to bear the costs that their potential failure places on others, this capital requirement would require firms to bear the costs their GHG emissions financing activities are placing on others. This approach would improve the resilience of the banking system and disincentivize banks from engaging in an activity that propagates systemic risk. If banks want to limit their climate risk contribution capital surcharge, they could simply limit their financed GHG emissions by adjusting their balance sheets or by working with borrowers, counterparties, and clients to lower their emissions.



The G-SIB surcharge is calibrated according to an institution's G-SIB score. The score is calculated using several variables that contribute to a bank's systemic importance—the proxy for a bank's loss-given default. These variables include measures of size, interconnectedness, complexity, cross-border activity, substitutability, and wholesale funding.<sup>63</sup> Similarly, the climate risk contribution capital surcharge should be calibrated based on a financial institution's climate risk contribution score—a proxy for the increased probability of default that carbon financing places on the financial system. The climate risk contribution score should be calculated based on the GHG emissions financed by the institution.

Accounting for all of the emissions financed by a financial institution would be a comprehensive way to estimate its climate risk contribution score. Fossil fuel supply is the ultimate source of most GHG emissions, but other industries—including agriculture and chemical and industrial material production—are responsible for a portion of emissions. Deforestation, in particular, is a critical source of emissions that should be factored into this requirement. Moreover, sectors of the economy that rely heavily on fossil fuel combustion for power are driving fossil fuel demand and contributing to climate change as well as climate-related financial risks. Methodologies to estimate financed emissions, including one developed by the Partnership for Carbon Accounting Financials (PCAF), are being used by a growing number of banks on a voluntary basis to align their balance sheets with the Paris Agreement.<sup>64</sup> Regulators should learn from these voluntary methodologies and develop their own to estimate the emissions financed across a bank's investing, underwriting, trading, and off-balance-sheet activities.

It may take some time for regulators to develop these methodologies for a range of asset classes and activities. The voluntary frameworks have yet to roll out approaches that cover the entire balance sheet, but the groups are working expeditiously to address this. Mandatory corporate emissions disclosures implemented by the U.S. Securities and Exchange Commission would help speed this process along and sharpen the precision of the estimates. Since it is clear that companies along the fossil fuel supply chain are the ultimate source for the bulk of emissions, regulators could pursue this climate risk contribution capital surcharge in two steps. First, the climate risk contribution score could be initially calibrated based on the totality of a covered institution's fossil fuel financing activities. The metrics used to calculate the score would include fossil fuel-related bonds and loans on the bank's balance sheet; the fossil fuel debt, equity, and syndicated loan issuances that the bank underwrites and trades; and fossil fuel-related derivatives transactions and all other forms of off-balance-sheet activities. These metrics should

be weighted based on the extent to which the company derives its revenue from fossil fuel-related activities. Second, once developed, regulators could replace the fossil fuel-specific score with a more comprehensive methodology to calculate the entirety of a covered institution's financed GHG emissions.

Banks may argue that the marginal increase in the financial system's probability of default created by today's financed emissions will not materialize for a long time and should not prompt regulators to take immediate action. It is true that emissions financed today may not immediately lead to higher climate-related losses than predicted yesterday. But if regulators ignore risks when they are created because the materialization of potential losses could be long-term, then no regulator would ever seek to mitigate such risks when they are created—leading to a clearly suboptimal policy outcome. Every year of delay means greater risk to the financial system and higher costs for the economy. Mark Carney has referred to this dynamic as the “Tragedy of the Horizon.”<sup>65</sup> Regulators can overcome this dynamic by acknowledging that it is their job to mitigate risks created by the financial system's activities under their watch, whether those risks are expected to materialize tomorrow or 10 years from now.

Given that both the climate risk contribution capital surcharge and the transition risk-related capital adjustment outlined in the previous section focus on banks' financing of carbon-intensive exposures, it is worth clarifying how these two approaches complement one another by targeting different risks. The climate risk contribution capital surcharge would be used to target banks' contributions to future climate risk-related losses that stem from financing GHG emissions. Importantly, this capital charge looks beyond just the carbon-intensive exposures held on banks' balance sheets and accounts for the myriad ways banks facilitate the financing of emissions. It is a macroprudential approach that would mitigate systemic risk and is not primarily focused on the microprudential risk to the bank engaging in the financing activity. The goal is to bolster the overall resilience of the system and require banks to internalize the costs they are placing on other financial institutions, the economy, and the public. The transition risk capital adjustment to risk weights, on the other hand, is directed at the increased riskiness of fossil fuel-related assets as a result of the transition to a low-carbon economy. This adjustment to the risk-weighted capital framework seeks to mitigate the effect of the heightened direct losses banks may face due to the decreased ability of fossil fuel companies to meet their financial obligations during the clean energy transition. The primary objective of this microprudential policy is to increase the loss-absorbing capacity of banks directly exposed to these transition risks.

# Integrate climate into new and existing stress tests

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**The problem:** Financial regulators, markets, and the public do not have a sufficient understanding of how specific financial institutions, and the financial system as a whole, could fare under a range of severe physical and transition-related shocks. As explained throughout this report, regulators have more than enough information to take strong proactive actions to safeguard against these risks, but additional policy interventions would benefit from a more granular evaluation. In addition, financial institutions themselves are not adequately integrating forward-looking climate risks into their core business and risk decisions.

**The solution:** The Federal Reserve should establish climate-related stress tests that probe the resiliency of large banks to medium- and long-term physical and transition shocks. As part of this exercise, banks should be required to submit remediation plans outlining how they will adjust their balance sheets over time to avoid severe losses. The Fed should also include near-term climate-related variables in the existing nine-quarter annual stress tests and set supervisory expectations for banks requiring them to integrate climate-related risks into their governance, risk management, internal controls, capital planning, and self-run stress tests.

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**The Federal Reserve should establish climate-related stress tests for the largest banks in the country.<sup>66</sup>** The stress tests would probe how bank balance sheets would be affected by hypothetical severely adverse climate scenarios over the next 15 to 30 years. The time horizon of the climate-related stress tests should be much longer than the nine-quarter horizon for the annual macroeconomic stress tests in order to allow regulators to probe how the worst effects of climate change could affect bank balance sheets. The scenarios should include both physical and transition risks. Regulators should work with climate scientists, environmental economists, and their international counterparts to develop credible models regarding the financial impact of transition and physical shocks on various asset classes and exposures. This undertaking will not be easy, but it's important to remember the end goal is not to predict the future. The goal is to develop plausible scenarios and models that, while inherently imperfect, will help regulators, markets, and the public assess the climate-related resiliency of regulated institutions.

Banks should then be required to submit remediation plans that outline how they plan to adjust their balance sheets and financing activities over time to mitigate their exposure to these severe risks. The plans should include qualitative and quantitative targets for financing activities in the risky climate exposures that drove the bank's stress testing losses, a detailed description of the business and risk strategies the bank will use to hit those targets, and how those targets and strategies also align with the results of internally run stress tests on a range of other potential climate scenarios. Unlike the annual macroeconomic bank stress tests, these tests should not quantitatively set capital requirements. The inherent difficulties in projecting losses over such a lengthy time horizon, particularly those driven by medium- to long-term climate-related risks, make these exercises ill-suited for setting bank-by-bank capital requirements immediately.

Even though the quantitative results of the tests shouldn't directly set capital requirements, it is critical for the stress tests to have teeth and not become a box-checking exercise of modest value. Regulators should therefore include a qualitative objection component in the climate-related stress tests that is similar to the one used for many years as part of the postcrisis annual macroeconomic stress tests. If the remediation plans are inadequate in scale or granularity, or if banks are not meeting supervisory expectations by failing to sufficiently integrate climate change into their internal controls, governance, risk management, or capital planning processes, the Fed should invoke the qualitative objection and restrict banks' planned capital distributions today. Relatedly, regulators should set clear supervisory expectations for climate-related risks.

## Climate-related supervisory expectations

As Fed Governor Lael Brainard stated recently, “Supervisors have a responsibility to ensure that financial institutions are resilient to all material risks—including those related to climate change—both currently and into the future.”<sup>67</sup> It is critical for banks to integrate climate risk into their governance, risk management, internal controls, capital planning, and self-run scenario analyses.

- **Governance:** The board of directors and senior management should clearly assign responsibilities for climate-related risks within the bank’s governance structure. This issue requires attention at the highest levels of the bank to ensure that climate-related factors are being appropriately integrated throughout the bank’s core business and risk functions.
- **Risk management:** Banks should have the policies and procedures in place to identify, evaluate, report, and mitigate climate-related risks. Both the physical and transition-related risks associated with climate change pose serious credit, market, liquidity, reputational, and operational risks for many banks. It is vital for banks to account for all of these risks in their core risk management frameworks.
- **Internal controls:** It is important for banks to have the policies and procedures in place to effectively monitor the integration of climate-related factors into core risk and business functions. Strong internal controls can help the bank evaluate the effectiveness of climate-related risk management, governance, capital planning, model use, compliance, audits, and other functions, as well as address any clear deficiencies in a timely manner.
- **Capital planning:** As part of the normal capital planning process, in which banks evaluate their capital needs and determine how to manage their capital resources, banks should take climate-related risks into account.
- **Scenario analyses:** While the Fed should establish supervisory stress tests, banks should be expected to conduct their own company-run stress tests and scenario analyses. The Fed will only use a handful of the thousands of potential climate-related scenarios that could play out. It’s important for banks to think through and attempt to model a wide range of potential scenarios.

The European Central Bank, Bank of England, Network for Greening the Financial System, and others have implemented or released draft supervisory guidance around climate-related risks. To its credit, the Federal Reserve recently established a Supervision Climate Committee (SCC) to analyze and mitigate climate-related risks to supervised firms. It is critical for the Fed’s SCC to work with the Federal Deposit Insurance Corporation and the Office of the Comptroller of the Currency to quickly develop and issue supervisory guidance around climate-related risks. U.S. banking regulators should also seek to learn from international peers that have already promulgated and begun implementing climate-related supervisory guidance. As part of this effort, banking regulators must invest in building up internal climate capacity and make sure examiners are thoroughly trained to ensure these institutions are operating in a safe and sound manner with respect to these risks. Vigorously integrating climate risk into ongoing supervision will complement the creation of new climate-related regulations and ensure that banks are appropriately centering climate considerations in core decision-making functions. Regulators should also integrate these expectations into supervisory ratings frameworks.

Banks have pushed back against the creation of climate-related stress tests.<sup>68</sup> They have argued that there is significant uncertainty around climate-related shocks and their effects and that they would be tough to model. It is true that there is substantial inherent uncertainty around climate-related risks and potential warming and transition pathways. But again, stress tests are not designed to predict the future. They are used to test bank balance sheets against extreme, but plausible, scenarios. That's a threshold the Fed should be able to meet. There are certainly data, modeling, and scenario decisions that the Fed will have to weigh carefully. Those challenges are by no means insurmountable given the purpose and role of stress testing. Moreover, banks have lamented the long time horizon of the scenarios as it relates to assumptions regarding bank balance sheets. It is certainly true that a bank's balance sheet could look very different in 2045 than it does in 2021. Stressing a bank's 2021 balance sheet against longer-term risks, however, demonstrates just how significantly a bank may have to adjust its balance sheet over time to avoid catastrophic climate-related losses. The Fed could then ensure banks are, in fact, adjusting their balance sheets over time to avoid these long-term risks.

The arguments banks are making against climate-related stress tests rhyme with the arguments they deployed against the initial stress tests in 2009, the Supervisory Capital Assessment Program, and the annual macroeconomic tests that were developed in the wake of the crisis, the Comprehensive Capital Analysis and Review (CCAR).<sup>69</sup> For 12 years, banks have fought tooth and nail with the Fed over what constitutes appropriate or realistic scenarios, models, and assumptions. One particular example is instructive. In CCAR, the Fed included an assumption that bank balance sheets would grow during the stress testing time horizon. This was a prudent assumption, since regulators want banks to be capitalized enough to serve as a source of strength during a downturn and historical evidence suggested that there would be pressure on bank balance sheets to expand as businesses and households sought liquidity. While it may be prudent from a microprudential standpoint to assume banks could keep a static balance sheet or shrink to conserve capital during a stress period, that would lead to a severe contraction in credit if a range of banks all took that approach. After years of pressure from banks, the Fed relented and watered down the balance sheet growth assumption and changed it to assume a flat balance sheet.<sup>70</sup> Then, in early 2020, the global financial system experienced a real-life stress test due to the COVID-19 shock and bank balance sheets grew significantly.<sup>71</sup> Banks were not pushing the Fed to adopt a flat balance sheet because it was more realistic or grounded in historical evidence. They did so because a flat balance sheet assumption weakened the stress tests by reducing required capital. Similarly, when it comes to climate-



related stress tests, banks will continue to advance arguments that seek to reduce the severity of projected losses or the procedural consequences of the stress tests. Regulators must see the arguments for what they are.

The climate-related stress tests would provide transparency regarding banks' climate risk exposure, force banks to embed climate risk into their core business and risk functions, and require them to provide regulators with actionable plans to adjust their balance sheets over time to limit climate-related risks.

Conducting several iterations of the climate-specific longer-term stress tests should improve regulators' understanding of climate-related variables, scenario design, and modeling. Ultimately, climate-related variables and near-term shocks should be introduced into the severely adverse scenario of the nine-quarter annual macroeconomic stress tests. While the worst effects of climate change will materialize over the medium to long term, physical risks and certainly transition risks could increase banking sector losses in the not-too-distant future. The annual stress tests directly feed into banks' capital requirements, as regulators use both static and dynamic tools to ensure capital adequacy.<sup>72</sup> Adding climate variables and shocks to these tests would further integrate climate considerations into all facets of the bank capital framework and promote the resiliency of the banking system in the face of severe oncoming climate-related risks.

# Tackle additional transition risks and physical risks

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**The problem:** The transition to a low-carbon economy could pose material risks to a range of carbon-intensive financial assets, beyond just those directly tied to the fossil fuel sector. Additionally, the increase in frequency and severity of extreme weather events and the progression of long-term environmental shifts could impair the value of a wide array of real assets and financial assets. Losses driven by these physical and transition-related risks could threaten the safety and soundness of the banks exposed to them.

**The solution:** Regulators should use the information gleaned from climate-related stress tests, corporate climate risk disclosures, and engagement with climate scientists and environmental economists to adjust capital risk weights for assets exposed to serious transition risks and physical risks. The improved data and modeling will help regulators calibrate risk weights to reflect these more nuanced risks.

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The first two policy recommendations target the risks posed by carbon-intensive financing activities because they are the most urgent risks to address and the policies could be implemented relatively quickly. It doesn't take substantial complex data and modeling efforts to conclude that increased greenhouse gas emissions will lead to higher climate-related losses in the future and that under various transition scenarios, a significant portion of fossil fuel assets will become fully or partially stranded. While some further analysis and debate is certainly warranted regarding the exact structure and design of the proposed capital changes, these are cautious financial stability policies that need not take five years to develop. The potential costs of inaction appear to be significantly higher than the risks of swift and robust action, as these risks are set to metastasize over time and the cost of dealing with them will only increase.

There are, however, prudent and worthwhile capital-related policies that require significant additional data collection and analysis to design appropriately. First, the banking regulators should use the information gleaned from enhanced corporate climate risk disclosure and climate-related stress testing to make additional transition risk adjustments to the risk-weighted capital framework. Financial

instruments tied to other carbon-intensive sectors are susceptible to transition risks to varying degrees, including the utility, transportation, chemical and metal production, mining, and agricultural sectors.<sup>73</sup> Adjusting risk weights for these exposures could help bolster the resilience of banks, but regulators need not wait to sort through these more nuanced risk profiles before acting on various fossil fuel exposures, as outlined above.

In addition, regulators could use stress testing and engagement with climate scientists and environmental economists to improve modeling approaches regarding the physical risks of climate change. Regulators need more granular data, including geospatial data, to better map the physical effects of climate change onto banks' financial exposures. It's clear that physical risks could inflict substantial losses on a wide range of financial assets. The impact of sea-level rise; increasing global temperatures; and more frequent and severe floods, droughts, wildfires, and other natural disasters could drive up losses for insurance companies, banks, and other market participants invested in exposed assets.<sup>74</sup> These risks threaten to reduce the value of a range of real assets and financial instruments tied to commercial and residential real estate, agricultural lending, commercial and industrial lending, corporate and municipal bonds, and commodities. Physical risks can impair physical property, disrupt supply chains, limit economic activity, increase financial uncertainty, and strain profitability, which reduce real-estate and commodity values, lower equity prices, and limit the ability of borrowers to repay debt.<sup>75</sup> They can also directly damage and reduce the value of collateral that secures credit extended in some of these markets. In addition to the credit and market risks posed by the physical effects of climate change, the effects threaten to significantly increase claims for an array of property and casualty insurance business lines.

Severe weather events have already caused \$106 billion in damage per year, on average, over the past five years, significantly higher than the 1980–2019 average of \$43.9 billion.<sup>76</sup> Seventy percent of weather-related losses worldwide are not insured, and that figure could increase as insurers potentially pull out of certain geographies and business lines.<sup>77</sup> Based on the projected intensification of these events, they could trigger trillions of dollars in losses for financial institutions and investors exposed to these markets in the coming years and decades.<sup>78</sup> Under severe warming scenarios, the physical impacts of climate change could drive at least \$2 trillion in losses to gross domestic product annually (in today's dollars) by 2100—loosely speaking, the economic equivalent of the 2008 financial crisis every five years.<sup>79</sup> Even if policymakers are successful in limiting warming to 1.5 degrees Celsius above preindustrial levels, extreme weather events will be substan-

tially more severe and frequent than they are today, and long-term environmental shifts will continue to progress. Today, the world has warmed about 1 degree Celsius above preindustrial levels, and the destructive impacts are clear.<sup>80</sup> Another 50 percent increase in warming will meaningfully exacerbate the physical impacts of climate change—and that’s under the best-case scenario.

The risks weights for assets most exposed to these physical risks should also be adjusted upward to bolster the resilience of the banking system. Some commentators have argued that adjusting risk weights may not be necessary, since banks’ underwriting processes can be trusted to appropriately account for these risks.<sup>81</sup> There is significant evidence that banks are not sufficiently accounting for the physical risks of climate change, and regulators should not simply trust that banks will do so over time.<sup>82</sup> As mentioned previously, just because a risk is priced in does not mean the institution is resilient to tail risk, which should be the goal of regulators. The physical effects of climate change will vary under different emissions pathways and are inherently uncertain. In addition, other commentators have noted that physical risks do not warrant heightened attention because banks, insurance companies, and other financial firms have already faced severe weather events over the past few decades and no such events have caused major financial stability issues.<sup>83</sup> The key characteristic of extreme weather events and lasting environmental changes is that they are increasing in frequency and severity, often in a nonlinear fashion. Past resilience to natural disasters does not predict future resilience to climate-driven physical shocks.

# Follow climate risks into the shadow banking sector

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**The problem:** Implementing strong climate-related capital rules for banks could raise the costs of certain risky financing activities and push them outside the core banking system. Shadow banking firms, such as hedge funds and private equity companies, could pick up the slack and increase funding for climate-risky ventures as banks reduce their exposure to those markets. Instead of sufficiently mitigating climate-related risks, this migration could shift some of these financial stability risks from one part of the system to another.

**The solution:** Regulators should mitigate climate-related risks in the financial system, wherever they may live. Regulators have a suite of tools that they could use to ensure the shadow banking system is resilient to climate-related risks, including the Financial Stability Oversight Council's designations of nonbank systemically important financial institutions as well as the capital markets authorities at the U.S. Securities and Exchange Commission (SEC) and the Commodity Futures Trading Commission (CFTC). In addition, the banking regulators could use prudential tools to limit banks' ability to facilitate the migration of these risks to the shadow banking sector, since the shadow banking sector relies heavily on financial support from the banking system.

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Higher bank capital requirements for climate risk-related exposures and activities would increase the cost of bank financing for certain borrowers, most notably fossil fuel companies. Due to the tax treatment of debt, equity capital is a more expensive source of funding for financial institutions.<sup>84</sup> Higher equity, however, comes with significant social benefits, as it reduces the likelihood of financial sector distress.<sup>85</sup> One reasonable critique of this proposal is that it will simply push certain financing activity outside the traditional regulated banking sector. Instead of borrowing from a bank, a fossil fuel company may simply turn to capital markets by issuing bonds or other instruments funded by hedge funds, private equity funds, high-yield mutual funds, insurance companies, structured investment vehicles, and other entities looking for yield. Proponents of this critique may use the argument as a cudgel to push back against such regulations. This critique, however, ignores the ultimate effect on borrowing costs for companies that migrate to nonbank financing and underestimates the likelihood that these capital require-

ments would cause banks to work with their clients to limit emissions. Moreover, there is a more appropriate policy solution to address the potential migration of this financing activity from the banking sector to the shadow banking sector. The potential migration effect does not justify inaction.

First, the alternative funding sources would come at a higher cost to the borrower relative to current bank funding sources. These higher costs would limit the extent to which fossil fuel companies could reasonably borrow. Raising the borrowing costs of fossil fuel companies is not the primary aim of these policies, but it is an appropriate consequence given the costs that fossil fuel activities are placing on the economy and the planet. Second, the policies outlined above are designed, in part, to mitigate transition-related risks and align the banking system with a decarbonized economy. The structure of these policies will incentivize banks to work with their clients to limit their emissions and transition risk. It doesn't necessarily mean banks will immediately dump every high-carbon client. But over time, if those high-carbon clients are not decarbonizing, the capital requirements will indeed become more stringent to reflect the build-up of transition risk and/or the contribution to climate-related risks. Third, the shadow banking system is deeply intertwined with the traditional banking sector.<sup>86</sup> The design and implementation of the policies mentioned in this report should factor in that reality and seek to limit banks' ability to facilitate the migration of climate-risky financing activities to the shadow banking sector. For example, regulators could tighten capital requirements for loans, guarantees, or other support provided to nonbank financial firms and vehicles that are engaged in climate-risky activities.

Finally, and most importantly, regulators should work to mitigate risks to the financial system wherever they exist. A potential migration of risk from one part of the financial system to the other is an argument for expanding regulatory oversight, not for refraining from regulating the risk in the first place. It is important to understand how risks can reorient and adapt to avoid the regulatory framework, and then it is incumbent on regulators to ensure those risks are addressed wherever they may land. Climate risks do not discriminate based on a financial institution's corporate charter or regulator. Regulators should use the tools at their disposal to improve the climate resilience of, and limit the future financial harm caused by, nonbank financial companies. For example, the FSOC should integrate climate risk analysis into its process for subjecting systemically important nonbank financial companies to enhanced oversight and regulation by the Federal Reserve.<sup>87</sup> As a general matter, designated nonbank financial companies should be subjected to these climate-related capital requirements. The FSOC should also identify and recommend policies that nonbank



financial regulators, such as the SEC and the CFTC, should take to integrate climate risk into their own regulatory and supervisory frameworks. In particular, the SEC and the CFTC could integrate climate risk into margin and haircut requirements for certain transactions exposed to climate-related risks, as well as into capital requirements for broker-dealers, swaps dealers, future commission merchants, and other firms under their jurisdiction.<sup>88</sup>

While the FSOC has the authority to require prudential regulation for systemically important shadow banks, it should seek additional statutory authority to directly regulate systemically important activities in the nonbank financial sector more broadly.<sup>89</sup> That additional authority could be used to target climate risk, regardless of the type or size of the financial institution engaging in the risky activity, and would complement existing authority at primary regulators.

# Address risk now and consider green opportunity later

These policy recommendations all revolve around increasing bank capital requirements to mitigate various climate-related risks to the financial system. It is worth addressing the second half of the climate-bank capital debate that has evolved internationally—the treatment of green assets in the capital framework.<sup>90</sup> In addition to raising risk weights for dirty assets or assets otherwise exposed to climate risks, some have argued that current risk weights for green assets should be lowered to incentivize green investment.<sup>91</sup> The primary purpose of a bank capital requirement should be to safeguard against risk, not to incentivize certain investments. There is no evidence to suggest that green projects are less risky than other corporate exposures.<sup>92</sup> Lowering prudential regulatory requirements for exposures that are not less risky would undermine the safety and soundness of financial institutions and could pose financial stability risks. Other financial regulatory tools, such as the Community Reinvestment Act, are better suited to drive green investment directly.<sup>93</sup> Moreover, there is a critical role for public investment and well-designed public-private partnerships to play in closing the green financing gap.<sup>94</sup>

It's also worth reiterating that raising the cost of borrowing for dirty investments to better reflect their riskiness does lower the relative cost of funding for green assets and will indirectly drive green investment, even if that is not the primary goal. One possible exception to this principle is a class of investments that proactively remove carbon dioxide from the atmosphere, such as natural climate solutions or direct air capture projects.<sup>95</sup> Sustaining net-negative global emissions will be necessary for stabilizing global warming, according to the Intergovernmental Panel on Climate Change.<sup>96</sup> Regulators should be open to arguments that certain exposures to negative emission projects, if their effectiveness is reliably demonstrated over the long term without creating other harms, can materially reduce the physical risks of climate change and warrant more favorable treatment under the capital framework. Such investments would create a positive externality, as these projects would lower potential physical risk-related losses for the financial system as a whole.

# Conclusion

It is critical for financial regulators to aggressively mitigate the risks that climate change poses to the financial system. Regulators would be neglecting their mandates and statutory obligations if they choose to ignore these risks and let them fester. While there are a range of policy tools that should be utilized to safeguard the financial system from climate-related risks, the capital framework is a core element of banking regulation and should be a cornerstone of these efforts.

The effects of climate change are already apparent, but the worst projected impacts fall outside the typical decision window of policymakers. A former Governor of the Bank of England, Mark Carney, has referred to this dilemma as the “Tragedy of the Horizon.”<sup>97</sup> It is critical for financial regulators to overcome this dynamic by understanding that financial institutions’ contributions to the climate crisis today affect the losses that the financial system, economy, and public will face down the line—in some cases irreversibly. Restricting those risk-inducing activities should be an immediate priority of regulators. In addition, physical and transition risks are intensifying. These are not risks that financial regulators can wait decades to address. Swiftly embedding climate considerations into financial regulatory and supervisory frameworks will ensure the financial system is resilient to these immense risks.

Integrating climate risk into various elements of the capital framework will go a long way toward mitigating climate-related risks and ensuring the economy is safeguarded from a climate-driven financial crisis. These policies would increase the capacity of the financial system to absorb climate-driven losses and continue to provide the financial services that the economy needs to thrive. This effort would also position the financial system to serve as a source of strength to the economy during this period of decarbonization and would return the United States to a position of leadership on the world stage. While there are a series of steps regulators could take to accomplish these goals within the capital framework, a range of complementary financial regulatory tools should also be deployed. It is critical for regulators to thoroughly embed climate considerations throughout the financial regulatory framework. These climate risks are complex, but regulators need not

spend the next decade studying them before taking action. Given the high probability of climate change and the potential magnitude of financial losses, regulators should exhibit a precautionary approach and act decisively. The most troubling risks on this front are on the side of inaction.

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## About the author

**Gregg Gelzinis** is an associate director for Economic Policy at the Center for American Progress. Gelzinis' work focuses primarily on financial institutions, financial markets, and consumer finance policy. His analyses has been quoted in *The New York Times*, *The Washington Post*, *The Wall Street Journal*, and other publications. Gelzinis has also testified before the U.S. Congress.

Before joining the Center in 2016, Gelzinis completed a graduate school fellowship at the U.S. Department of the Treasury in the Office of Financial Institutions. During his undergraduate career, he held internships at Swiss Re, the Federal Home Loan Bank of Atlanta, and in the office of Sen. Jack Reed (D-RI). Gelzinis graduated summa cum laude from Georgetown University, where he received a bachelor's degree in government and a master's degree in American government, and was elected to the Phi Beta Kappa Society. He is a Massachusetts native and a die-hard Boston sports fan.

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## Our Mission

The Center for American Progress is an independent, nonpartisan policy institute that is dedicated to improving the lives of all Americans, through bold, progressive ideas, as well as strong leadership and concerted action. Our aim is not just to change the conversation, but to change the country.

## Our Values

As progressives, we believe America should be a land of boundless opportunity, where people can climb the ladder of economic mobility. We believe we owe it to future generations to protect the planet and promote peace and shared global prosperity.

And we believe an effective government can earn the trust of the American people, champion the common good over narrow self-interest, and harness the strength of our diversity.

## Our Approach

We develop new policy ideas, challenge the media to cover the issues that truly matter, and shape the national debate. With policy teams in major issue areas, American Progress can think creatively at the cross-section of traditional boundaries to develop ideas for policymakers that lead to real change. By employing an extensive communications and outreach effort that we adapt to a rapidly changing media landscape, we move our ideas aggressively in the national policy debate.

