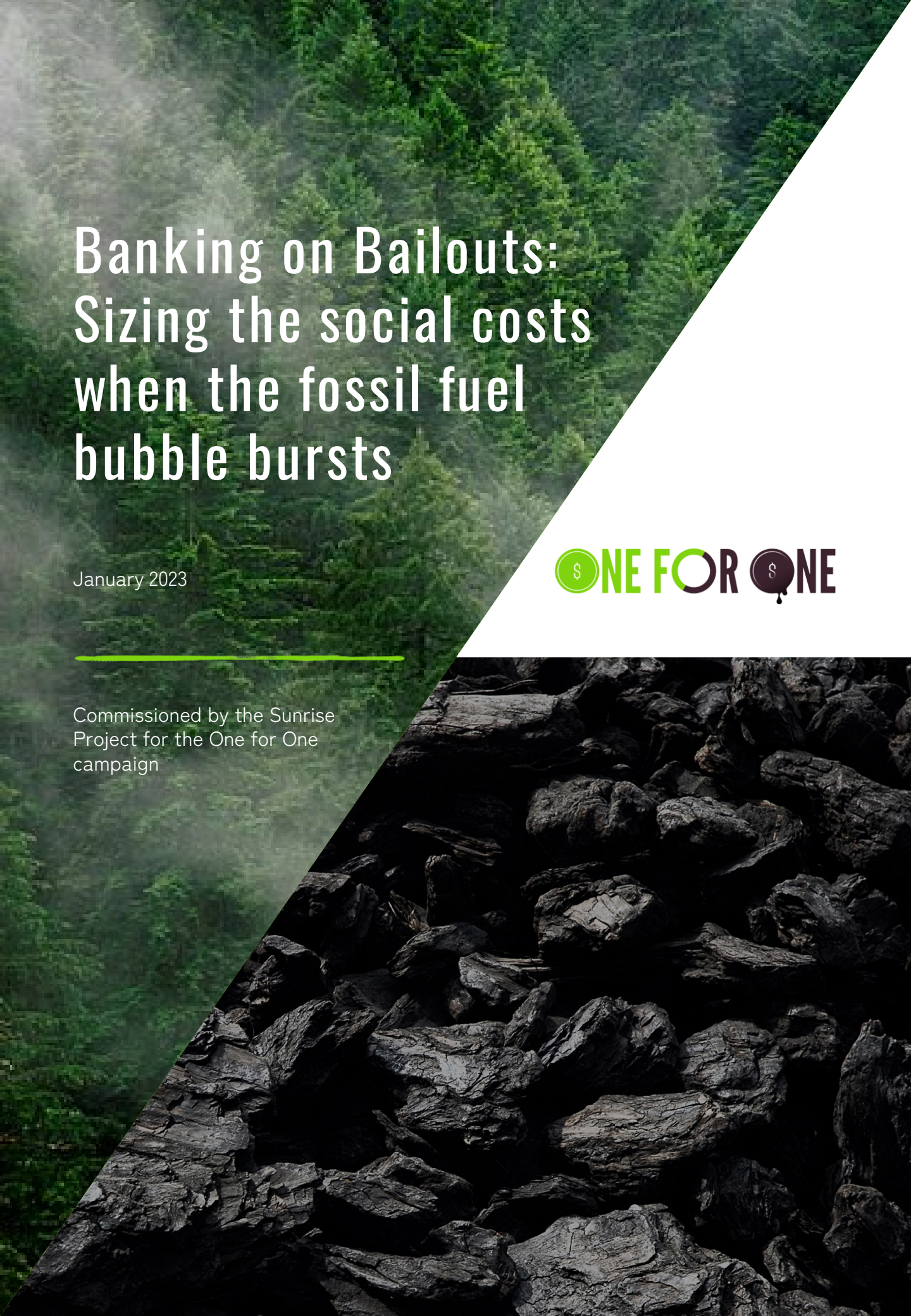


# Banking on Bailouts: Sizing the social costs when the fossil fuel bubble bursts

January 2023

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Commissioned by the Sunrise  
Project for the One for One  
campaign



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# EXECUTIVE SUMMARY

Academics and economists have raised the alarm for many years about the growing risk of a fossil fuel stranded asset bubble. This means investments in oil, gas or coal exploration and extraction projects could suddenly have their value wiped out as demand drops as a result of climate change mitigation policies, changes in consumer preferences, and technology developments. A sudden drop in the value of fossil fuel assets could cause borrowers to default on their debts, in turn leaving banks and insurers insolvent and causing knock-on effects across the financial markets.

Despite the clear threat of climate change and the urgent necessity of meeting net zero targets, banks and insurers around the world continue to finance new fossil fuel projects, through lending, insurance, and both direct and indirect investment.

While efforts have been made to shore up the stability of the global financial system since the 2008 global financial crisis, regulators are lagging behind in implementing rules that adequately mitigate the risks of climate change and net zero on banks and insurers.

Under the One-for-One campaign's policy demands a 1,250% risk weighting for capital requirements should be applied all financing of new fossil fuel exploration and extraction projects such that for every dollar invested in fossil fuels, financial institutions have one dollar to cover the risk. The campaign also calls for a 150% risk weighting to applied to existing fossil fuel assets.

These measures will prevent the buildup of systemic climate risk across the financial sector by raising the costs of providing capital for fossil fuel financing relative to clean energy, incentivizing investment in the net zero transition and discouraging new fossil fuel production. Crucially, the rules will also protect against a global financial crisis stemming from a collapse in the value of fossil fuel assets, as banks and insurers will have the capital buffers in place to absorb any losses.

This report gives a global estimate, relative to the 2008 housing market crisis, of how devastating a financial crash may be in terms of job losses and the impact on public finances when the anticipated fossil fuel bubble bursts, unless capital requirement regulations are tightened.

While the actual date of the crisis and exactly how it will unfold in the markets is impossible to forecast, the report takes 2030 as the presumed year of the crash. The report also takes in two scenarios for global warming – either a trajectory that sees 2° C of global temperature rise by the end of the century, or 3.5 ° C.

The report finds that, without robust capital requirements in place, the socioeconomic impacts of a fossil-fuel led financial crisis will be severe, with over 13.6 million job losses expected and a global bailout of \$4.9 trillion required to keep banks afloat, taking 2030 as the presumed date of the crash and under a 2° C global warming scenario.

# GLOSSARY

**Fossil fuel assets** are defined as banking book assets that are related to non-renewable carbon-based energy sources such as solid fuels, natural gas, and oil, both conventional and non-conventional, as per the data in Finance Watch’s report, A safer transition for fossil banking: Quantifying capital needed to reflect transition risk<sup>1</sup>. This encompasses credit exposures related to the exploration, extraction, and support for the extraction of these resources (i.e. upstream activities), as well as the production of electricity from these fuels, but not distribution through main pipelines.

**Stranded assets** are those that lose their value or turn into liabilities before the end of their expected economic life. In the context of fossil fuels, this means reserves that must remain in the ground, with a halt to the operation of any associated exploration and extraction infrastructure. A Nature report estimates that by 2050<sup>2</sup>, “nearly 60 percent of oil and fossil methane gas, and 90 percent of coal must remain unextracted to keep within a 1.5 °C carbon budget... rendering many operational and planned fossil fuel projects unviable.”

**Credit exposure** and **fossil exposure** is the book value of fossil fuel assets (or volume of financing provided to the fossil fuel sector), which is used as a measure of the potential financial loss to a lender if the borrower defaults on fossil fuel debt repayment; in other words, the maximum losses banks could face if their fossil fuel clients no longer repay debt.

**Capital requirement ratio** is defined as the capital required to underpin investment in debt and financial liabilities. As per Basel III regulation, banks must maintain a level of capital of at least 10.5% of risk-weighted assets, comprising an 8% minimum regulatory capital requirement and a 2.5% capital conservation buffer<sup>3</sup>. A One-for-One 100% capital requirement ratio is equivalent to 8% x 1,250%. A 150% risk weighting is equivalent to a 15.75% capital requirement ratio.

**Basel III** is an internationally agreed set of measures developed by the Basel Committee on Banking Supervision in response to the financial crisis of 2007-09. The measures aim to strengthen the regulation, supervision, and risk management of banks. Basel III standards are minimum requirements that apply to internationally active banks.

## Impact of asset risk class on capital requirement ratio

Asset risk class	Asset risk-weighting*	Capital level** as % of exposure value
AA	20%	2.1%
BBB	100%	10.5%
<b>Base case</b> Even mix of AA/BBB in the credit portfolio	60%	6.3%
<b>Target for existing fossil fuel investments</b> B / below B-	150%	15.75%
<b>One-for-One</b> Target for future fossil fuel investments in new/expanded fossil fuel resources	1,250%	100%

*\*Standardised approach to credit risk weighting used. Larger banks that can sometimes use an internal ratings-based approach may be subject to lower risk-weightings.*

*\*\*Including capital conservation buffers, not including countercyclical and systemic risk buffers.*

# 1. INTRODUCTION

In May 2021, the International Energy Authority (IEA) published a report which found that to reach net zero by 2050, there can be no new fossil fuel supply projects<sup>4</sup>.

Despite national pledges made under the Paris Agreement to limit global warming to well below 2°C above pre-industrial levels, greenhouse gas emissions were at a historically high level in 2022<sup>5</sup>. Many fossil fuel sector companies are reaping huge profits in the wake of the post-pandemic economic resurgence and Russia's war on Ukraine, and planning large new exploration and extraction projects in coal, oil, and gas<sup>6</sup>.

## 1A. Stranded assets

As the IEA makes clear, new fossil fuel supply projects will likely become stranded if 2050 net zero targets are maintained. Without proper regulation in place, these stranded assets represent a fossil fuel market bubble that will eventually burst.

Despite the clear threat of climate change and the urgent necessity of meeting net zero targets, banks and insurers around the world continue to finance new fossil fuel projects, through lending, insurance, and both direct and indirect investment.

While efforts have been made to shore up the stability of the global financial system since the 2008 global financial crisis, regulators are lagging behind in implementing rules that adequately mitigate the risks of climate change and net zero on banks and insurers.

## 1B. Net-zero commitments

The latest Banking on Climate Chaos data shows that 44 out of the 60 banks within the report, who are all members of the Net-Zero Banking Alliance (NZBA, part of the Global Financial Alliance for Net Zero, GFANZ) and have committed to net zero emissions by 2050, collectively provided \$145.9 billion in financing in 2021 for the 100 companies doing the most to expand oil, gas, and coal production<sup>7</sup>. Likewise, Share Action has highlighted that many of the world's largest insurers, including founding members of the Net Zero Insurance Alliance (NZIA), are funneling billions into new fossil fuel projects<sup>8</sup>.



Continuing to finance fossil fuels is directly contributing to dangerous levels of greenhouse gas emissions, bringing with it the risk of triggering environmental tipping points that unleash catastrophic climate change. The science is clear; if we allow runaway climate change to occur, it will render the planet increasingly unlivable as environmental tipping points are reached.

## 1C. ‘Catastrophic impacts’

According to a paper co-authored by Finance Watch, the New Economics Foundation, the Climate Safe Lending Network, and the UCL Institute for Innovation and Public Purpose, runaway climate change will bring with it “systemic and catastrophic impacts on the financial system and macroeconomy,” and unimaginable human devastation and loss of the natural world<sup>9</sup>.

At the same time, if governments do decide to begin adhering to a net zero pathway, and implement policies that limit consumption or price in the risk of the consumption of fossil fuels, and rapidly roll out clean energy technologies, the price of fossil fuel assets could plummet. Unless the financial system is geared up to absorb this shock, it will trigger a financial crash. The later governments leave it to roll out a net zero transition, the faster they will have to act and the more abrupt and disruptive that economic shock will be.

Regulators can mitigate both of these risks by raising the capital requirements for fossil fuel financing.

## 1D. Strengthening financial resilience with One-for-One

One-for-One is a global campaign, calling regulators to implement capital requirement rules that would mean all new fossil fuels are assigned the highest possible risk-weighting of 1250% for assets on a bank or insurer’s balance sheet.

This rule would mean that for each dollar that finances fossil fuels, banks and insurers would need to have a dollar in capital to guard against future risks and cover potential losses. This would mean any financing for new oil, gas, or coal exploration and extraction projects is done at each bank or insurer’s own risk. Existing financing for fossil fuels should be given a risk weighting of 150%.

The rule would act as a brake on fossil fuel financing, by making it more expensive to finance new coal, oil and gas projects, while also ensuring that when the stranded asset bubble bursts, banks and insurers are able to absorb the losses rather than looking to governments for bailouts.



The current absence of the rule means the continued growth of a financial bubble in fossil fuel assets that will become stranded in the transition to net zero, with a sudden drop in these assets' value likely to occur as government policy and consumer preferences shift, and clean technology becomes more widely available. Economists have asserted that “the loss of assets and income increases the likelihood of default on debt; therefore, banks could see their share of nonperforming loans grow. Higher ratios of nonperforming loans could in turn reduce the profitability of the lending bank, affect its market valuation, and, if the phenomenon is significant enough, lead to a bank run and its default.”<sup>10</sup>

Without the right regulations in place, this fossil fuel bubble risks causing devastating damage to the global economy and people's jobs as asset values plummet and the banks turn to governments for bailouts.

We have seen the impact of boom and bust economic cycles in the fossil fuel sector, and the socioeconomic disruption they can cause. For example, in the US, fossil fuel booms and busts have happened twice in the past 10 years due to collapses in demand. Unless action is taken it could happen again on a global scale, threatening the stability of the global economy.

Faith in financial institutions was damaged by the 2008 financial crisis. The public has the right to expect that the sector and its regulators have learned from their mistakes. Risky fossil fuel financing cannot be this generation's equivalent of mispriced subprime mortgages.

## Case study: US shale boom & bust

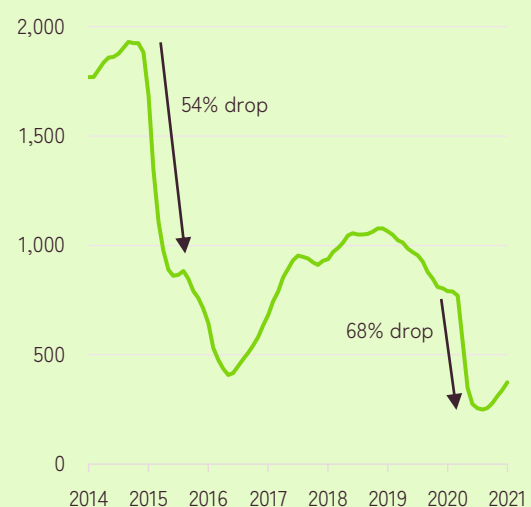
**Boom:** Fueled by cheap Wall Street debt and high oil prices, the US shale industry twice grew to unsustainable highs.

**2015 bust:** Shale oil prices plunged a dramatic 70% between 2014 and 2016 causing more than 100 bankruptcies.

**2020 bust:** Covid-19 and failed OPEC+ talks drove down both demand and price. Dwindling revenues forced US frackers, collectively owing \$200 billion in debt, into bankruptcies. The Dow Jones industrial stock market index dropped a record 20% in one day.

**Socio-economic impact:** Hundreds of thousands of job losses were recorded by the oil and gas industry, and the public's pension funds recorded billions in losses.

The double decline in US rig count<sup>11</sup>



## 1E. The responsibility of regulators

International regulators and financial supervisors, such as the Basel Committee on Banking Supervision (BCBS), the Financial Stability Board, and the International Association of Insurance Supervisors (IAIS), as well as regional and national regulators like the EU's co-legislators (the EU Commission, Parliament and Council), the United States' Federal Reserve Board, Canada's Office of the Superintendent of Financial Institutions (OSFI), and the UK's Financial Conduct Authority, have all begun exploring how to regulate climate risk within prudential frameworks.

Many of these consultation and review processes are being done in conjunction with the relevant central banks, who are undertaking climate stress test exercises and climate scenario analyses to test the robustness of prudential frameworks to ensure the resilience of the financial system in the face of financial shocks stemming from climate change.

But so far no institution has yet taken the measure of introducing the highest capital risk weightings for fossil fuel assets, citing a lack of relevant data or certainty to justify the step. This, in spite of a paper published by the BCBS identifying the “radical uncertainty” of how the risks of climate change and net zero transition could impact financial stability<sup>12</sup>.

The ECB's inaugural stress test found European banks are failing to sufficiently incorporate climate change into their risk management frameworks and internal models, predicting potential losses of over €70 billion. The Network for Greening the Financial System's (NGFS) recent survey of central banks' use of scenario analysis stated that “[stress test] exercises are still considered exploratory and in most cases do not translate into micro- or macro-prudential policy action at this stage.”<sup>13</sup> Academics have pointed to the fact that “even pioneering forward-looking stress tests cannot feasibly capture all possible tail risks.”<sup>9</sup>

In the face of this “radical uncertainty” and the likelihood of significant losses that modelling will be unable to accurately predict, the One-for-One campaign calls on regulators to take a precautionary approach - in other words, to expect the worst and apply the highest possible capital requirement risk weightings for new fossil fuel financing.

In early 2023, ECON members in the EU will be voting on whether to incorporate One-for-One style amendments into the prudential framework for European banks and insurers under the Capital Requirements Regulation, Capital Requirements Directive and Solvency II. Subsequently, the EU's co-legislators will decide on the adoption of the amendments. While in the UK an amendment to the Financial Services and Markets Bill has been tabled that would see One-for-One applied to UK financial institutions if adopted.

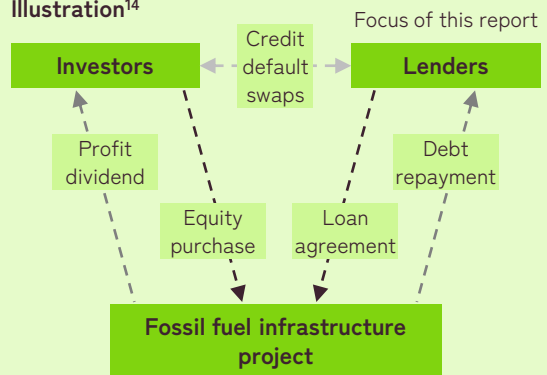
## Explained: How fossil fuel infrastructure financing works

**Investors:** The project's parent company (e.g. Shell) and banks (e.g. JPMorgan) will purchase an equity share in a project in return for profit dividends.

**Lenders:** Banks (e.g. JPMorgan), bondholders, and other parties lend to a project through a loan agreement in return for set interest on the debt. This report analyses bank's credit risk exposure to size and regionally allocate the fossil fuel credit exposure bubble.

**What happens in a crisis:** Credit default swaps share risk among many lenders, in a crisis the bankrupting of one investor or lender could ripple through the market and bankrupt other investors and lenders.

Illustration<sup>14</sup>



Notes: Not included in the visualisation, or this report's analysis, is the issuance of bonds by the fossil fuel industry with underwriting from banks.

## 2. ANALYSIS

### 2A. Sizing the financial crisis

This report is aimed at prompting a serious discussion about the very real risks of the net zero transition, by estimating the growing size of the fossil fuel asset bubble held by banks over time, and what the socio-economic impact could be if this bubble burst in terms of the size of per capita bailouts governments might need to hand over to banks to keep them afloat, and what the potential job losses per country could be.

The report does this by scaling the socio-economic impacts from the 2008 global financial crisis to a 2030 fossil fuel-led financial market crisis. Historic and forecast capital requirement ratios and credit exposures are used as the basis for scaling.

This report also builds in two global warming scenarios. The ‘slow transition’ scenario sees bank profit expectations and therefore credit exposure aligned with policy for net-zero greenhouse gas emissions by 2050 and 2060 in the EU and East Asia respectively, consistent with 2.0 °C median warming in the 21st century. The ‘no transition’ scenario sees bank profit expectations and credit exposure aligned with the IEA’s World Energy Outlook 2019 current policies scenario, consistent with 3.5 °C median warming in the 21st century.

Lastly, the report analyses the benefit to people and public finances of implementing the One-for-One rule relative to not implementing the rule.

Acknowledging the difficulty of forecasting into the future, the impact of a changing climate on the financial system is not factored into this modelling. The report focuses on banks due to the lack of publicly accessible and relevant data on the insurance industry.

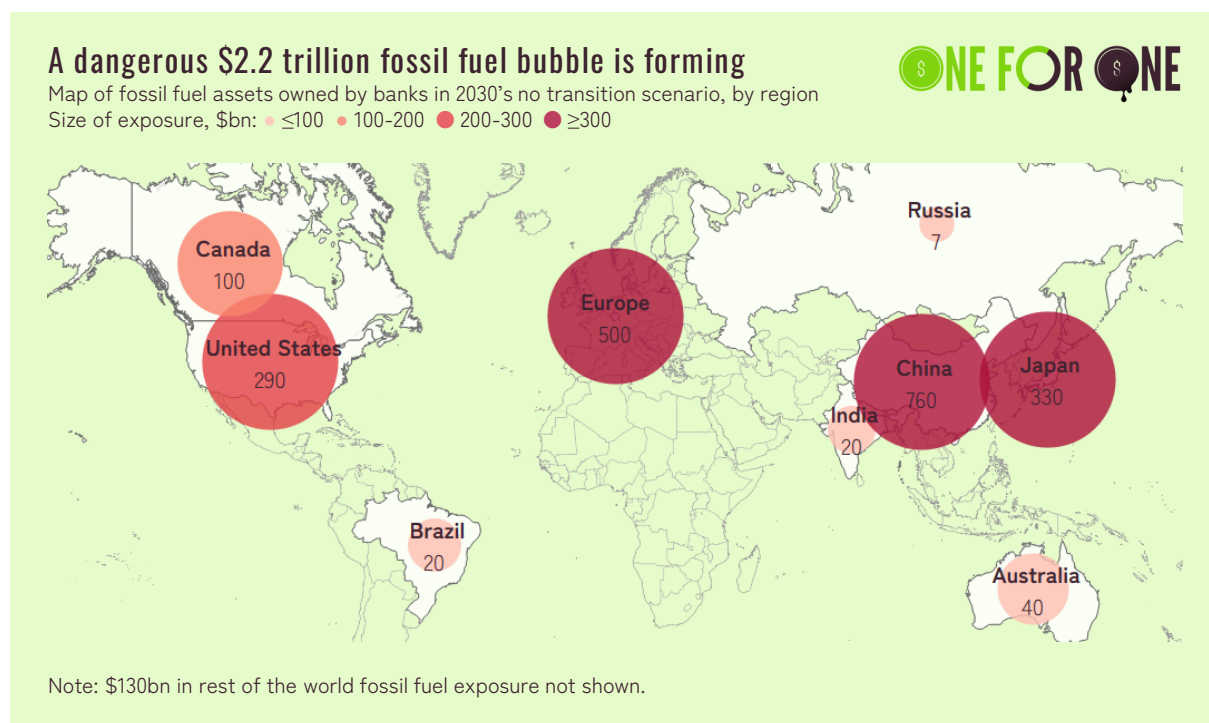
While no two economic crises are the same, and the severity of any crash is determined by a wide range of factors, the report is intended as a wakeup call to show that even a conservative estimation of the potential losses stemming from a net zero transition paints a grave picture of the financial crisis we could face unless action is taken to shore up the resilience of the financial system.

## 2B. The growing bubble of fossil fuel credit exposure

We calculate that banks' global credit exposure to the fossil fuel industry in 2030 could exceed \$1.6 trillion in a slow transition scenario and \$2.2 trillion in a no transition scenario.

Western banks are especially exposed to fossil fuel credit risk as not only do they own local high-cost assets that will be out-competed by lower-cost Middle Eastern assets, but they also are large investors in foreign fossil fuel assets.

Banks in China, Europe, Japan, and the United States account for around 85% of this high-risk credit exposure to fossil fuel assets.



## 2C. Socio-economic impact of a fossil fuel-led financial market crisis

Asset stranding becomes a socio-economic concern when it destabilizes financial markets, bringing with it negative repercussions on the real economy such as on jobs, pensions, and government finances.

As the findings show, taxpayers' money and workers will be put at great risk in the net zero transition unless capital requirements – the amount of own liable funds banks are required to have against fossil fuel assets – are raised to safe levels.

While it is impossible to forecast exactly when the bubble might burst, our analysis shows that the later a fossil fuel-led financial market crisis happens the larger the accumulated fossil fuel credit exposure would be. Given current capital ratios, a 2030 fossil fuel market collapse is expected to require a significantly larger government bailout in absolute terms than the 2008 subprime mortgages market collapse due to the considerably higher levels of risky credit exposure held by banks (\$2.2 trillion vs \$1.4 trillion), and also in part to the larger global economy in 2030 than 2008.

By contrast, unemployment rate rises are expected to be marginally lower than the 2008 crisis owing to Basel III regulatory improvements on capital requirements marginally outweighing the larger burden of risky credit exposure. However, owing to a growth in the population and hence the labour force, the absolute levels of job losses are projected to exceed that caused by the 2008 crisis.

### Comparison of global socio-economic impact resulting from financial crises

Financial market crises	Employment		Government bailout	
	Job losses	Rise in unemployment	Bailout per person	Total bailout
<b>2008 subprime mortgages</b>	18,000,000	0.6%	\$340	\$2.3 trillion
<b>2030 fossil fuel</b> Slow transition	13,600,000	0.4%	\$600	\$4.9 trillion
<b>2030 fossil fuel</b> No transition	18,700,000	0.5%	\$800	\$6.8 trillion

Globally, 18,700,000 jobs are at risk from banks defaulting with unemployment rates rising by 0.5%. In the US, one in 25 could lose their jobs as the knock-on effect of financial institutions defaulting on debt ripples around the wider economy.

A global bailout of \$6.8 trillion could be needed to keep banks afloat. Such a bailout would be equivalent to 6% of global GDP, larger than the combined post-2008 financial crisis capital injections, Treasury asset purchasing, and Central Bank support bailouts' provided, with the 2008 bailout equivalent to a 3.6% share of GDP by comparison.

The Canadian, British and American public are expected to be the worst hit, needing to bail out their local banking industry to the tune of over \$9,000 per taxpayer.

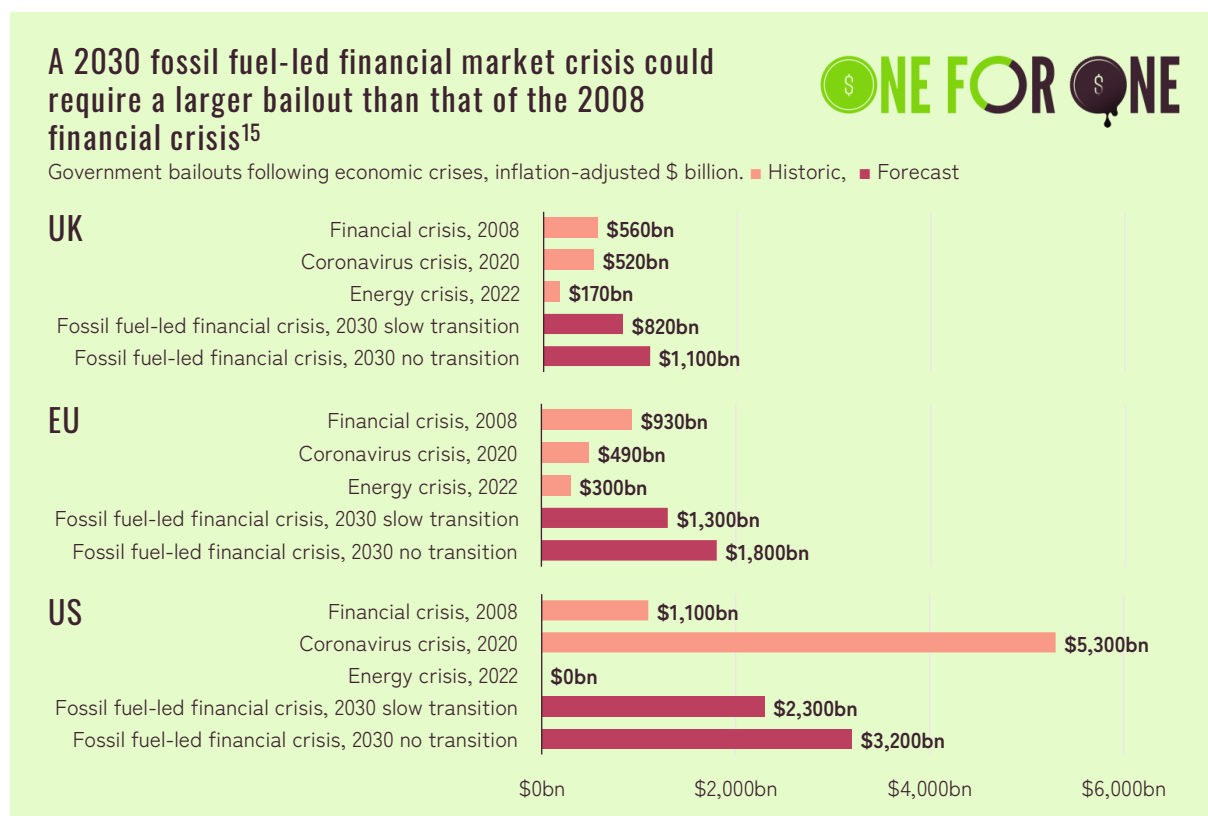
### Comparison of country-level socio-economic impact resulting from a 2030 fossil fuel-led financial market crisis, by energy transition scenario

Country	Slow transition		No transition	
	Job losses	Bailout per person	Job losses	Bailout per person
USA	5,000,000	\$6,500	6,800,000	\$9,000
UK	500,000	\$11,900	690,000	\$16,400
Japan	470,000	\$400	640,000	\$600
Brazil	380,000	\$30	520,000	\$50
Canada	320,000	\$6,500	440,000	\$9,000
Italy	250,000	\$400	340,000	\$500
France	200,000	\$1,000	270,000	\$1,300
Germany	160,000	\$2,500	220,000	\$3,400
Netherlands	40,000	\$4,800	50,000	\$6,600
Switzerland	20,000	\$1,300	30,000	\$1,800
EU	3,700,000	\$1,800	5,100,000	\$2,400
Global	13,600,000	\$600	18,700,000	\$800



The UK economy is particularly at risk in the coming fossil fuel-led financial crisis due to the dominance of the finance services sector. In a no transition scenario, the projected UK government bailout of \$1.1 trillion is more than the combined government bailouts from the 2008 financial crisis and the 2020 coronavirus crisis. If a fossil fuel-led financial market crisis happens in 2030 under a slow transition scenario, the bailout required in the UK would be around \$820 billion.

The socio-economic impact of a fossil fuel-led financial market crisis will also be broader than job losses and bailouts. For example, a crash in the value of fossil fuels is expected to negatively impact the bond market and the public's pension holdings.



## 2D. Benefits of implementing One-for-One capital requirements regulation

Primarily, the One-for-One rule would ensure that fossil fuel credit exposure losses incurred by banks would be absorbed using the liquid assets held on those same banks' own balance sheets, saving the public up to \$6.8 trillion in government bailouts no longer required globally, equivalent to \$800 in savings per person. In the US, the UK, and Canada, the implementation of the One-for-One rule could save the public over \$8,000 per person through the prevention of government bailouts.

The One-for-One rule would significantly reduce job losses caused by the financial market crash by a factor of up to 15.

Job losses would likely remain under this scenario as the banks affected by the fossil fuel bubble bursting may resort to redundancies and cuts in broader investment to maintain profitability. It is expected that 1.2 million jobs may still be impacted globally. Compared with a scenario where the One-for-One rule is not implemented, however, up to 17.5 million job losses would be avoided in a no transition scenario.

Finally, the One-for-One rule would help to slow investment into fossil fuels, reducing the resultant environmental and economic crisis, by making fossil fuels more expensive to finance relative to clean energy – in a reversal of current rules. As [Finance Watch](#)'s recent report argues, the lower risk weightings currently applied to fossil fuel financing essentially acts as a subsidy from banks to the fossil fuel industry, by decreasing the associated costs of financing.

As fossil fuel financing tends to be mix new fossil fuel with existing and/or non-fossil fuel capital expenditure, the One for One campaign calls for the relevant capital rules to be applied as a weighted ratio to reflect the makeup of the recipient's capital expenditure.

In other words, if a bank lends \$100bn to a company that has 17% of its capital expenditure devoted to expansion and 20% devoted to renewables, the One for One rule of the 1250% risk weighting would apply to \$17b and 150% risk weighting would apply to the remaining portion of \$63bn.

**Averted job losses from implementing the One-for-One rule in a 2030 fossil fuel-led financial market crisis, by energy transition scenario**

Country	Slow transition	No transition
USA	4,700,000	6,400,000
UK	470,000	640,000
Japan	440,000	600,000
Brazil	350,000	480,000
Canada	300,000	410,000
Italy	230,000	320,000
France	190,000	260,000
Germany	150,000	200,000
Netherlands	30,000	50,000
Switzerland	20,000	20,000
EU	3,500,000	4,800,000
Global	12,700,000	17,500,000

## 3. CONCLUSION

Adopting the One-for-One rule will stop banks from fueling the climate crisis, and causing another global financial crisis. Countries with large finance sectors, including the US, UK, and Canada, are most at risk from the growing bubble in fossil fuel assets.

The One-for-One rule could help avoid up to 18,700,000 job losses and \$6.8 trillion in banker bailouts following a fossil fuel-led financial crisis. Countries that are slow to apply the One-for-One rule will suffer the most.

### The fossil fuel bubble

- ▶ **Banks will hold an estimated \$2.2 trillion in fossil fuel assets by 2030**

Banks in China, Europe, Japan, and the US will account for around 85% of these high-risk assets. These banks will require the largest government bailouts when the fossil fuel bubble bursts, with the burden ultimately falling on taxpayers.

### Socio-economic impact of a fossil fuel-led financial market crisis

- ▶ **Worldwide, 18.7 million jobs are at risk from fossil fuel companies defaulting on dangerously high levels of risky debt owed to banks, precipitating a financial crisis**

The US jobs market is the most exposed to a fossil fuel-led financial market crisis with one in 25, or 6.8 million people expected to lose their jobs if the fossil fuel bubble bursts in 2030.

- ▶ **A \$6.8 trillion bailout would be needed to keep banks afloat in 2030 due to a failure of regulation**

The Canadian, British and American public are expected to be the worst hit, needing to bail out the finance industry at an average sum of over \$8,000 per taxpayer.

- ▶ **Compared to the 2008 subprime mortgage crisis, a 2030 fossil fuel-led financial market crisis could lead to marginally more job losses and require government bailout sums 3 times greater globally to keep banks afloat.**

### Benefits of pursuing the One-for-One financing rule

- ▶ **Implementing the One-for-One rule would negate the need for government bailouts and reduce job losses by up to a factor of 15.**

Additionally, the One-for-One rule would slow investment in fossil fuels, reducing the resulting environmental and economic crisis by making fossil fuel financing more expensive relative to clean energy.

# METHODOLOGY

The analysis focuses on the assumption that banks' fossil fuel credit exposure grows in line with investor expectations for growing fossil fuel profits, and their fossil fuel assets being invested under a steady capital requirement ratio (including the capital conservation buffer) of 6.3%, as Finance Watch estimates is currently the case. In line with Nature<sup>16</sup>, both a no transition scenario precipitating 3.5 degrees of warming in the 21st century and an additional slow transition scenario precipitating 2 degrees of warming are used in the analysis.

Taking the year 2030 as the presumed year of the financial crisis, the report models the socioeconomic impact of bank balance sheet losses from a fossil fuel-led financial crisis, in terms of job losses and the scale of government bailouts required. A fossil fuel-led financial crisis is anticipated to take place at some future point on the grounds of a disconnect in the speed of the energy transition between banker expectations and reality, triggering a sudden drop in fossil fuel asset prices.

In the no transition scenario, bank profit expectations for future fossil fuel industry profits are based on the IEA's World Energy Outlook 2019 current policies scenario, a scenario that is consistent with 3.5° C median global warming<sup>17</sup>.

Supporting our use of this no transition scenario for bank profit expectations is its use in other prominent scientific literature and the recent inflation-adjusted records in fossil fuel investment by banks despite the IEA statements there should be no investment in new fossil fuel supply projects if the world is to reach net zero by 2050<sup>4,7</sup>.

Additionally, our slow transition scenario sees bank profit expectations aligned with policy for net-zero greenhouse gas emissions by 2050/2060 in the EU and East Asia respectively, consistent with 2.0 °C median warming in the 21st century. The modelled banker expectations of growing fossil fuel profits can be reconciled as being based on either a belief that governments do not stick to their announced pledges or a belief in the large widespread use of carbon capture and storage technology that permits continued fossil fuel use.

An assumed even mix of AA and BBB-rated fossil fuel assets is used to calculate the current levels of capital, including capital conservation buffer, of 6.3% and is based on the assumption that an average fossil fuel assets portfolio of banks consists of an even mix of exposures of ratings from AA to BBB - as first used in the Finance Watch report<sup>1</sup>. In our modelling, the impact of a fossil fuel-led financial market crisis is calculated for the base case capital requirement ratio of 6.3%, against a target case capital requirement ratio of 100%.

The larger the credit exposure or the lower the capital requirement ratio, the larger the socio-economic impact from a default of that credit exposure.

The socio-economic impact of a fossil fuel-led financial market crisis is calculated for a 2030 crash in terms of job losses and the size of the economic bailout required to keep the economy afloat by propping up bank solvency. The model assumes that banks will keep investing in the fossil fuel industry because they expect the pace of the energy transition to be slower than reality.

What the model shows, therefore, is that the larger the difference between bankers' expected pace of the energy transition and the actual pace of the energy transition pursued by policymakers; the larger the difference between expected and actual fossil fuel profits grows over time; the greater the buildup of stranded assets; and the sooner a market crash should occur<sup>16</sup>. However, given the uncertainty over when the crisis could occur, the 2030 date is chosen for its prominent use in climate discourse. Under existing capital requirement levels, the later the market crash the greater the build-up of risky credit exposure and the larger the socio-economic impact of a financial market crisis.

The risks that climate change poses to financial institutions and financial markets and vice-versa is known as the concept of "double materiality". Due to the "radical uncertainty" of the climate-related events and the complexity of modelling a climate-finance interplay, the impacts of climate change on the financial sector earnings are not included within the scope of this paper<sup>12</sup>.

## **Sizing the fossil fuel credit exposure of banks**

### **Current sizing**

Finance Watch estimates that for the world's 60 largest banks 1.47% of assets are related to fossil fuel activities, equivalent to \$1.35 trillion in fossil fuels assets out of a total of \$92 trillion<sup>1</sup>. Given the Financial Stability Board's calculation that \$180 trillion in global assets are held by banks globally, \$88 trillion in assets are calculated to be held by banks outside of Finance Watch's list of 60<sup>18</sup>. Analysis of Finance Watch's list of the world's 60 largest banks showed a positive correlation between the size of a bank's assets and the share of assets related to fossil fuel activities.

Using linear extrapolation of the observed correlation, the share of assets related to fossil fuel activity among banks outside the top 60 was modelled to be 0.79%. We calculate current bank exposure to fossil fuel assets as \$2.0 trillion, equivalent to 1.13% of the \$180 trillion in global assets.

## 2030 sizing forecast

The growth in global fossil fuel credit exposure held by banks is modelled to align with investor expectations for growing fossil fuel profits.

A paper published in the journal Nature provides rigorous scenario-contingent data on price and volume of demand, and profit margins for oil and gas. This data is used to calculate banker expectations for global oil and gas profit from 2022 to 2036<sup>16</sup>.

From an additional Nature paper that uses the same no transition and slow transition scenarios, coal price and volume of demand data are used to scale up oil and gas profit to calculate the total value of future fossil fuel profits<sup>2</sup>.

Increasing capital requirement ratios would make lending more expensive, as banks would have to back their credit exposure with a greater proportion of their own funds (which is first liable to cover losses), which should slow investment into fossil fuel assets by raising financing costs. The avoided investments in fossil fuel assets have environmental and socio-economic benefits that are not reflected in the modelling, which focuses on socio-economic harm prevented by safeguarding financial stability.

## Forecasting the socio-economic impact from a fossil fuel-led financial market crisis

The socio-economic impact of a fossil fuel-led financial market crisis is modelled based on a comparison with the causes behind and outcomes of the 2008 global financial crisis.

The rise in the unemployment rate and government bailout as a share of GDP are outcomes of a financial market crisis modelled to be caused by banks' high exposure to risky credit (subprime mortgages or upstream fossil fuel activities and infrastructure), and insufficient levels of capital requirement underpinning investments.

The rise in the unemployment rate from a financial market crisis is modelled as scaling in line with global fossil fuel credit exposure and inversely to the capital requirement ratio. The bailout required from a market crisis is modelled as scaling in line with unbacked global fossil fuel credit held by banks. That is, the higher banks' global fossil fuel credit exposure and the lower the capital requirement ratio, the worse the impact is on a country's unemployment rate and bailout requirement as a share of GDP when the crisis occurs. In our model, the use of the One-for-One rule would significantly reduce job losses and reduce to zero any bank bailout required.



Since 2008, with tighter regulation of global financial resilience to shocks, there has been a reduction in interbank lending, which was an important contributor to the 2008 financial crisis<sup>19</sup>. Owing to conservative calculations elsewhere in our analysis and to the complexities in modelling how interbank lending impacts job losses and bailout requirements its effects have not been included in this analysis.

Regardless of the level of interbank lending, the same value of credit exposure and stranded assets will be impacted by a fossil fuel market crash and underpin job losses and the need for banker bailouts.

The reduction in interbank lending since 2008 may mean that a fossil fuel market crash would impact a more concentrated number of highly exposed banks than the widespread impact on all banks seen in the 2008 financial crisis.

Only the socio-economic impact resulting from the fossil fuel-led financial market crisis is calculated. Additional socio-economic impact can be expected from job losses and bailouts in the fossil fuel industry.

The modelling is based on a set capital requirement ratio underpinning all fossil fuel investments. No differentiation is made between currently owned assets and future investments. This section of the report focuses on a base case that all fossil fuel investments currently maintain a 50:50 mix of AA and BBB classed assets, hence meriting an average risk weighting of 60% and requiring a capital ratio of 6.3% of the gross exposure.

Under the One-for-One campaign's policy demands, a 150% risk weighting should be applied to all current investments in fossil fuel production and extraction financing, while the One-for-One rule with a 1,250% risk weighting should be applied to investments related to new or expanded fossil fuel resources. In the accompanying [Tableau](#) dashboard, the risk weighting for all current and future fossil fuel assets can be switched from 60% to a 150% and a 1,250% scenario, with the resulting socio-economic impact from a fossil fuel-led financial market crisis presented.

As a basis for comparison, the 2008 global financial crisis is observed to have been caused by \$1,368 billion in exposure to subprime mortgages<sup>1</sup> and a capital ratio of 3.3%\*. Globally, the socio-economic impact is observed to have been a 0.6 percentage point rise in unemployment\*\*, and a bailout of 3.6% of GDP<sup>+</sup>.

*\*Average of the capital ratio observed in Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley before the 2008 global financial crisis. \*\*Difference between World Bank's 2009 and 2007 unemployment rate*

*+Global weighted average of the IMF's country-level bailouts (capital injections, purchase of assets and lending by Treasury, and central bank support provided with Treasury backing), wherein the bailout for countries not stated is assumed to match that of the average from emerging markets economies. ++PWC data used for GDP projections, UN data for population projections, and an assumption that labour force participation rates remain constant at 2021 levels used for labour force projections.*

The country-level socio-economic impact from a fossil fuel-led financial market crisis is calculated by scaling the historic country-level socio-economic impact from the 2008 financial crisis by the relevant scaling ratio of global fossil fuel credit exposure and capital requirement ratio.

Country-level GDP, population, and labour force projections are used to convert modelled rises in the unemployment rate and bailout requirement as a share of GDP to that of a number of job losses, and the absolute and per-person bailout requirement<sup>++</sup>.

### Calculating the benefit of pursuing One-for-One fossil fuel financing

The forecast socio-economic impact of a fossil fuel-led financial market crisis given the base case risk weighting of 60% is compared to the lesser socio-economic impact from applying the One-for-One rule's 1,250% risk weighting.

*\*Average of the capital ratio observed in Bear Stearns, Goldman Sachs, Lehman Brothers, Merrill Lynch, and Morgan Stanley before the 2008 global financial crisis. \*\*Difference between World Bank's 2009 and 2007 unemployment rate  
<sup>+</sup>Global weighted average of the IMF's country-level bailouts (capital injections, purchase of assets and lending by Treasury, and central bank support provided with Treasury backing), wherein the bailout for countries not stated is assumed to match that of the average from emerging markets economies. <sup>++</sup>PWC data used for GDP projections, UN data for population projections, and an assumption that labour force participation rates remain constant at 2021 levels used for labour force projections.*

# BIBLIOGRAPHY

1. Ford, G., Symon, J., Nicol, C. and Dicale, L. (2022b). *A safer transition for fossil banking*. [online] Available at: <https://www.finance-watch.org/wp-content/uploads/2022/10/A-safer-transition-for-fossil-banking-Finance-Watch-report.pdf>.
2. Mercure, J.-F. ., Pollitt, H., Viñuales, J.E., Edwards, N.R., Holden, P.B., Chewpreecha, U., Salas, P., Sognnaes, I., Lam, A. and Knobloch, F. (2018). Macroeconomic impact of stranded fossil fuel assets. *Nature Climate Change*, 8(7), pp.588–593. doi:[10.1038/s41558-018-0182-1](https://doi.org/10.1038/s41558-018-0182-1).
3. www.bis.org. (2019a). CRE20 - Standardised approach: individual exposures. [online] Available at: [https://www.bis.org/basel\\_framework/chapter/CRE/-20.htm?inforce=20191215&published=20191215](https://www.bis.org/basel_framework/chapter/CRE/-20.htm?inforce=20191215&published=20191215) [Accessed 8 Dec. 2022].  
www.bis.org. (2019b). RBC20 - Calculation of minimum risk-based capital requirements. [online] Available at: [https://www.bis.org/basel\\_framework/-chapter/RBC/20.html](https://www.bis.org/basel_framework/-chapter/RBC/20.html).
4. IEA. (2021). *Pathway to critical and formidable goal of net-zero emissions by 2050 is narrow but brings huge benefits, according to IEA special report - News*. [online] Available at: <https://www.iea.org/news/pathway-to-critical-and-formidable-goal-of-net-zero-emissions-by-2050-is-narrow-but-brings-huge-benefits>.
5. Carrington, D. (2022). *Carbon emissions from fossil fuels will hit record high in 2022*. [online] the Guardian. Available at: <https://www.theguardian.com/environment/2022/nov/10/carbon-emissions-from-fossil-fuels-will-hit-record-high-in-2022-climate-crisis>.
6. gogel. (n.d.). *Home*. [online] Available at: <https://gogel.org/>.
7. Banking on Climate Chaos. (2022). *Banking on Climate Chaos 2021*. [online] Available at: <https://www.bankingonclimatechaos.org/>.
8. Going Beyond Insurers' Voluntary Initiatives Why policymakers must embed sustainability principles in mandatory insurance regulation Solvency II. (2022). [online] Available at: <https://api.shareaction.org/resources/reports/Going-beyond-insurers-voluntary-initiatives.pdf> [Accessed 9 Dec. 2022].
9. Ford, G., Kedward, K., Krebel, L., Ryan-Collins, J., Vaccaro, J. and van Lerven, F. (2022a). *Fat Tails, Tipping Points and Asymmetric Time Horizons: Dealing With Systemic Climate-Related Uncertainty in the Prudential Regime*. [online] papers.ssrn.com. Available at: [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=4245871](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4245871) [Accessed 9 Dec. 2022].

10. Semieniuk, G., Campiglio, E., Mercure, J., Volz, U. and Edwards, N.R. (2020). Low - carbon transition risks for finance. *WIREs Climate Change*, 12(1). doi:[10.1002/wcc.678](https://doi.org/10.1002/wcc.678).
11. www.eia.gov. (n.d.). *U.S. Crude Oil and Natural Gas Rotary Rigs in Operation (Number of Elements)*. [online] Available at: [https://www.eia.gov/dnav/ng/hist/e\\_ertrr0\\_xr0\\_nus\\_cm.htm](https://www.eia.gov/dnav/ng/hist/e_ertrr0_xr0_nus_cm.htm).
12. Bolton, P., Despres, M., Pereira da Silva, L.A., Samama, F. and Svartzman, R. (2020). *The Green Swan: Central banking and financial stability in the age of climate change*. [online] Available at: <https://www.bis.org/publ/othp31.pdf>.
13. www.google.com. (n.d.). *Redirect Notice*. [online] Available at: [https://www.google.com/url?q=https://www.ngfs.net/en/communique-de-presse/current-climate-scenario-analysis-exercises-may-understate-climate-exposures-and-vulnerabilities&sa=D&source=docs&ust=1670581782571984&usg=AOvVaw3QqasAJziBlZTzz\\_w20Xff](https://www.google.com/url?q=https://www.ngfs.net/en/communique-de-presse/current-climate-scenario-analysis-exercises-may-understate-climate-exposures-and-vulnerabilities&sa=D&source=docs&ust=1670581782571984&usg=AOvVaw3QqasAJziBlZTzz_w20Xff) [Accessed 9 Dec. 2022].  
Bank, E.C. (2022). Banks must sharpen their focus on climate risk, ECB supervisory stress test shows. *www.bankingsupervision.europa.eu*. [online] Available at: <https://www.bankingsupervision.europa.eu/press/pr/date/2022/html/ssm.pr220708~565c38d18a.en.html>.
14. Yescombe, E. (2014). *Principles of Project Finance*. Erscheinungsort Nicht Ermittelbar: Elsevier Books Customer Service.
15. Euractiv. (2022). European governments splurging €500bn to cushion energy crisis: report. [online] Available at: <https://www.euractiv.com/section/energy/news/european-governments-splurging-e500bn-to-cushion-energy-crisis-report/>.  
Fiscal Implications of the Global Economic and Financial Crisis A Staff Team from the Fiscal Affairs Department Fiscal Implications of the Global Economic and Financial Crisis Prepared by a Staff Team from the Fiscal Affairs Department 1. (2009). [online] Available at: <https://www.imf.org/external/pubs/ft/spn/2009/spn0913.pdf>.  
IMF. (n.d.). Fiscal Policies Database. [online] Available at: <https://www.imf.org/en/Topics/imf-and-covid19/Fiscal-Policies-Database-in-Response-to-COVID-19>.  
Sgaravatti, G., Tagliapietra, S. and Zachmann, G. (2022). National policies to shield consumers from rising energy prices. [online] Bruegel | The Brussels-based economic think tank. Available at: <https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices>.  
World Bank (2020). Indicators | Data. [online] Worldbank.org. Available at: <https://data.worldbank.org/indicator>.

16. Semieniuk, G., Holden, P.B., Mercure, J.-F., Salas, P., Pollitt, H., Jobson, K., Vercoulen, P., Chewpreecha, U., Edwards, N.R. and Viñuales, J.E. (2022). Stranded fossil-fuel assets translate to major losses for investors in advanced economies. *Nature Climate Change*. doi:10.1038/s41558-022-01356-y. Available at: <https://www.nature.com/articles/s41558-022-01356-y>.
17. International Energy Agency (2019). *World Energy Outlook 2019 – Analysis - IEA*. [online] IEA. Available at: <https://www.iea.org/reports/world-energy-outlook-2019>.
18. Global Monitoring Report on Non-Bank Financial Intermediation. (2021). [online] Available at: <https://www.fsb.org/wp-content/uploads/P161221.pdf>.
19. The financial crisis 10 years on: what’s been done to make the system safer? (2017). [online] Available at: <https://www.bankofengland.co.uk/-/media/boe/files/news/2017/september/the-financial-crisis-10-years-on-fact-sheet.pdf>.

## About One-for-One

The One-for-One campaign is a coalition of people and organisations that campaigns for the implementation of the One-for-One rule, meaning that for every dollar financial institutions invest in fossil fuels, they must use a dollar of their own funds to cover any future losses themselves, rather than rely on government bailouts.

Together we can cut off fossil fuel funding.

## About The Sunrise Project

Driven by the imperative of climate justice, The Sunrise Project scales social movements to drive the transition from fossil fuels to renewable energy as fast as possible.

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