

Macro ESG

The economics of a hotter world

The temperature on the planet is soaring and there is plenty of evidence that humans are to blame. Global warming will likely have a big impact on companies, sectors and society at large. We find that low-income countries are particularly vulnerable, but also richer economies will suffer. Climate change is putting financial stability at risk and could even spark a new financial crisis as fossil fuel companies' assets worth over USD 1 trillion may be left stranded. Studies show that measures to keep climate changes at bay are economically beneficial, both in the short and long run. Yet, policy makers' efforts so far are insufficient. Even if all commitments in the Paris Agreement from 2015 were to be fulfilled, it would not be enough to stop the rising trend in temperature. Thus, we also need to adapt and prepare for catastrophe. On the positive side, there's currently a strong global momentum for action and the private sector is rapidly stepping up its efforts to combat climate change. Perhaps we're on the brink of a new green industrial era.

Nordea Markets

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Are we losing it?

The Economist's announcement that "[t]he world is losing the war against climate change" made for pretty gloomy reading, despite the summer sunshine. Global emissions are still on the rise, as are investments in oil and gas, while last year saw the first rise in demand for coal in four years. Moreover, CO₂ emissions reached a new record-high this summer.

Emissions of carbon dioxide rising, and temperatures with them

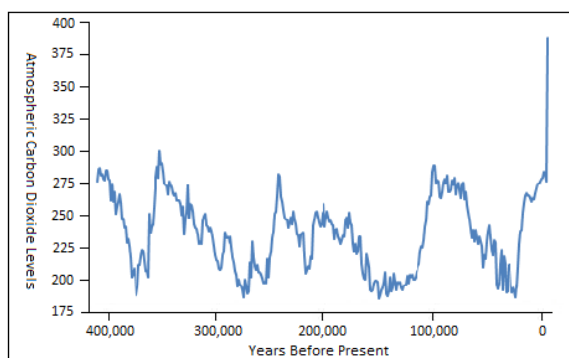
The concentration of CO₂ in the atmosphere has increased by more than 50% from pre-industrial levels. It is estimated by NASA to be by far the highest level over the past 400,000 years. The chart below, which probably depicts the longest time series seen for CO₂ levels, speaks for itself. We are living in an anomaly. Along with the rise of CO₂ in the atmosphere, the temperature on Earth has soared. The global average temperature has increased by 1°C over the past century, with an acceleration seen since the 1980s (chart to the right below). In fact, the speed at which this increase has taken place in recent decades is unprecedented over the past 20,000 years. ^[end note 1]



The economic consequences

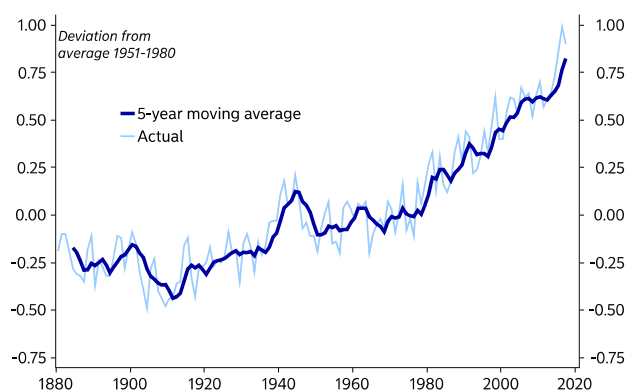
The impact of climate change on economies worldwide will likely be large, influencing companies, sectors and society at large. From a macroeconomic viewpoint, climate change is expected to cause lower trend growth as well as increased volatility in GDP and inflation, implying challenges for fiscal and monetary policy.

EXPLODING CO₂ LEVELS IN THE ATMOSPHERE



Source: NASA Ice Core and Nordea

GLOBAL SURFACE TEMPERATURE



Source: NASA (GISS) and Nordea

The economics of a hotter world



Humans to blame

According to a comprehensive evaluation report from the UN, there is plenty of scientific evidence that human activity is the predominant cause of global warming since the 1950.^[2] It is our emissions of greenhouse gases, mainly due to the burning of fossil fuels, that are heating up the planet.

Scientists have called this a new geologic era, the "Anthropocene", in which human activity has, for the first time ever, had a significant impact on our planet's geology and ecosystems, including climate change. We have already reached a new normal where extreme weather conditions (storms, heat waves, flooding and wildfires) are becoming more common. If emissions continue to grow, this will likely get worse.

We expect that climate change, and the fight to prevent it, will have profound consequences on the economy at large. Below we expand on this matter.

The economic consequences

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Biggest effects on low-income countries...

The macroeconomic effects are uneven across and within countries.^[3] In general, however, since low-income countries tend to be concentrated in geographical areas with hotter climates, studies typically find that a rise in temperature would be particularly harmful for these countries.^[4] The adverse effects were found to be long-lasting, stemming from lower agricultural output, depressed labour productivity, lesser capital accumulation, and deteriorating human health. Productivity seems to peak at about 13°C and declines strongly at higher temperatures.^[5] Each one-degree increase above 25°C causes a 2% drop in productivity.

Since global warming is redrawing the map of where people can live, climate change is also expected to cause mass migration flows, potentially leading to more conflicts and social unrest.^[6] Water scarcity is growing worse in North Africa and the Middle East. Somalia is experiencing more frequent droughts, and heat waves seem to be increasingly common in Iraq.^[7]

...but richer countries will also suffer

Richer countries are in general in a better position to cope with the consequences of climate change. Also, richer economies are generally less reliant on, for example, agriculture. However, they are not immune. Natural disasters, rising sea levels and the loss of biodiversity will also strike them. Global warming should begin to weigh on growth in many advanced countries as temperatures rise above the optimal 13°C. The cold Nordic countries seem to have less to fear in this respect. In fact, our understanding from the various studies is they could actually gain from higher temperatures as the land become more fertile.

But other advanced countries are under threat. A recent study found that the consequences of higher temperatures could reduce the US economy's overall growth by as much as one-third by 2100.^[8] The lower output is likely to be caused on the whole by negative effects in the services sector, including finance, insurance and real estate companies.

Climate-induced volatility in output and prices could boost inflation...

In the short term, countries will also face greater volatility in output and prices. This summer's drought in Northern Europe offers a glimpse of this. Germany, the second-largest grower in the EU, is now likely to harvest its smallest crop in 24 years, presumably leading to a hike in grain prices.^[9] Although grains only account for a small portion of the consumer basket, substantial price spikes could lead to higher food price inflation and lift overall consumer price inflation.

...impacting monetary policy

So, droughts could lead to a temporary inflation boost that potentially also influences central banks' inflation targets. The standard economic model, however, suggests that central banks are unlikely to respond to supply shocks such as this if they are transitory. Typically they instead wait for inflation to come back down. However, if inflation

expectations are at risk of decoupling from the inflation target, stricter monetary policy might be justified. In practice, it could be hard to disentangle a temporary rise in inflation from a permanent one, posing a challenge to central banks in setting their inflation targets.

Financial instability

Living in a carbon bubble

Climate change is putting financial stability at risk and could even spark a new financial crisis, according to a fresh study.^[10] The study finds that we are in the midst of a “carbon bubble” due to burst before 2035 as the world will inevitably drastically reduce its greenhouse gas emissions. This will likely cause a sharp slump in the value of fossil fuels. And this is projected to happen even without new climate polices; it will merely be driven by markets.

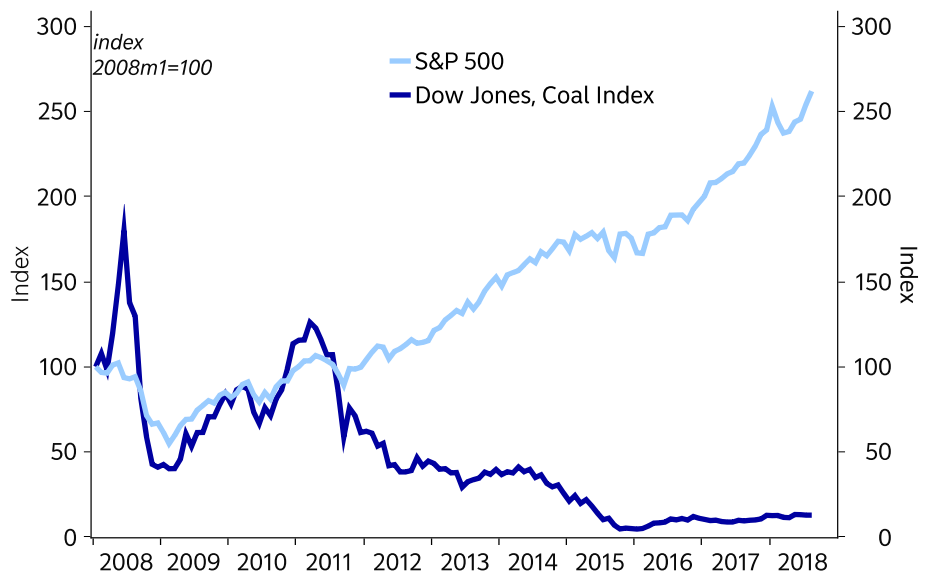
Slump in fossil fuel demand could leave companies in that industry facing the loss of USD 1-4tr in assets

Globally, the slump in demand could leave fossil fuel companies' assets worth USD 1-4 trillion stranded. That's quite a sum. Actually, it is on a par with the losses seen during the financial crisis in 2008. There will be winners and losers. Net importers of fossil fuels, such as the EU and China, are set to gain, while net exporters, such as the US, Canada, Russia and many Middle Eastern countries, will likely suffer.

This so-called transition risk – the financial risk resulting from the adjustment towards a low-carbon economy – could come about abruptly. Mark Carney, Governor of the Bank of England, has warned of “a climate Minsky moment”, meaning that after an era of misplaced complement without action, the change will come suddenly. That represents classic herd behaviour and it will likely be crowded at the exit.^[11]

The speed of adjustment is uncertain but it could be decisive for financial stability. Some sectors directly involved in fossil fuels are already suffering. Over the past decade, the Dow Jones Coal Index has dropped 90% versus the 250% rise seen in the S&P 500. Of course, not all of this can be attributed to the transition to a low-carbon economy, but part of it certainly should be. Next up could be sectors that are heavily dependent on fossil fuels, should they not manage to decarbonise in time.

THE US COAL SECTOR INDEX VERSUS S&P 500



Source: Macrobond and Nordia

Benefits of action

A tragedy on the horizon

The fight against global warming has been seen as a trade-off between short- and long-term benefits. For myopic humans, the threat of future damage from climate change has simply been too distant or vague to drive necessary actions. It has been perceived as a cost for the current generation to the benefit of future generations, and not worth paying. Climate change has been seen as a tragedy on the horizon.^[13]

Measures to keep climate changes at bay would be beneficial in both the short and long run

This seems to be a misconception. According to a recent OECD study, measures to keep climate changes at bay would actually be beneficial both in the short and long run. Such measures would lift GDP by 1% as early as 2021 in the G20 countries, and by close to 3% by 2050, according to the study. The positive effects are driven by green investments (low-emission and climate-resilient infrastructure) and are projected to exceed the dampening effects of higher energy prices and stranded fossil fuel assets. The study assumes that countries use the fiscal space that many now have due to the low interest rates.

This is also fully in line with the first, comprehensive, cost-benefit analysis of taking action against climate change, the so-called Stern report from 2007. The report found that the benefits of "strong and early action" clearly outweighed the cost of not acting. Inaction was estimated to cost at least 5% of global GDP each year going forward and if a wider range of risks were taken into account, the damage costs could rise to 20% of GDP per year. As a comparison, the cost of action to reduce greenhouse gas emissions was estimated at around 1% of global GDP each year.

Procrastination is costly

Moreover, both studies above suggest that procrastinating is costly. A delay would raise transition costs and require a more abrupt adjustment, even more so for net fossil fuel exporting countries.

The battle against climate change

The Paris Agreement...

When policy makers met in Paris in 2015, their aims were high. The agreement reached was that countries would seek to limit global warming in this century to under 2°C and pursue efforts to limit it to 1.5°C above the pre-industrial level. The planet is currently about 1°C above the pre-industrial level. As of July 2018, 179 countries – representing 89% of global emissions – had ratified the agreement.^[12] Their national governments have committed to develop their own action plans, called Nationally Determined Contributions (NDCs).

This was certainly not the first time world leaders gathered together to save the planet. The Kyoto Protocol, adopted in 1997 and entered into force in 2005, also targets reducing greenhouse gas emissions. However, the US never ratified the protocol, while China and India had no binding obligations. Compared with the Paris Agreement, the Kyoto Protocol covered a much smaller share of emissions.

... is not enough

Insufficiency

Regrettably, the high ambitions set out in the Paris Agreement do not seem sufficient. According to estimations by the UN, the world is not on track to reduce emissions to the extent needed. Even a full implementation of the current national pledges would make a temperature increase of at least 3°C by 2100 very likely. There is also a scientific consensus that without efforts to tackle climate change, average temperatures could rise by 4°C or more by the end of the century.

The planet is moving towards a new, hotter, not-so-nice equilibrium

This would cause tipping points at which the earth starts to heat itself, exacerbating the problem, and leading to severe disruption and economic damage. The planet will simply find a new, hotter, not-so-nice equilibrium.

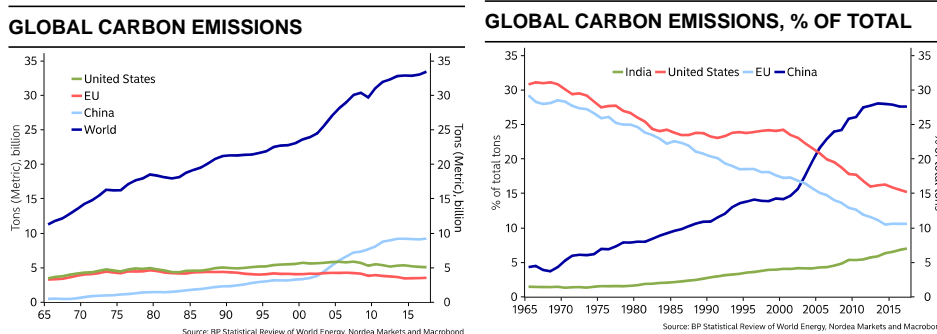
The OECD does not hold back: "The scale of potential damage from climate change poses a major systemic risk to our future well-being and the eco-system on which we depend. Let's try to avoid this."

There is a need to urgently pursue actions that will bring deeper and more rapid emissions cuts. However, even slashing emissions to zero may not be enough. Carbon emissions are long-lived and tend to stay in the atmosphere for about 100 years. Even with zero emissions, CO₂ will stay at current elevated levels for a long time, meaning negative emissions are probably needed. This could be reached through improved forest and agricultural management that binds more carbon on Earth and investments in technology that remove CO₂ from the atmosphere and store it underground.^[14]

Policy options

Given the urgency of climate change, you might argue that policy makers should simply forbid the use of carbon. However, an abrupt prohibition is hardly a realistic or sustainable solution as it would send the global economy into a deep recession, with mass unemployment and misery. Luckily then, there are not many advocates for this strategy. The most popular measures among economists are much less radical and are

based on the idea of gradually pricing carbon out of the market, largely through two different options. First, you simply tax the use of carbon. Second, you apply a “cap and trade” strategy, creating a trading system of emission allowances. We dig into these options below.



Option 1: Let’s tax it

In the Nordic region, taxes have always been a popular way of managing the behaviour of households and businesses. These countries have a long history of taxing things that are potentially harmful to health, such as alcohol and tobacco. This is also true for carbon taxation. Finland was the first country in the world to introduce taxes on each tonne of CO₂ emissions back in 1990. Sweden and Norway followed suit, introducing a similar tax in 1991, while it took another couple of years before Denmark was on board. Sweden can now boast having by far the highest taxes on carbon in the world, far above the second highest, Switzerland.

In other countries, however, taxes are less popular and are more difficult to introduce. This is especially true for some of the countries with high emissions, such as the US and China.

Option 2: Dirty trading

Trading emission allowances are becoming more and more popular. In practice, it works like this: authorities set a cap on overall emissions and allowances are then either distributed to companies for free or companies are invited to buy them in an auction. Allowances can then be freely traded on the secondary market.

The EU emission trading system (EU ETS) is the world’s first major carbon market and remains the largest, accounting for more than 75% of international carbon trading and covering 45% of the EU’s total greenhouse gas emissions. The EU ETS covers 31 countries (EU28 plus Iceland, Liechtenstein and Norway), more than 11,000 plants (power stations and industrial plants) and airlines operating between those countries. ^[15] The EU’s target by 2020 is to reduce the emission level by 21% compared with 2005 through the system and by 43% by 2030. To reach this target, the cap is reduced every year.

Carbon pricing continues to gain traction outside Europe as well

Carbon pricing continues to gain traction outside Europe as well. In 2017, China officially launched its ETS. In the US, emission trading systems are up and running or are underway in states on the East Coast and in California, although not much is happening on the federal level.

To date, 51 carbon pricing initiatives have been implemented around the world, covering about 20% of total greenhouse gas emissions. There are 25 emission trading systems and 26 carbon tax initiatives. Most initiatives saw increases in carbon prices in 2018 versus 2017. Yet, most initiatives remain well below the EUR 35-70 per tonne price range for CO₂ equivalents in 2020, the level estimated as consistent with achieving the temperature goal of the Paris Agreement. ^[16] Also, 80% of emissions are not subject to taxes or trading systems.

Carbon leakage

Carbon taxes are complicated, and most countries have numerous exemptions from the rule, not least for heavily polluting industries. How could this be defended? A complication with the carbon tax is the risk of “carbon leakage” – i.e. should the industries in the Nordics face overly high taxes, they could move abroad or close down.

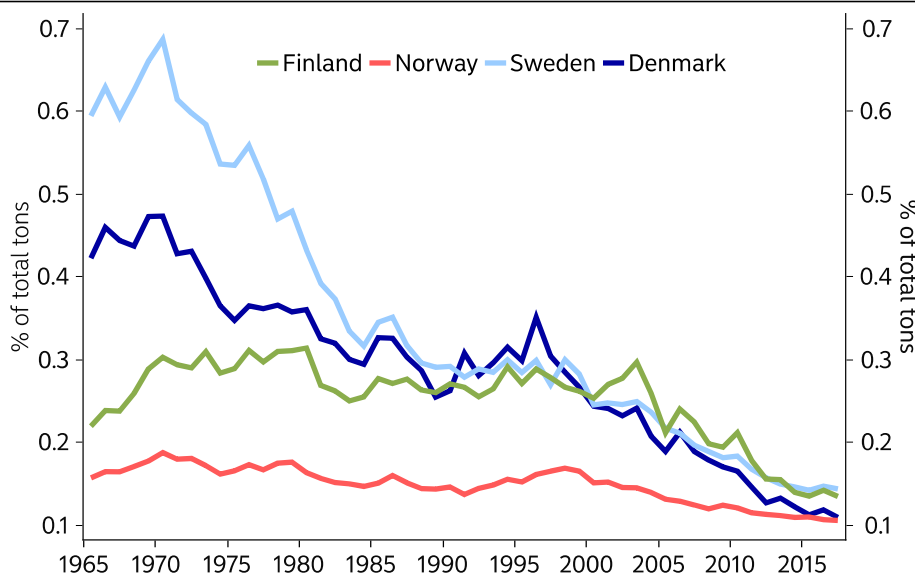
Moving the factory to another country would obviously not reduce global emissions, while closure could reduce emissions but could also simply pave the way for a company elsewhere to fill the demand, leaving total emissions unchanged.

Calibrating an efficient trading system might also be a challenge. The EU ETS has been criticised for setting too high an overall emission cap, which in practice has implied a very low market price of allowances. Another problem of the system is that it benefits existing companies by giving them an allowance, while new or growing companies are penalised. In theory, you might also face the reverse problem that too strict a cap would risk “carbon leakage” by companies leaving the EU.

The target should, of course, be to get as much climate improvement as possible for the money put in. With all the challenges mentioned above, we can consider both carbon taxing and trading systems to be efficient after all. Cap-and-trade measures are deemed more efficient than the command-and-control variant, where emission caps or cleaner technology are simply enforced.

A seemingly efficient measure would be that governments simply buy allowances from the EU ETS without using them. This would directly lead to lower emissions in the EU and also higher prices on carbon, thereby solving the problem of too low prices for the system to be effective. According to the Swedish National Institute of Economic Research, this is probably one of the most cost-efficient ways to reduce emissions within the EU.

NORDIC CO₂ EMISSIONS, % OF TOTAL



Source: BP and Nordea

What not to do

Fossil fuels are still heavily subsidised in many countries, especially in the high-polluting ones.^[17] The amount of subsidies directed toward fossil fuels globally adds up to more than USD 5 trillion, amounting to 6.5% of global GDP in 2015. This figure includes the estimated environmental costs. Looking at the narrow view of subsidies (pre-tax) they amounted to 0.7% of global GDP in 2013.

Coal subsidies account for the largest part (about half) of global subsidies. Undercharging for global warming accounts for 22% of the subsidy in 2013, air pollution 46%, broader vehicle externalities 13%, supply costs 11%, and general consumer taxes 8%. China was the biggest subsidiser in 2013 (USD 1.8 trillion), followed by the United States (USD 0.6 trillion), Russia, the European Union and India (each with about USD 0.3 trillion). Eliminating subsidies would have reduced global carbon emissions in 2013 by 21% while raising public revenues by 4% and social welfare by 2.2% of global GDP.

Subsidies directed at fossil fuels globally were more than USD 5tr in 2015, representing 6.5% of global GDP

Nordic climate laws

The Nordics have been pioneering in making the battle against emissions into law, with all four having implemented climate laws (Denmark and Finland in 2015, Norway in 2017 and Sweden in 2018). Common to these laws is that the governments are obliged to show what measures have been taken to reach nationally and internationally agreed emission targets. Also, all four have established climate committees to assess the progress of the governments' climate work.

Central banks going green

Even though climate-related financial risks vary across countries, central banks should consider taking them into account. Some central banks, such as De Nederlandsche Bank (DNB) and Banque de France, are already adopting ESG criteria for their own investments. DNB has also embraced sustainability as an over-arching framework.

Some central banks, typically in less developed economies, are being more pro-active and have started to promote green finance (eg The Bangladesh Bank). The People's Bank of China is also facilitating green finance in order to support the long-term development of the domestic economy.

After the Paris Agreement, a central bank network was established to develop environment and climate risk management in the financial sector

However, the mandates of central banks in most advanced countries are typically more narrowly defined or interpreted, and therefore do not take environmental issues into considerations. Nevertheless, central banks have a role in enhancing the resilience of the financial sector. The Bank of England is pioneering in this area. Following the Paris Agreement, a central bank network (Network for Greening the Financial System, or NGFS) was established to contribute to the development of environment and climate risk management in the financial sector. From the Nordics, the Bank of Finland and the Swedish FSA (Finansinspektionen) participate.

Central banks or financial regulators could still consider supporting green finance with their current tools. The EU high-level Expert Group on Sustainable Finance has proposed that capital requirements could be differentiated on a green basis. This means that banks could fund "green" loans with less capital, or fund "brown" loans with more capital: nice in theory, but could be tricky in practice; e.g., there is a risk that such a system would penalise brown borrowers even if they are trying hard to shift towards more sustainable business models.

Never underestimate humans' ability to mess things up...

Preparing for catastrophe

The clock is ticking but scientists agree that there is probably still some time to stop global warming and to meet the goals of the Paris Agreement. However, this would take unprecedented efforts from policymakers, companies and households on a global scale. Thus, even though sustainability and climate change are top of the agenda for many policymakers and businesses, we must prepare for failure. Never underestimate humans' ability to mess things up!

The issue of how society can be adapted to a hotter Earth is therefore getting a lot of attention in climate research. Building resilience is also at the heart of the Paris Agreement, as significant climate effects are already locked in.

Green capitalism

Almost 300 investors world-wide, holding assets worth USD 30tr, have signed on to Climate 100+

Let's end this on a positive note. At present there is strong global momentum to build a low-carbon, climate-secure future. The private sector has quickly stepped up its efforts to combat climate change. Close to 800 companies with a total market capitalisation of USD 17 trillion have made far-reaching climate commitments, according to the We Mean Business Coalition. Meanwhile, almost 300 investors world-wide, holding assets worth USD 30 trillion, have signed on to Climate 100+, a five-year initiative to engage greenhouse gas emitters and other companies that have significant opportunities to drive the clean energy transition. Investors are calling on companies to improve governance on climate change, curb emissions and strengthen climate-related financial disclosures.

Also, green bond issuances are taking off. In 2018, the total issuance is expected to be around USD 250bn, up more than 50% since the year before. This could be compared to the total global bond market at around USD 90 trillion. Institutional investors representing around USD 11 trillion have committed to growing a green bond market.

[18]

Businesses taking leadership have a pivotal role as the investments needed ahead are massive. In the energy sector alone, total investments of USD 53 trillion are required by 2035 to avoid dangerous climate change, according to the IEA. The total investment need across all sectors is estimated to be USD 93 trillion by 2030.^[19] These estimated large investment needs also bring potential for businesses and investors. Perhaps now, as business leaders, politicians and households worldwide are feeling the heat, is the time for a green industrial revolution.

End notes

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10. Mercure et. al. (2018), "Macroeconomic impact of stranded fossil fuel assets", Nature Climate Change, vol. 8, July, p588-593.
11. A "Minsky moment" usually refers to a situation within financial markets when a market fails, or falls into crisis, after an extended bullish period driven by speculations. The phenomena is named after the economist Hyman Minsky who pointed to this inherent instability of markets.
12. On 1 June 2017, president Donald Trump announced his intent to withdraw the United States from the Paris Agreement. Article 28 of the Paris Agreement permits a Party to withdraw by giving written notification, which may only be provided after three years from which the agreement entered into force. Withdrawal then takes effect upon expiry of one year from the date of receipt. The Paris Agreement entered into force for the US on 4 Nov 2016. Hence the earliest the US could give written notice is 4 Nov 2019, and the earliest the US could leave is 4 Nov 2020. Until this time the US will have to stick with the agreement and is obliged under international law not to frustrate or obstruct its implementation. The U.S stands for 18% of global emissions.
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