BRIDGING THE GAP

MEASURING PROGRESS ON THE CLIMATE GOAL ALIGNMENT AND CLIMATE ACTIONS OF SWISS FINANCIAL INSTITUTIONS

Report November 2020

The 2° Investing Initiative (2DII) is the global think tank for developing climate and long-term risk metrics and related policy options in financial markets. 2DII coordinates the world's largest research projects on climate metrics in financial markets, with over 40 research partners in the public, private and philanthropic sector, and over 3€ million re-granted to research partners to date. As part of this work, 2DII developed the first climate scenario analysis tool for financial portfolios, applied by over 1500 financial institutions and three financial supervisory authorities to date.

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Funder: This project has received funding from the European Union's Life program under grant agreement LIFE19/NGO/SGA/DE/000040 for the development of the software infrastructure and methodology, as well as from the Swiss Federal Office for the Environment for the enhancement of the methodology and its application to Switzerland.

Supported by:

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Office for the Environment FOEN

Published November 2020

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Executive Summary

CONTEXT

The goal of the Paris Agreement is to make financial flows consistent with a low-carbon pathway. The climate compatibility test 'PACTA 2020' measures the progress of the Swiss financial sector in this respect. The 2020 test builds on the successful climate compatibility test in 2017. [1]

Article 2.1c of the 2015 Paris Agreement created the political mandate to ensure the consistency of financial flows with the goal to limit the increase of global mean temperature to well below 2°C. Responding to this mandate, Switzerland launched the first national climate compatibility test for the financial sector in 2017, building on the open-source PACTA methodology (Paris Agreement Capital Transition Assessment). Following this exercise, the Swiss Federal Council announced its intention to regularly measure progress.

The PACTA Test 2017 has delivered comparable results for financial institutions and demonstrably triggered action: Of the participants who participated in both tests, over 50% said they had taken climate action based on the results of the 2017 test.

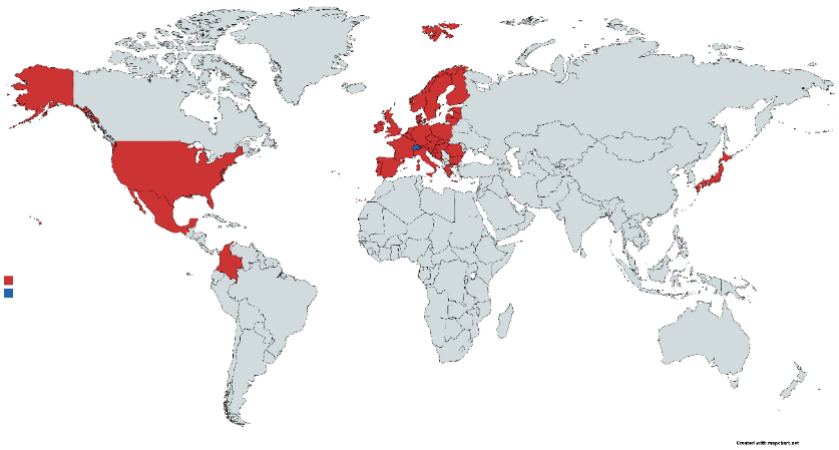
Building on the 2017 test, the Federal Office for the Environment (FOEN), together with the State Secretariat for International Finance (SIF) invited all Swiss pension funds, insurance companies, banks and asset managers to take part in the voluntary PACTA 2020 climate compatibility test. Besides increasing the number of participants as well as the market share significantly, Next to listed equity and corporate bonds that were already covered in the 2017 assessment, the 2020 test also assesses Swiss real estate and mortgage portfolios and includes a qualitative survey to complement the quantitative analysis.[2] Additionally, participants were offered an optional 'stress-test' for equity and corporate bond portfolios to analyse potential financial losses in climate relevant sectors.

The test was coordinated internationally. It contributes to the standardization of the measurement and monitoring of the financial sector's contribution to the Paris climate goals.

The PACTA 2020 test will be implemented in a number of European countries such as Austria, Luxembourg, Norway and Sweden, as well as through the Swiss/Dutch initiative on aligning financial flows with the Paris Agreement.[3] Countries involved help their financial institutions to test their investments for climate compatibility in an internationally comparable way. Lessons learnt will be shared and feed into the international debate on measuring climate alignment and monitoring progress towards it. Financial market supervisory authorities and central banks in different jurisdictions currently also apply the PACTA tool, specifically the stress-test analysis. With applications in South and North America, Europe, and Asia, PACTA is developing into an international standard.

[1] https://2degrees-investing.org/wp-content/uploads/2017/10/Out-of-the-fog.pdf
[2] Corporate Loans, on the other hand, were not assessed as part of PACTA 2020.
[3] https://www.bafu.admin.ch/bafu/en/home/documentation/news-releases/anzeige-nsb-unter-medienmitteilungen.msg-id-76481.html

Figure 1: PACTA application internationally by governments, financial supervisors, and industry associations (Source. 2°Investing Initiative)



Recognizing the critical role of moving beyond portfolio alignment towards the climate impact of different portfolio strategies, the PACTA 2020 climate compatibility test combines, for the first time, the quantitative analysis of portfolio alignment with a qualitative survey on existing climate strategies.

The financial sector appears as a key mechanism for achieving climate goals, supporting measures in the real economy as well regulation such adequately pricing CO_2. However, challenge in terms of "decarbonizing finance" and not just redistributing 'fossil' or 'green' financial assets within the financial sector remains significant. While from a government perspective, the overarching goal of *aligning* financial flows with the goals of the Paris agreement is important, the alignment of individual financial portfolios is only a partial representation of progress. For example, if one financial investor ceases to invest in a coal power plant this does not necessarily mean that it stops operating – emissions may have just been transferred across financial portfolios or even asset classes.

It is therefore critical to build evidence on the relationship between real world emissions reductions, climate actions by financial institutions, and portfolio and market alignment, in order to develop effective soft or hard policy incentives and to ensure that financial institutions' voluntary initiatives are targeted and effective.

By aggregating the quantitative and qualitative components, this report provides a market level insight into the alignment of the Swiss financial market with climate goals. It improves the collective understanding of the state of the art of climate actions by Swiss financial institutions and the relationship between climate actions and portfolio alignment. While this is only a first step in understanding the climate impact of financial markets, it represents a crucial advance in tracking progress over time both at micro and macro level.

In addition to this country-level analysis, each participating institution received a bespoke individual report.

The individual report for the institutions' PACTA climate alignment results across covered asset classes and sectors, and benchmarks them against peers, market portfolios and indexes. In addition, the individual report also offers - if requested by the participants - the results of a climate stress-test analysis for equity and corporate bonds. Participants also have access to a new module, the Climate Action Guide, which can be used to inform further actions. Participating institutions are free to disclose the results of the analysis as they want.

PARTICIPATION

The PACTA 2020 test provides a representative picture of the Swiss financial sector across key climate-relevant asset classes and financial sectors. It demonstrates that voluntary initiatives can engage a broad share of the market.

179 financial institutions that represent around 80% of the market participated in the assessment, more than twice the number of institutions that participated in 2017. These institutions included pension funds, insurance companies, asset managers and commercial banks. The following table shows the market coverage, as well as the total portfolio value uploaded in the two global asset classes assessed[4].

	Participants	**Portfolio Value uploaded** (Bln USD)		**Market coverage**
	#	Listed Equity	Corporate Bonds	%
Pension Funds	106	128,4	105,0	82 %
Insurance	24	43,4	137,4	79 %
Banks	31	950,2	415,4	88 %
Asset Managers	14	188,0	59,0	NA
Other	4	NA	NA	NA
Overall	179	1 310,8	717,0	NA

While market coverage data does not exist for asset managers and others, the level of participation suggested broad support in terms of market coverage, in particular among the larger Swiss asset managers. It is worth noting that both the quantitative and qualitative exercise can be considered representative, with 83% of participants also filling out the accompanying survey. The loan portfolios of UBS Switzerland and Credit Suisse underwent a bilateral evaluation within a respective international pilot study initiated by 2dii; however, the results are not published in this report.

Around half of all buildings held directly by institutional investors were submitted for the climate compatibility test. Through the mortgage portfolios, two thirds of all residential buildings in Switzerland have been analysed.

In total, the test examines over 23,000 directly owned buildings by institutional investors. Pension funds submitted the largest number, 43% of all portfolios. Banks and insurance companies are on a par, while asset managers submitted slightly fewer portfolios. The residential buildings dominate with

[4] The numbers below are based on the research of the institutions total assets reporting their annual report, compared to estimations of the entire Swiss market based on the FINMA 'Versichererreport', the SIF 'Kennzahlen Finanzstandort Schweiz' and the data portal of the Swiss National Bank.

90 % of all tested buildings in direct ownership of the institutional owners. Additionally, a total of 28 mortgage portfolios (from 26 participants) were submitted to test, representing around 1.15 million residential buildings. The banks together with the asset managers have the largest share with 12 portfolios (43 %) submitted and the two sectors pension funds and insurance companies both submitted 8 (29 %) mortgage portfolios each.

METHODOLOGY AND COVERAGE

The climate relevant real economy sectors analysed represent roughly 70-90 % of indirect emissions in capital markets. The underlining asset-level database consists of around a quarter of a million industrial assets.

The quantitative, scenario-based analysis focuses on the most climate relevant sectors across global corporate bonds and listed equity, as well as Swiss real estate and mortgages. The model for the assessment of Swiss real estate and mortgage portfolios was developed specifically for this test by Wüest Partner, commissioned by FOEN. The following sectors are covered by the conventional PACTA analysis: oil and gas extraction and coal mining, electric power, transportation (automobile, aviation, shipping), industry (steel, cement). The sectors included in this analysis together represent roughly 70-90 % of indirect CO_2 emissions in capital markets.

In total, the analysis for the equity and corporate bond portfolios builds on over 1 million individual holdings uploaded across nearly 4,000 individual portfolios in Switzerland's PACTA test, of which 90 % could be mapped to the underlying company data and evaluated.

The assessment presented in this report seeks to answer four related questions:

- What is the *current exposure* of the Swiss financial sector to climate-relevant sectors and technologies?
- What is the *forward-looking alignment* of the Swiss financial sector with 2°C climate scenarios across key climate-relevant sectors and asset classes and how has this evolved since 2017?
- What is the state of the art of financial institutions' *climate actions* and how do these relate to the quantitative alignment results?
- What is *the risk* that equity and corporate bond investments within the Swiss financial sector are exposed to under different transition scenarios? (additional analysis)?

The climate scenarios used in this report for assessing the climate compatibility of global sectors were published by the international energy agency (IEA), the European Commission Joint Research Centre and the Swiss federal council for the Swiss building sector.

The PACTA model was developed by the independent, not-for-profit think-tank 2° Investing Initiative and is based on forward-looking, asset-level data and production plans for the real economy companies from external data providers from third-party data providers.

KEY AGGREGATE FINDINGS

The fact that the same methodology has been used throughout the financial industry and that the standardised test provides more in-depth knowledge of the climate performance of financial institution's own portfolios is effective. The institutions that reported to have taken action on the basis of the results performed better in the 2020 test across a number of key indicators.

Financial institutions who indicate to implement climate change measures because of the 2017 test decreased their exposure to high-carbon technologies in the power and automotive sector on average more than their peers did. However, this result is not consistent for all institutions in this group. Overall, around 72 % of climate actions reported in this study were taken after 2017, which suggests an increased awareness and uptake of the topic in the sector after the first test.

Different levels of knowledge about climate-relevant indicators are evident in the building sector. Most institutional investors in real estate submitted significantly more accurate data e.g. on the heating system of each building for the test than mortgage portfolio holders. On average, the former scored better in terms of climate alignment than the latter.

However, the Swiss financial sector across all types of financial institutions is still not aligned with the goals of the Paris agreement. Looking at eight key climate-related sectors[5], no single financial institution performs climate goal aligned in more than half of these sectors.

Improvements in certain technologies within these sectors are measurable. The Swiss financial market as a whole is on track – this means in line with the required decline in fossil technologies or the expansion of renewable energies and alternative technologies according to the IEA Sustainable Development Scenario - in the following technologies: In the production of electric vehicles, gas production and electricity generation from gas. In the gas sector, the result can also be explained by the fact that the IEA foresees a sharp decline for gas only after the time horizon of the next five years which are considerate here. Based on forward looking production plans of the companies in the portfolios, we find that in every technology assessed there are some financial institutions who are aligned with the Paris climate goals. However, no single financial institution is aligned across all, or even half, of the technologies assessed.

The results also reflect the broader reality that the global economy is not on track to meet its Paris Agreement commitments. In contrast to 2017 however, the financial sector is no longer aligned with a single aggregate trajectory. The diversity in the performance of the various financial institutions has significantly increased across the various technologies assessed and there is growing evidence of alignment across selected sectors and technologies.

[5] Oil and gas extraction, coal mining, production of electricity, automobiles, airplanes, ships, steel and cement - excluding the real estate sector

Overall, the Swiss financial market still invests in the further expansion of oil production and coal mining. This potentially exposes financial institutions to significant risks, especially given the vulnerability of the fossil fuel system demonstrated during the current COVID-19 pandemic[6].

3-5% of submitted portfolio value is invested in the extraction of oil and gas as well as coal mining in different peer groups. Furthermore, 80 % of participants are still invested in coal mining companies today.

The power sector is at the center of the low-carbon transition and essential for the decarbonization of other sectors such as transport, industry and building. However, the share invested in high-carbon power capacity is still four times as high as the share invested in renewable capacity.

Ambitious build-out of renewable energy capacity and retirement of the most carbon intense source of power generation, coal, are indisputably necessary to meet the goals of the Paris agreement. 15 financial institutions are leading the way by submitting portfolios with a greater than 25 % exposure to renewable power capacity. However, the power capacity currently financed by all 179 Swiss investors is neither set to increase fast enough in terms of renewables, nor retired fast enough with respect to coal capacity.

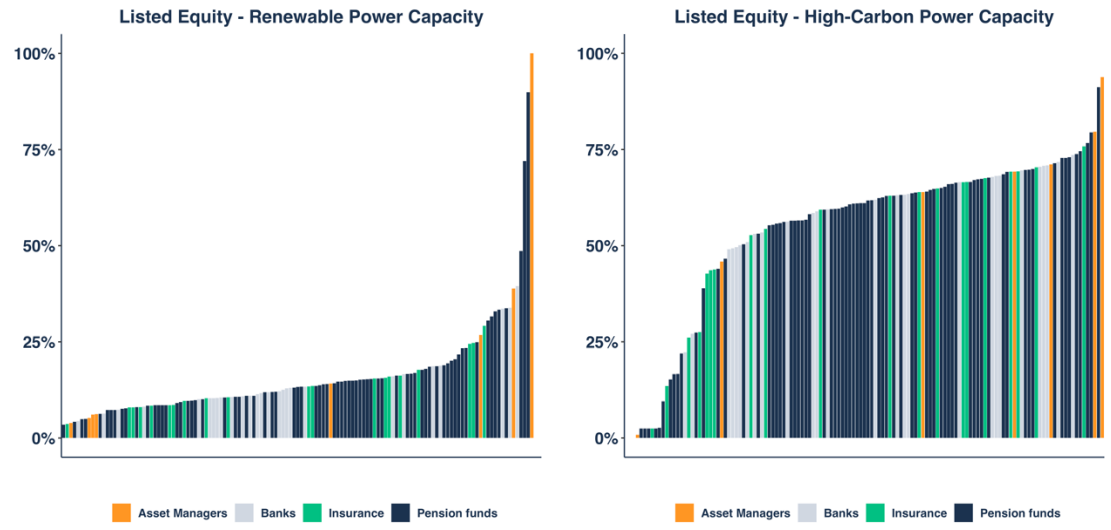


Figure 2: Renewable and high-carbon technologies in the power sector as a share of the overall exposure to the sector. Not shown are the percentages covering low-carbon alternatives associated with other environmentally controversial issues (e.g. hydropower, nuclear). Each line represents a respective participant's result. (Source: 2°Investing Initiative)

[6] Carbon Tracker Initiative 2020, *Decline and Fall: Size and Vulnerability of the Fossil Fuel System* (https://carbontracker.org/reports/decline-and-fall/)

Although the number of reported climate actions have increased strongly, there appears to be a significant gap between high-level climate strategies and communication on this topic on the one hand, and the actually realised portfolio allocation on the other hand.

More than 70 % of participants reported to employ at least one climate strategy such as engagement with enterprises or exercising shareholder voting rights (55 %) or exclusion policies (30 %). However, over 50% of listed equity and over 70% of corporate bonds investors with coal divestment policies still have coal exposures.

This result can partly be explained through the high-level nature of the survey questions that did not mandate reporting the specifics and ambition of the policy. Nevertheless, this shows that there is clearly a gap between communication, high-level strategy and actually implemented climate action within the institutions themselves.

Overall, 30 % of participating institutions consulted end clients or beneficiaries on climate and sustainability objectives. However, only 5% reported a standardized and systematic approach in this area.

Most of the financial institutions which state to consult their clients, reported to only mention climate or brother sustainability objectives to their clients if the client specifically brings up the topic. This conflicts with the results outlined by a range of surveys and studies[7] which show that citizens, as the ultimate "asset owners" behind pension funds and insurance companies, have strong sustainability objectives and want to see those objectives represented in their savings. These studies also highlight the need for a structured infrastructure around identifying sustainability preferences and translating these into investment decisions.

[7] https://2degrees-investing.org/resource/retail-clients-sustainable-investment/

ASSET CLASS SPECIFIC FINDINGS

a) Real estate

70 % of buildings owned by institutional owners still operate with oil or gas. Even though these buildings emit, on average, less CO_2 in kg/m^2 than the rest of the Swiss building park, improvements are necessary to reach the climate target.

The majority of participants already meet the limit value of 20 kg CO_2 emission per square meter of energy reference surface - which the Swiss parliament seeks to implement from 2023 onwards, in case a heating system has to be replaced in an existing building. This limit value will increase by 5 kgCO2/m2 every five years. However, approximately half of all participants would exceed the tighter limit of 15 kg $CO2/m_2$ implemented from 2028 onwards, if no heater replacement and renovation measures take place, as more than two third of the buildings still are heated with a fossil fuel-based system. Furthermore, institutional property owners know their buildings well with regard to climate relevant indicators - the indicators submitted by the owners for the analysis could be used as a basis for 79 % of all buildings.

In particular, pension funds reported that they are planning to make a significant contribution to achieve the climate targets by switching to a renewable energy heating system in the next 10 years.

Pension funds stated that more than 300 buildings, that currently use oil or gas as energy sources, will be equipped with a renewable energy source. This would correspond to 20 % of the directly held buildings of the pension funds that are currently heated with oil, and 10 % of buildings currently heated with gas. Insurance companies and asset managers are much more cautious in this respect and only report substitution rates of 1 to 2 % by 2030. It may be assumed that further substitutions are planned, but these were not submitted by the participants in this analysis. Banks on the other hand were only able to provide information on the planned refurbishment and heating system substitution measures for very few portfolios. Therefore, no reduction of CO_2 emissions until 2030 can be determined here**.**

Figure 3: Relative CO_2 emissions with the energy source oil (red) and gas (blue) under consideration of the planned refurbishment and substitution measures between 2020 and 2030 according to participants (2020) (Source : Wüest Partner)

b) Mortgages

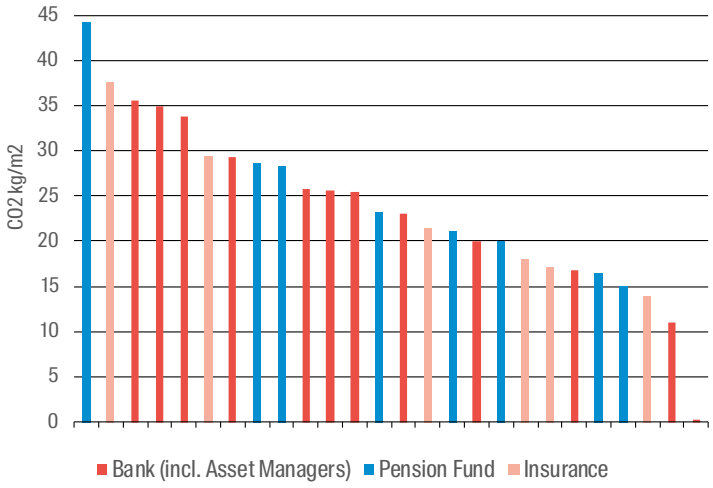
The CO_2 emissions associated with mortgage portfolios are on average higher compared to the new limit of 20 kg/m2. 79 % of the buildings analysed still operate with fossil fuels.

The average relative CO_2 emission of the mortgages portfolios lies with 26.2 kg/m^2, which is above the future first limit of 20 kg/m^2. Of those buildings that could be evaluated, 59 % use oil and 20 % gas as energy sources, while the rest have a non-fossil energy source. The relative CO_2 emissions of the oil-fired buildings lie by 41.1 kg/m^2 and 23.9 kg/m^2 for gas. However, in the case of mortgage portfolios, specific indicators (e.g. on the heating system) were often not transmitted by the financial institutions and therefore taken from the Swiss Register for Buildings and Dwellings. Since these data are not always up to date, CO_2 emissions tend to be overestimated.

An evaluation of the results for each participant according to the respective industry sector shows a rather heterogeneous picture.

Banks together with asset managers tend to have higher CO_2-emissions per square meter than the participants form the other two sectors. In terms of absolute CO_2 emissions, buildings from the oldest construction period with year of construction before 1980 contribute about 70 % and the newest buildings only 10 %. One mortgage portfolio shows very low emissions because most buildings in the portfolio are heated with renewable energy and very few with gas.

Figure 4: Distribution of average relative CO_2 emissions per participant by sector (2020) of mortgages (Source : Wüest Partner)



c) Capital Markets – Corporates Bonds and Listed Equity

Although the climate alignment of listed equity and corporate bonds portfolios has improved in some sectors and technologies, the results show that in particular coal mining and coal power production lag behind the business as usual scenario of the International Energy Agency. Looking at electric vehicles, the expansion plans are now aligned.

On the aggregated level, the companies held by Swiss investors are nearing or achieving climate goal alignment with respect to high-carbon fuels such as gas and low-carbon technologies such as electric vehicles. Coal mining and coal power production remain misaligned. Participants are still investing in the expansion of coal mining, and, in aggregate, pension funds in particular are investing in the build-out of coal power capacity. This trend is in line with the actual trajectory of the global market, marked in green in the figure below however, contrary to the climate objectives. Furthermore, all financial sectors invest on average in companies that plan to further expand oil production.

Electric vehicles production has scaled up massively in recent years, with a number of key announcements from major automotive companies. Although the overall share of electric vehicles in the car production remains low, the expansion plans are aligned with the IEA's sustainable development scenario – this holds across all types of institutions (banks, pension funds, insurance, asset managers).

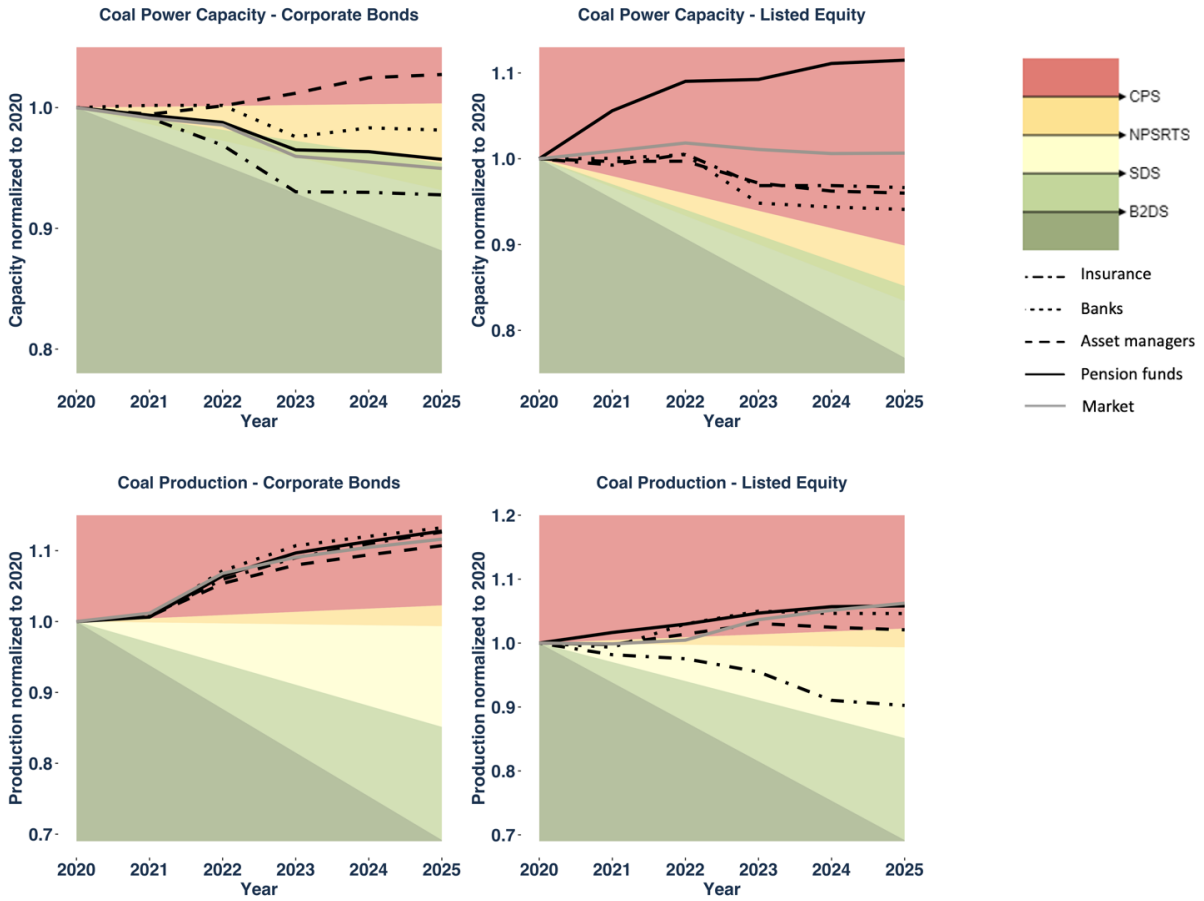
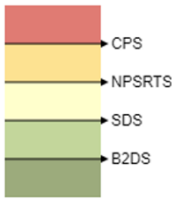


Figure 5: Production plans (coal mining and coal power capacity) of different types of Swiss financial institutions compared to the build-out rates required under different climate scenarios. The gray line marks the trajectory of the global market. (Source: 2°Investing Initiative)

The table below summarizes the alignment of the aggregate portfolios by technology, type of participating institution and asset class (corporate bonds and listed equity), in contrast to the alignment of individual participants portfolios depicted above.

Corporate Bonds

Sector	**Fossil Fuels**			**Power**		**Automotive**		
Technology	**Oil**	**Gas**	**Coal**	**Rene-wables**	**Coal**	**ICE**	**Electric**	**Hybrid**
Pension funds								
Insurance								
Banks								
Asset Manager								



Listed Equity

Sector	**Fossil Fuels**			**Power**		**Automotive**		
Technology	**Oil**	**Gas**	**Coal**	**Rene-wables**	**Coal**	**ICE**	**Electric**	**Hybrid**
Pension funds								
Insurance								
Banks								
Asset Manager								

Although aggregate portfolios are overall not aligned, there are financial institutions leading the way in terms of exposure to and build-out of low-carbon technologies.

The PACTA analysis for the power sector shows a wide distribution of exposures both within and across peer groups (see results for renewable power below). For example, some Swiss investors own 8-10x as many coal-fired power plants as their leading peers.

The results also highlight that in terms of build-out, only few financial institutions are meeting aligning the renewable power build-out with the level of ambition required in the sustainable development Scenario (B2DS) of the International Energy Agency (IEA).

The build-out of renewable energy capacity, on the other hand, shown in the alignment figure below, is not in aligned with a 2°C climate scenario. Except for asset manager in their listed equity portfolios, peer group is investing in the build-out of renewables at the required rate.

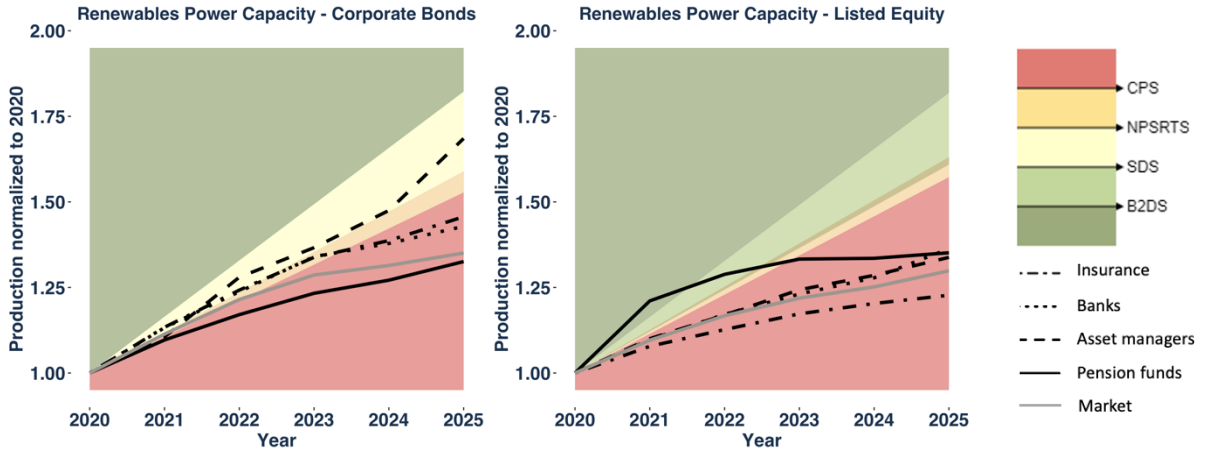


Figure 6: Production plans for renewable electricity generation capacities of the companies in the portfolios compared to the expansion rates required in different climate scenarios. The gray line shows the development of the global market. (Source: 2°Investing Initiative)

Analysing only at pension funds and insurance companies who took part in 2017 as well as 2020, we find that the majority of participants increased their exposure to low-carbon technologies in the power and automotive sector, although progress is still fragmented.

Two-thirds of those investors decreased the share of coal power capacity, and slightly more than half increased their share of renewable power capacity in their overall exposure to the power sector. Those financial institutions that said to have taken climate action on the basis of the results on average were more likely than their peers to expand their share in renewable power capacity and reduce their share in coal power capacity, although this result is not consistent across all participants.

Overall, ESG-labelled portfolios fare slightly better in terms of exposure to low-carbon technologies in the power sector, although this result does not hold across all ESG labelled portfolios submitted.

20 % of portfolios submitted were labelled as ESG portfolios. This means they include environmental (E), social (S) and governance (G) criteria for the companies held in the portfolios. Overall, the climate alignment analysis of ESG-labelled portfolios is mixed. ESG-labelled portfolios have, on average, a lower exposure to oil extraction and coal mining and a higher share of renewable power capacity. However, there are still a large number of ESG portfolios that do not fare well across these indicators. This shows that ESG does not imply automatically climate compatibility, although the average results are slightly better than average performance of the tested portfolios overall.

Although the different financial sectors perform in general relatively similar across peer groups, some differences emerge.

The aggregate alignment results for pension funds and insurance companies are, on average, very similar across sectors and technologies, and generally fall in line with the listed companies on the world market. An outlier in this regard is the build-out of coal power capacity in the aggregate portfolio of pension funds. On average there are more asset managers aligned in specific technologies than is

the case for pension funds, insurance companies and banks, and asset managers are also the only peer group whose build-out of renewable power capacity in their listed equity portfolio is aligned with the 2°C climate scenario.

In the qualitative survey, banks overall reported the highest number of climate strategies and actions, and more frequently stated to support the climate relevant policies and agreements mentioned. Banks focusing heavily on exclusion strategies and best-in class investing. Exercising voting rights and engagement on the other hand are the most employed strategy by pension funds and insurance companies. he ability of these climate actions and strategies to deliver impact in the real economy vary greatly across actions and modalities of implementation. Recent research demonstrates that engagement strategies, if well conducted, are more likely than portfolio reallocations to deliver an impact (Kölbel et al., 2020). The Climate Action Guide mentioned below provides more information on this topic. Furthermore, the plans of pension funds for the replacement fossil fuel heating with renewable sources are the most advanced and concrete.

The additional stress-test analysis for equity and corporate bond portfolios reveals that while overall loses are limited, the distribution is material.

The transition to a low-carbon economy will involve an industrial transformation that will create "winners" and "losers". That transformation will likely also have an effect on the risk and returns to financial portfolios. A number of approaches have been developed to try to quantify those transition risks as part of stress-test scenarios. As part of the 2020 exercise, financial institutions received – if wanted - the results of a stress-test scenario simulation for their uploaded equity and corporate bond portfolio of the kind applied by private sector actors like UN Principles for Responsible Investment (UN PRI) and some financial supervisory authorities.

Results of the simulated shock to the 'overall Swiss portfolio' depend on the exposure of the overall sector as well as of different high- and low-carbon technologies in that sector. In the stress-test analysis, shocks with start year 2030 are applied although a variety of scenarios is available. The results of the exercise demonstrate that a small minority of participating institutions may face significant losses of upwards of 10% under a climate transition to their listed equity and corporate bond portfolios. It should be noted that the model also finds that losses are lower as a function of a transition that is both well anticipated (i.e. where portfolios align early and rapidly with climate goals) and starts sooner rather than later.

AREAS FOR IMPROVEMENT AND NEXT STEPS

The project revealed both a number of challenges and areas for next steps, in particular regarding the observed gaps between communicated actions and underlying portfolios exposures.

This is particularly striking with respect to the coal exclusion policies reported. Here the majority of investors that had coal divestment policies in place still had holdings in coal mining in their portfolios, and sometimes even a higher exposure in this sector than their peer average without such a strategy. As the majority currently do not consult their clients or involve beneficiaries in this process, this represents another area of possible improvement.

Furthermore, there is room for improvement regarding the political support of climate relevant policies if financial institutions believe that pricing carbon emissions adequately is the most effective way to align financial flows with the climate goals. Around 80 % of respondents did not position themselves actively on the Paris climate agreement or the totally revised CO_2-law in Switzerland.

Overall, 65 % of participants indicated to be member of at least one sustainable finance initiative. However, only 7 % of these institutions take part in an initiative that requires concrete and quantitative commitments.

The PACTA 2020 analysis demonstrated the extent to which climate change awareness has been mainstreamed in the Swiss financial sector. However, there is need for improvement to ensure overarching ambition translates more effectively into concrete real-world emission reductions.

Around three-quarters of participants had identified a climate ambition or over-arching strategy across at least one asset class. The qualitative survey recorded 188 specific climate actions. At the same time, the results of this test also show that for some actions, the “translation” of these actions into portfolio outcomes is still incomplete. Only 15 % reported to have gathered evidence for impact in the real economy following their climate actions. This points to a lack of the accurate translation of climate ambition into specific actions and consistent application of these actions. Some of this is a function of the broader constraints within which financial institutions operate.

There are options for action with a direct climate impact in the real estate sector. Energy-related refurbishment of an investment property can increase the market value. In the case of mortgage portfolios, lenders could incentivise additional action.

Owners can increase the market value of their properties with climate friendly refurbishments if they can finance the investment costs through higher rental income. Moreover, tenants benefit when the additional rents are compensated by saving or refunding the CO_2 tax on heating fuels. Although the mortgage lenders have no direct influence on the buildings of the actual owners, they could actively contribute to the climate goal by providing incentives to the building owners. Examples are: better interest rates or other favourable conditions, offering energy analysis and general advice, or pre-financing models for switching from fossil fuels to renewable energy sources. The monthly mortgage interest rate for such a pre-financing loan could be lower for the customer than the CO_2 taxes on fossil fuel consumption were before.

There are a number of potential next steps that can contribute to filling the gaps identified in this report:

In order to help address the gaps outlined above, this test also includes the dissemination of a climate action guide linked to the financial portfolios to help in the design and implementation of climate actions by financial institutions. The guide has been distributed to financial institutions together with the portfolio results.

Better analysis of financial climate risks for investors can also help raise awareness. The test involved a stress-testing module for equity and corporate bond portfolios and financial institutions will be able to use a stress-test tool informed by PACTA as an open-source solution from 2021 onward.

International harmonization and standardization also play a role in this context. Over 1,000 organizations have used the PACTA tool to date. The tool has also been designed to articulate and inform other international initiatives. PACTA can be used to set science-based climate targets[8] and is currently used by a number of investors and banks in the context of the Net Zero Asset Owner Alliance (AOA)[9] and the Principles for Responsible Banking Collective Commitment on Climate Action (CCLA)[10]. It also informs the Climate Action CA100+ Initiative[11] as a data input and – as outlined above – is applied by a number of governments and financial supervisory authorities around the world. By using the PACTA tool, financial institutions are also fully aligned with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD)[12] with the requirement to conduct scenario analysis.

In addition, the mechanisms in place to measure impact of financial institution's climate actions are still insufficient. More research is needed to measure the impact of climate actions in terms of real world GHG emissions reductions. Only a quarter of survey respondents had any mechanism in place to track "real world impact". Anecdotal evidence based on the in-text responses suggests that many of these mechanisms are still quite rudimentary. This is not a criticism of the approach of financial institutions themselves, but rather a broader comment on the challenges of tracking real world impact of actions taken in the financial sector. A number of initiatives in Switzerland (e.g. University of Zurich Sustainable Finance Centre) and internationally (e.g. Evidence for Impact initiative) are seeking to fill that gap.

Finally, the analysis demonstrates the benefit of progress tracking. Switzerland announced the next test round for 2022. The enhanced PACTA model used for the internationally coordinated tests 2020 will again be available unlicensed in the market after completion of the tests under www.transitionmonitor.com/pacta-2020.

[8] While PACTA can be used to set science-based targets, it is not formally recognized by some NGO initiatives, notably the so-called Science-based Targets Initiative.
[9] https://www.unepfi.org/net-zero-alliance
[10] https://www.unepfi.org/banking/bankingprinciples/collective-commitment
[11] http://www.climateaction100.org
[12] https://www.fsb-tcfd.org

I. Introduction

The PACTA 2020 climate compatibility test aims to measure the Swiss financial sector's progress in aligning with the Paris Agreement goals, building on a successful pilot test in 2017.

Article 2.1c of the 2015 Paris Agreement created the political mandate to ensure the consistency of financial flows with the goal to limit the increase of global mean temperature to well below 2°C. Responding to this mandate, Switzerland launched the first national climate compatibility test pilot for the financial sector in 2017. The pilot involved a voluntary initiative to better understand the consistency of financial flows of Swiss financial institutions – specifically insurance companies and pension funds – with the Paris Agreement climate goals. As the first exercise of its kind, it mobilized around 79 Swiss financial institutions representing around two-thirds of the insurance and pension fund market (in terms of assets under management).

Following that exercise, the Swiss Federal Council announced its intention to regularly measure progress. In 2020 the Federal Office for the Environment (FOEN), in collaboration with the State Secretariat for International Finance (SIF), invited all Swiss pension funds, insurance companies, banks and asset managers to take part in the expanded PACTA 2020 analysis, where PACTA stands for Paris Agreement Capital Transition Assessment (see also chapter III). The PACTA 2020 climate compatibility test succeeded in significantly increasing the number of participants and market coverage of the study and expanded the analysis to additional sectors and asset classes.

The climate compatibility test 2020 is conducted in the context of a number of initiatives from governments, the private sector, and NGOs in Switzerland.

This climate compatibility test was backed and recommended by relevant Swiss finance associations, including the Swiss Bankers Association (SBA), the Swiss Insurance Association (SSV), the Swiss Pension Fund Association (ASIP) and the Swiss Asset Management Platform (AMP, former SFAMA), as well as the sustainable finance associations SSVK-ASIR (Swiss Association for Responsible Investments) and SSF (Swiss Sustainable Finance).

The PACTA test forms part of a broader set of Swiss initiatives, led by the private sector, NGOs, and the government, focused on integrating climate considerations into financial markets. Specifically:

- Swiss Financial Market Supervisory Authority as well as the Swiss National Bank joined the Network for Green the Financial System;[13]
- Switzerland joined the International Platform on Sustainable Finance;[14]
- In June 2020, the Federal Council adopted a report and guidelines on sustainability in the financial sector with the aim is to make Switzerland a leading location for sustainable financial services;[15]

[13] https://www.finma.ch/en/news/2019/04/20190417-mm-beitritt-ngfs/
[14] https://www.admin.ch/gov/en/start/documentation/media-releases.msg-id-78343.html
[15] https://www.sif.admin.ch/sif/en/home/finanzmarktpolitik/nachhalt_finanzsektor.html

- The Swiss Parliament anchored as a purpose of the totally revised CO_2-law the third goal of the Paris Agreement: to make financial flows consistent with a low carbon and climate resilient development;[16]
- The associations of the different financial market actors published recommendations on sustainable finance to their members;[17]
- NGOs have also increasingly become vocal on the issue, notably through analyses of cantonal banks and pension funds.[18]

These Swiss initiatives complement and contribute to a growing number of EU and international initiatives, notably the implementation of the EU Sustainable Finance Action Plan, the formation of the Network for Greening the Financial System (NGFS), and private sector initiatives (Katowice Commitment, Climate Action 100+, Collective Commitment on Climate Action, Net Zero Asset Owner Alliance, etc.).

These exercises have been complemented by new analytical solutions and breakthroughs in terms of understanding climate issues in financial markets, notably the improvements around asset-level data, modelling advances related to climate stress-tests, and the development of "Inevitable Policy Response" (IPR) scenarios as a complement to traditional approaches.[19]

The past few years have seen an increase of climate-related disclosure and measurement of portfolio alignment across the financial sector. Voluntary assessments such as the 2017 pilot test show the strength of voluntary action in setting standards, while stimulating engagement with climate change within the financial sector.

The uptake of the PACTA tool, as well as other metrics and methodologies to assess the climate compatibility of financial instruments, as well as climate disclosure aligned with TCFD recommendations, indicate that there are a growing number of financial institutions who are starting to assess their alignment and risk with regards to climate change. This is a positive sign, as it can represent a first step towards the integration of climate consideration into financial decision making ("you manage what you measure").[20]

Within the Swiss financial sector, the 2017 test has demonstrably triggered action: Of the participants who participated in both tests, over 50% said they had taken climate action based on or inspired by

[16] https://www.bafu.admin.ch/bafu/de/home/themen/klima/recht/totalrevision-co2-gesetz.html

[17] E.g. SwissBanking SBA: https://www.swissbanking.org/en/media/positions-and-press-releases/sustainable-finance-2013-switzer-land-on-course-to-become-a-premier-international-hub?set_language=en; Swiss Asset Management Platform AMP (former SFAMA) und Swiss Sustainable Finance SSF: https://www.sustainablefinance.ch/upload/cms/user/DE_2020_06_16_SFAMA_SSF_key_messages_and_recommendations_final.pdf, Swiss Insurance Association: https://www.svv.ch/de/versicherer-dokumentieren-ihre-nachhaltigkeitsbestrebungen; SVVK-ASIR: https://www.svvk-asir.ch/fileadmin/user_upload/documents_de/DE_Paper-Paris-Agreement-updated2020_01.pdf; Schweizerische Pensionskassenverband ASIP : https://www.asip.ch/de/dienstleistungen/fachmitteilungen/247/download/

[18] WWF, Sustainability in the Swiss retail banking sector,https://www.banktrack.org/download/sustainability_in_the_swiss_retail_banking_sector/4porwkoc5n_zusammenfassung_wwf_retailbanking_rating_en.pdf

Greenpeace Schweiz: Greenpeace klagt Klimaverantwortung der Finanzplatz-Regulatoren ein, https://www.greenpeace.ch/de/medienmitteilung/57033/greenpeace-klagt-klimaverantwortung-der-finanzplatz-regulatoren-ein/

[19] https://www.vivideconomics.com/casestudy/the-inevitable-policy-response/

[20] https://www.tandfonline.com/doi/full/10.1080/20430795.2019.1673142?scroll=top&needAccess=true

the results of the 2017 test. As the PACTA 2020 test is implemented in different European countries, lessons learnt will be shared and fed into the international debate on measuring climate alignment and monitoring progress.

However, despite the momentum on sustainable finance and early evidence of actions, the broader trends on climate change over the past few years have arguably not matched the ambition of the 2015 Paris Agreement.

Up until 2020, greenhouse gas emissions have increased every year, each year taking us further away from the possibility of reaching the Paris climate goal of limiting global mean temperature increase to well below 2°C.[21] Moreover, advances in climate science suggests that 'benign' climate outcomes seem increasingly unlikely and significant impact can already be expected at a global mean temperature increase of 1.5°C.[22]

The global COVID-19 pandemic and the policy response to it have now caused GHG emissions to drop in the first half of 2020. However, this abrupt shock has affected the most vulnerable countries and people most severely, and the effect is likely to rebound when economic activity takes up again. The disruption represents both an opportunity for economic transformation, but also a risk as public and private budgets for climate action may be negatively affected.

Effective measures and concrete action contributing to the Paris climate goals in the financial sector are now more important than ever. As the Swiss financial sector represents a significant percent of the Swiss GDP as well as its climate impact, it plays a crucial role in the broader climate strategy of the Swiss government.

While the financial sector appears as a key mechanism for achieving climate goals – as recognized in the Paris Agreement – the challenge in terms of "decarbonizing finance" remains significant:

Disclosure and awareness within the financial sector are important first steps but do not necessarily lead to better risk management or positive climate impact. Especially the aspect of "impact vs. exposure" was and is a critical point in the discussion about the contribution of the financial sector to the Paris Agreement and the way forward in terms of regulatory action and voluntary initiatives.

While from a government perspective, the overarching goal of *aligning* the financial sector with the goals of the Paris agreement is important, the alignment of individual financial portfolios is only a partial representation of progress. For example, if one financial institution ceases to invest in a coal power plant this does not necessarily mean that it stops operating – emissions may have just been transferred across financial portfolios or even asset classes. These issues cannot be ignored when considering the real-world impact of climate actions of financial institutions and the definition of climate-related targets, especially those that should meet the threshold of being "science-based". A

[21] https://www.unenvironment.org/resources/emissions-gap-report-2019
[22] IPCC, 2018: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways

critical goal of the 2020 exercise was to make progress on better understanding the relationship between climate actions and "portfolio alignment" and the real world impact this engenders.

There is still a lack of evidence and frameworks around the concept of financial sector' climate impact. This limits progress in the transition from measuring alignment to measuring impact.

For example, some financial institutions may invest in "non-aligned" companies in order to engage with them and drive their alignment. Similarly, financial institutions may have aligned their portfolios by shifting the emissions to another financial institution in the system.

It is therefore critical to build evidence on the relationship between real world emissions reductions, climate actions by financial institutions, and portfolio and market alignment, in order to develop effective soft or hard policy incentives and to ensure that financial institutions' voluntary initiatives are targeted and effective. Progress on alignment needs to be considered at macro-level, and at individual level coupled with information on climate actions and tracking of asset-level emissions. However, the underlying framework to understand the impact of climate actions in financial markets on the real economy is missing, although a number of initiatives have pivoted to focusing on that issue.[23]

ALIGNMENT AND IMPACT

Over the past years, awareness has grown that aligning a portfolio with climate goals does not equate to impact on real world emissions reductions. Lower emissions in a portfolio may be a function of drivers entirely independent of the investment decision of the portfolio manager such as changes in the company's production plans that occurred without the investor's involvement, company acquisitions or regulatory drivers.

Therefore, it is necessary to move beyond purely measuring alignment towards a better understanding of how investors can have impact in the real economy. Kölbel et al. (2020)[24] give the following definition of investor impact: the impact of an investor ("investor impact") is defined as the *change* that the investor has *caused* in the activities of the company benefiting from his investment.

There are a number of avenues outlined in the paper by which to achieve investor impact: In private markets, there is the possibility of enabling growth by to growing undersupplied markets, providing non-financial support or flexible capital. These avenues of impact are supported by empirical evidence. In public markets, investor impact is either based on encouraging improvement through shareholder engagement or market signals, or through non-market signals that impact matters. Especially for the latter two, the impact of this strategy is very difficult to evaluate.

[23] UZH, IMP-ACT, E4I

[24] https://journals.sagepub.com/doi/10.1177/1086026620919202

More academic research is needed to establish the link between climate actions in financial markets and real-world emissions reduction. New initiatives from the University of Zurich, Oxford, and 2° Investing Initiative among others are increasingly looking into this issue.

Updates to the PACTA 2020 climate compatibility test

The climate compatibility test in 2020 is part of an international initiative launched by the governments of Switzerland and the Netherlands ahead of the UN Climate Action Summit 2019.

As part of this international initiative, several European governments have committed to conducting a climate compatibility test with the countries' financial institutions based on the Swiss pilot in 2017. In the course of 2020-2021, Switzerland, Liechtenstein, Austria, Sweden, and Norway will conduct the climate compatibility test. Further countries are expected to follow.

In addition to these climate initiatives by governments, the project is also "mirrored" by supervisory and private sector initiatives. The financial supervisor is involved in the exercise directly both in Austria and Sweden. Beyond, PACTA as a tool, coupled with related analysis, is applied by the European Insurance and Occupational Pensions Authority (EIOPA) in Europe on insurance companies[25] and internationally by the Japanese Financial Services Agency (JFSA) on banks, among others. There are also industry associations – notably in Colombia and Mexico – using PACTA as a tool to track industry progress.

In recognition of the critical role of understanding portfolio exposure and actions, the PACTA methodology was expanded and enhanced for this test, reflecting the lessons learnt from the 2017 pilot test as well as feedback from 2020 participants.

A key finding of the feedback survey following the 2017 exercise and the exercise itself was the need to expand the coverage and analysis to the real estate and mortgage sector and to consider the climate actions of financial institutions in addition to their portfolio exposures. Moreover, the original pilot was closed to asset managers and large investment banks, limiting its applicability. In response to these issues, the 2020 exercise has been expanded to consider the following aspects.

Qualitative survey: In order to more broadly reflect possible avenues of climate impact and support the shift from exposure analysis to climate impact assessment, a qualitative survey was conducted as part of the climate compatibility test. The analysis and results of this survey provide financial institutions with best-in-class examples of existing climate strategies as well as a comparison to their peers and encourage the practice of assessing and reporting on climate impact. 83% of participants also filled out the survey.

Coverage of additional sectors and new data sources: Based on a collaboration with Wüest & Partner AG, the climate compatibility test covers Swiss real estate and mortgages. Investments in this sector typically make up 20-40 % of the investments managed by participants (see chapter II). The addition of this sector therefore greatly enhances the coverage and relevance of this study. Furthermore,

[25] https://www.eiopa.europa.eu/content/workshop-climate-change-related-risks

heavy-duty vehicles are now covered by the PACTA analysis, and the data and model of the aviation sector have been updated. Through new fund data from Lipper, the coverage of funds was also significantly improved.

New climate scenarios: Since the climate compatibility test in 2017, new scientific information on the significance of the difference between a 1.5°C and a 2°C global mean temperature increase has become available. To reflect the global ambition to limit warming to 1.5°C, a new range of climate scenarios was assessed. This analysis now includes an explicit 1.5°C scenario published by the European Commission Joint Research Centre, in addition to the Beyond 2°C Scenario published by the International Energy Agency.

Financial analysis: The 2020 analysis includes the application of climate stress test scenarios in order to quantify potential changes in the value of portfolios for each sector under different economic transition scenarios. The stress test scenarios consider a range of public scenarios designed in partnership with financial supervisors. The analysis also includes valuation estimates of the Inevitable Policy Response Forecast Policy Scenario, developed by Vivid Economics, with the support of the UN Principles for Responsible Investment (PRI).

Presentation of results: Based on the feedback of participants, the format used to present the results of the climate compatibility test have now been significantly improved. A new 'online' format was chosen in order to enable participants to interactively explore results. The explanations provided which each part of the analysis have been significant expanded, and more details on methodology and data sources are now made accessible to participants through the creation of a PACTA Knowledge Hub. Users can now receive a short executive summary as well as long-form interactive report

Participants: The number of participants increased from 79 in 2017 to 179 in 2020. This is reflected in the share of the Swiss market covered. In addition to pension funds and insurance companies, this years' participants also include pension funds, insurances, banks, asset managers including real estate funds and foundations. Of the 79 asset owner participants in 2017, 60 participated again in 2020.

This report presents the results of the 2020 climate compatibility test including these new updates.

Section 2 provides a brief review of the PACTA methodology, approach, and concept. Section 3 then Section 2 gives an overview of the participants and the survey and portfolios. Section 4 shows the results of Swiss real estate and mortgages, based on the work of Wüest Partner. Section 5 then presents the results of the climate scenario analysis using the PACTA methodology for the following sectors: fossil fuel industry, power, transportation (light- and heavy-duty vehicles, aviation, shipping), as well as industry (cement and steel). This section also elaborates on the implications of a 1.5°C scenario for the alignment analysis. Section 6 presents the results of the application of the stress-test scenarios. Section 7 investigates the development of the results since 2017 and section 8 discusses the findings of the qualitative survey conducted and Section 8 provides some concluding remarks.

II. Methodology and Data Sources

Overview of the PACTA Methodology

The Paris Alignment Capital Transition Assessment (PACTA) is a free and open-source methodology and software tool developed by the 2° Investing Initiative (2DII) to assess the alignment of financial portfolios with climate goals. It contains different modules that are presented in this chapter.

The PACTA climate scenario analysis for listed equity and corporate bonds is the core module of PACTA. Since 2018, this core module has been used by over 1,500 organizations worldwide representing a total of USD 106 trillion in assets under management. The PACTA methodology has also been recently expanded to corporate lending portfolios, a module which has been road-tested by a group of 17 major international banks including UBS, BNP Paribas, ING, Standard Chartered, Barclays and Credit Suisse.

In addition to the PACTA climate scenario analysis, 2DII developed climate stress test scenarios and models in collaboration with a number of financial supervisors and central banks. Funding for the development of the methodology and tool has been provided by the European Union's Life Programme as well as a range of governments and philanthropic institutions. In Switzerland, a collaboration with Wüest Partner was established to include the real estate sector in this analysis of the Swiss financial market.

This section provides a brief overview of the core principles behind the PACTA methodology. More information on the methodology and data sources is provided in reports published by 2DII[26] as well as the PACTA Knowledge Hub.[27]

PACTA Climate Scenario Analysis

The PACTA climate scenario analysis assesses the exposure, as well as the alignment of a portfolio with different climate scenarios and the Paris agreement in nine key climate relevant sectors.

The analysis is based on forward-looking asset-level data in the following nine key climate relevant sectors: Power, Oil & Gas, Coal mining, Automotive, Shipping, Aviation, Cement, Steel and Heavy-Duty Vehicles. Together, these sectors account for around 75% of global CO_2-emissions. This data is mapped to financial and ownership data and compared to climate scenarios that provide low-carbon energy transition roadmaps at technology-level.

The core climate scenario analysis provides answers to the following three questions:

1. *What share of the portfolio is currently exposed to activities in sectors affected by the transition to a low carbon economy?*

[26] Further details can be found on www.transitionmonitor.org.
[27] The knowledge hub can be found here: https://app.gitbook.com/@2-investing-initiative/s/pacta-knowledge-hub/

2. *How aligned are the investment and production plans of companies in the portfolio with different climate scenarios and the Paris Agreement?*
3. *What is the portfolio's technology mix in climate-relevant sectors expected to look like in five years based on current investment plans of the companies underlying the portfolio, and how does it compare to peers, the market, and a technology mix aligned with the Paris Agreement?*
4. *What companies are driving the results of the portfolio's exposure and alignment?*

The following table provides an overview of key components and principles underlying the PACTA methodology.

Physical asset-level data	The analysis is currently based on data covering 40 000+ companies and 230 000+ energy-related physical assets from third-party data providers. This alleviates the necessity to rely on companies' self-reported data that is published in a non-standardized manner and often does not account for scope 2 and 3 emissions.
Forward-Looking	PACTA provides a forward-looking analysis of the production plans financed by a portfolio that are compared to climate scenarios.
Sector-specific approach	The outputs of the analysis are metrics and indicators at sector and technology-level that allow for a detailed evaluation of a portfolios alignment, rather than one aggregated indicator at portfolio level. For sectors in which no low-carbon technologies exist, the sectoral decarbonization approach is used to benchmark the portfolio production against climate scenarios. The SDA was developed by the Science-based Targets Initiative.[28]
Allocating macroeconomic goals to microeconomic actors	The PACTA analysis uses a *market-share approach* to allocate macroeconomic climate goals to companies: all market level trends and goals are allocated to companies based on their current market-share in the sector or technology, for low- and high-carbon technologies respectively.
Mapping company-level activities to financial instruments and portfolios	A key question addressed in this methodology is how to allocate company-level activities to financial instruments. A number of different approaches exist that of which two are used in this analysis: **Portfolio Weight approach.** This approach calculates the portfolios' technology exposures based on the weighting of each position within the portfolio. This approach is used for the analysis of corporate bonds. **Ownership Weight approach:** This approach assigns a share of the companies' activities to the portfolio based on the percent of outstanding shares owned by the investor. This approach comes closer to allocating "responsibility" for the companies' activities to the financial institution. This approach is used for listed equity portfolios.

[28] https://sciencebasedtargets.org/

Data Sources and Coverage

The PACTA methodology is, in principle, agnostic to the data sources used to run it, as long as they meet the requirements specified above. The following three types of data input are needed:

Financial data	Data from financial databases and Lipper is used to assign securities to sectors and link them to parent and subsidiary companies.
Asset-Level data	For each sector covered in the analysis, 2DII sources data from independent industry data providers who source data on individual assets in climate-relevant industries using a variety of research capabilities, including web scraping, desk research and direct engagement with industry. These asset-level datasets cover more than 230,000 individual assets (power plants, oil fields etc) and account for more than 75% of global carbon emissions.
Climate scenarios	Production plans are compared to climate scenarios published by the International Energy Agency and Joint Research Centre of the European Commission.

Asset Level Data		
Data provider	**Sectors**	**Key data points**
GlobalData	Power, oil & gas, coal mining	a. Power plant data, including installed capacity, technology, status (i.e. announced, active, decommissioned, etc.). b. Oil and gas field data, including annual production volume. c. Coal mine data, including annual production mass.
AutoForecast Solutions	Automotive	Production forecasts for light duty vehicles
RightShip	Shipping	Ship data, including ship type and GHG rating score
CIRIUM, AirNav	Aviation	Passenger, cargo and combined aircraft data, including number of seats or tons transported, aircraft model, etc.
PlantFacts	Steel	Steel plant data, including production and CO2 emissions
Global Cement Directory	Cement	Cement plant data, including production and CO2 emissions
Power Systems Research	Heavy Duty Vehicles	Production forecasts for heavy duty vehicles

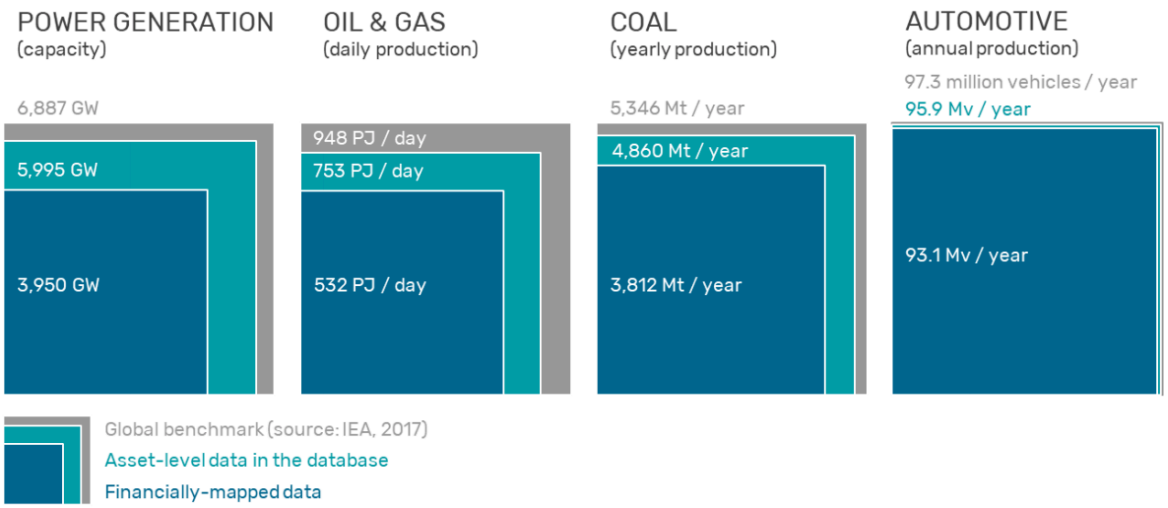


Figure 2: Coverage of the data sources in different sectors.

The portfolios of financial institutions are mapped to the asset level data based on the International Securities Identification Number (ISIN). Since this is not possible for loan books, the methodology was updated and is published as downloadable R packages.[29]

BOX: CLIMATE SCENARIOS

Stabilizing the global mean temperature increase to 2°C with some probability requires total anthropogenic CO_2 emissions to stay within a certain budget, estimated at around 1000 Gt CO_2 by the Intergovernmental Panel on Climate Change (IPCC). In conclusion, emissions will have to reach net zero by 2070, meaning that by that time, all remaining emissions will have to be compensated by removing CO_2 from the atmosphere. Achieving this goal requires profound shifts in our economy and energy system in particular.

A climate scenario is the result of a modelling exercise that aims to illustrate pathways for achieving this profound transition of the energy system under a certain set of assumptions. It is not a forecast or prediction of the future. Every climate scenario relies on a set of assumption regarding future technological as well as socioeconomic development.

Two main categories of models are used to study possible low-carbon transition scenarios: Energy System Models that provide a detailed study of the energy system and the development of different technologies, and Integrated Assessment Models that integrate models of the climate, economic, land-use and energy system and therefore are able to capture interactions between these systems. This report uses climate scenarios published by the International Energy Agency, as well as the POLES model published by the Joint Research Centre of the European Commission.

Alignment with specific temperature targets: Each climate scenario operates within the constraints of a global carbon budget that then corresponds to a global mean temperature increase, with a certain probability. This carbon budget can be allocated to different sectors and technologies in

[29] https://www.transitionmonitor.com/pacta-for-banks-2020/

different ways, based on the assumptions of the model. Alignment or non-alignment in one technology therefore does not imply alignment overall, as there are different ways of distributing the carbon budget across different sectors.

The following climate scenarios are used in this report: More details on each individual scenario can be found in the annex[30].

Scenario	Abbreviation	Estimated temperature increase	Source
POLES 1.9 SSP1	POLES1.5	~ 1.5 °C	JRC
Beyond 2°C Scenario	B2DS	< 1.75 °C	ETP17
Sustainable Development Scenario	SDS	1.75 – 2 °C	WEO19
New Policies Scenario	NPS	2 - 2.7°C	WEO19
Current Policy Scenario	CPS	> 2.7 °C	WEO19

Limitations of the Analysis

There are a number of limitations to the PACTA climate scenario analysis for equity and corporate bonds conducted in this report. The first relates to the data received from financial institutions. Financial institutions are not obliged to upload their entire portfolios; therefore, this analysis does not necessarily cover all their climate relevant holdings. The market coverage of the Swiss financial sector is high, but we do not aim to infer the alignment of the entire Swiss market from these results, as there may have been a selection bias.

The second limitation relates to the climate scenarios used. The climate scenarios here present one possible manifestation of how the energy transition aligned with the Paris climate agreement could look like. Even though the trend necessary is not controversial (expansion of renewables, retirement of high-carbon technologies), the precise way in which a carbon budget is distributed across sectors will be solved in different ways by different scenarios. Furthermore, different models will include different assumptions about the future development and potential of certain technologies. This analysis therefore focuses on those technologies that are proven and available to the market. Thereby, this analysis does not consider investments in R&D that represent an important contribution financial institution can make in bringing new solutions to the market.

The third relates to the asset level data used. Although the data is source from reliable, third-party data providers, errors are possible, either in the production plans themselves, or in mapping the ownership structure of a companies. Furthermore, planned production plans do not necessarily materialize and production forecasts should be interpreted baring this in mind.

The last relates to the scope of the analysis. PACTA does not cover certain sectors, such as agriculture and forestry, despite them being highly relevant for limiting future greenhouse gas emissions, due to lack of available data. Furthermore, asset classes such as sovereign bonds or private equity are also not included in the analysis.

[30] The annex is published in a separate document, available on the 2DII website.

Outlook to future development

2DII is working on expanding PACTA to cover additional sections, as well as adding different methodological options and add-ons, such as a potential EU taxonomy indicator. Further sectors such as agriculture, forestry and mining are in planning, however the availability of asset-level data limits the coverage of additional sectors. In addition, 2DII is also working on integrating approaches and methods from third parties, notably the Carbon Tracker Initiative for oil, gas, and coal production (CTI 2014, 2016). This approach uses the cost structure of a company's existing, planned, and potential capital stock to estimate which assets meet a sector-wide output constraint under the assumption that low-cost assets will be deployed first.

This project also, for the first time, builds a link between the 'traditional' PACTA alignment metrics and the analysis of climate strategies and impact - through the Climate Action Guide at participant level, as well as the analysis of climate strategies and their relation to portfolio alignment in this report. This analysis will be expanded upon in future work and research.

Climate stress-test scenarios & application

The stress-test scenario application calculates the magnitude of potential market value losses of equity and bonds due to a late and sudden policy shock to limit global warming to below 2°C.

Climate stress test scenarios based on PACTA results have been developed by 2DII in collaboration with a number of financial supervisors. As of now, the climate stress test in this report only considers transition risks when calculating potential losses. The approach is inspired by the Inevitable Policy Response (IPR) concept.[31]

The first assumption of this stress-test is that the world economy as well as the assessed portfolios are on a baseline transition scenario. The baseline scenario assumes overall production in climate relevant sectors and technologies to follow the trajectories described in the NPS/STEPS (Stated Policies Scenario) scenario. This baseline scenario would likely lead to a global temperature rise between 2.7 and 3.5°C by the end of the century and is therefore not aligned with the Paris Climate Agreement (UNPRI 2019).

The scenarios applied assume that governments between 2025-2030 decide to take drastic policy action that either meet the IEA Sustainable Development Scenario carbon budget or near it.

Effectively governments decide to switch the world economy from the path of the baseline and onto the SDS path. According to the Carbon Balance method developed by the 2° Investing Initiative, this transition is completed between 2030-2040.[32] Effectively, production in carbon intensive sectors will decrease significantly and production in less carbon intensive sectors will increase sharply (both in comparison to the SDS pathways). Along with the changes in production pathways under such a scenario, the market prices of said technologies are expected to change suddenly, as well as the profits. These changes are quantified as potential losses (or gains) in the value of equity and bond

[31] https://www.unpri.org/what-is-the-inevitable-policy-response/4787.article
[32] http://www.acrn-journals.eu/iframe-8/jofrp/jofrp/jofrpvol801p206.html

holdings. We do this by employing a discounted cash flow model that captures the differences in future profits between the baseline and the scenarios for each technology. A shock to the discounted cash flow will translate to a shock to the equity value of a holding. For bonds, it would be optimal to explicitly consider the default risk induced by such a shock, but for lack of data to run a fully-fledged credit risk model, we instead assume the technology shocks from equity assets carry over to corporate bonds using a 0.15 flat multiplier, as introduced by the Bank of England for the Climate Exploratory Scenario developed as part of the 2019 Insurance Stress-Test (BoE 2019). In addition to this exercise, it also applies the Inevitable Policy Response Forecast Policy Scenario for the equity portfolios as a complementary approach.

This climate transition stress test does not attempt to quantify the overall financial risk related to climate transition scenarios, as scenarios with limited or no transition are likely to have a higher physical risk and potentially legal risk than scenarios with a transition that manages to stay within two degrees of warming above pre-industrial levels or less. The tool is also still in its early stage of development and still has a number of limitations, with further work planned in 2021.

Real Estate

Overview of the methodology

As an extension to the PACTA Analysis 2017, an additional module for the analysis of real estate and mortgage portfolios in Switzerland was introduced for the current implementation of PACTA 2020.

This module was developed on behalf of the Federal Office for Environment FOEN by Wüest Partner in 2018/19. In close cooperation with the FOEN, Wüest Partner applied this new real estate module to all submitted real estate and mortgage portfolios in the implementation of PACTA 2020.

The key research questions are posed in this analysis:

1. *How high are the CO_2 emissions of the property or mortgage portfolios of all participants in the PACTA 2020 test?*
2. *How high are the CO_2 building emissions of the four sectors considered (banks, insurance companies, pension funds, asset managers)?*
3. *How do the sectors perform in relation to the Swiss climate targets for the building stock, i.e. how climate-friendly are the property or mortgage portfolios?*

In order to determine the climate compatibility of the test participants' property or mortgage portfolios, the CO_2 emissions of the tested properties are compared with various reference scenarios.

The analysis uses the following scenarios:

- The Federal Council's reduction path for the entire Swiss building stock to "net zero" by 2050.[33]

33 https://www.admin.ch/gov/de/start/dokumentation/medienmitteilungen.msg-id-76206.html

- The corresponding CO_2 emission limits for heating replacement in existing buildings and for new buildings under the totally revised CO_2 Act.[34]
- The "business-as-usual" scenario according to the method report on the real estate tool from Wüest Partner.[35]

"Net zero" in 2050 implies the Swiss building park no longer emits any CO_2 in 2050. This "net zero" target path therefore serves as a reference against which the climate compatibility of a property can also be measured prospectively.

This reference specifies how much CO_2 each building type still can emit on average for each year from 2020 to 2050. The limit values according to the totally revised CO_2 law also provide a further point of reference. Both values are shown as efficiency values, i.e. as the amount of CO_2 emitted in kilograms per square metre of energy reference area. The first limit value under the new CO_2 Act is 20 kg per m2 and year.

For PACTA 2020, two time periods were chosen. The first represents the current situation, while the second time period in 2030 is intended to reflect the situation in 10 years. Participants therefore had the possibility to submit their planned renovation measures for the building features relevant to this test, i.e. facade, windows, roof and basement. The substitution of the existing energy source for heating or hot water preparation with another - for example by replacing oil with gas or with a non-fossil energy source – was also taken into account. Participants had the possibility to indicate the location of the building in the form of the EGID (Federal Building Identification Number), an address or geographical coordinates. Additional factors (e.g. heating source, energy consumption area, renovation details) for determining the CO_2 emissions for each Swiss property were added by applying the module from the Swiss Register of Buildings and Housing (GWR) of the Federal Statistical Office.

The portfolio owners had the possibility to supplement some of these factors themselves if they had more up-to-date or more precise data available. Using the SIA standard 380/1 (2016) "Heating demand" as a basis, a simplified, "virtual, digital twin" was created for each building submitted and its heating demand calculated. Using the CO_2 emission factors specified by the FOEN for the three energy sources "heating oil", "natural gas" and "other", the annual CO_2 emissions are calculated which are produced by the generation of heat for heating and hot water in this building. For a correct calculation, the following information is required for each building of the participant:

Table 1: Information required from participants for the CO2 calculator PACTA

Specification	Example	Mandatory/optional
Energy reference area (EBF) in m2	500	Mandatory
Number of floors (heated)	3	Mandatory
Building year of construction	1995	Mandatory
Main use type building (definition according to SIA 380/1:2009)	1: Living EFH	Mandatory

34 https://www.bafu.admin.ch/bafu/de/home/themen/klima/recht/totalrevision-co2-gesetz.html

35 See Wüest Partner AG (2020): Methodenbericht zum Immobilienmodul (in German only) https://www.bafu.admin.ch/bafu/de/home/themen/klima/fachinformationen/klima-und-finanzmarkt.html

Code of the assigned Temperature measure station	ABO (Adelboden)	Mandatory
(Definition according to extract from SIA 2028)	Oil/gas/other	Mandatory
Energy sources for heating and hot water	2010	Optional
Renovation year facade	2010	Optional
Renovation year roof	2000	Optional
Renovation year window	Not specified	Optional
Renovation year cellar	500	Mandatory

If this mandatory information was not provided directly by the participant, it was obtained from the GWR as mentioned above. The following parameters were calculated:

Table 2: Parameters of the CO2 calculator PACTA

Parameter	**Unit**
CO_2 emissions per energy reference area and year	kg per m2 and year
CO_2 emissions per year, total	kg per year

The R-Package, developed for the calculations in the real estate module using the statistics environment "R"[36], can be obtained from the FOEN as open source software. Detailed information is available in the corresponding method report.[37]

Limitations of the analysis

The input data from the Swiss Building and Housing Register (GWR) can vary in terms of data quality depending on the canton and building type.

The data quality will improve in the course of time through the data maintenance of the respective municipalities and - if more precise information is available - can of course also be overwritten by the owner of the portfolio. The electricity consumption is assumed to be CO_2-neutral in the methodology of the real estate module, in accordance with the electricity mix produced in Switzerland. Energy aspects, the materials used for the construction of a property (grey energy) and recycling issues are not considered in this module. Financial indicators (e.g. renovation costs, operating costs, changes of income situation, etc.) are also not taken into account or reported.

Data robustness

As explained in the Methodology Report[23], in 2018, 13 % of the buildings in the Buildings and Housing Register (GWR) did not have data on the two building characteristics energy source or year of construction. For 78 % of the buildings included in the test, this information is available in the GWR, but is not necessarily up to date. This is the case, for example, if the age of a building is more than 30

36 https://www.r-project.org

37 https://www.bafu.admin.ch/bafu/de/home/themen/klima/fachinformationen/klima-und-finanzmarkt.html

years according to the year of construction, but simultaneously no information on any renovations is available. Only for buildings from the canton *Basel-Stadt* 100% of the building characteristics required for the analysis were available. In all other cantons, some of the building characteristics required for the calculations were missing. If the participants were able to feed in the building characteristics from their own data sources, the significance of the results of the CO_2 calculation was increased. The data quality of the buildings submitted for analysis is categorized as either "good", "medium" or "moderate". The following table provides information on the criteria for each allocation to one of the three categories.

Table 3: criteria for categorising data in terms of their quality

Quality	**Criteria**
good	Building age ≤ 30 years or building age > 30 years with renovation
medium	Building age > 30 years and no renovations available
moderate	Energy source and year of construction missing
n/a	obligatory indication missing

III. Participation and Coverage

Overview

179 financial institutions submitted their portfolios for analysis in the 2020 climate compatibility test. These include 106 pension funds, 24 insurances, 31 banks and 14 asset managers.[38]

This represents more than twice the number of institutions compared to the test in 2017. Participants had the possibility to submit their global listed equity and corporate bonds portfolios (analyzed by the 2° Investing Initiative), as well as their Swiss real estate and mortgage portfolios (analyzed by Wüest Partner). They also had the option to submit answers to a qualitative survey. Not all institutions participated in all three components of the test. The table below provides details of participation numbers by "module".

Table 4: Overview of participant numbers

Group	Listed equity & corporate bonds	Real Estate & Mortgages	Qualitative Survey	Total
Pension Funds	104	67	83	106
Insurance	24	16	19	24
Banks	28	16	24	31
Asset Managers	9	6	12	14
Other	1	4	4	4
Overall	166	109	142	179

Institutions participating in the test represent an estimated 88% of the balance sheet total of banks in Switzerland, 79% of assets under management by insurance companies,[39] and 82% of assets under management by pension funds.

One approach to assessing the market coverage of the study is to calculate the total assets under management represented by the institutions participating. The numbers below are based on the research of the institutions total assets reporting their annual report, compared to estimations of the entire Swiss market based on the FINMA 'Versichererreport', the SIF 'Kennzahlen Finanzstandort Schweiz' and the data portal of the Swiss National Bank.

[38] Note that the 179 institutions include 4 institutions classified as "others". Six investment foundations are counted as asset managers.
[39] It is relevant to note here that the coverage percentage for insurance companies is marginally lower than that estimated in the 2017 exercise, despite the fact that the number of participating institutions has increased. When estimating the coverage, the authors of this report are forced to rely on meta statistics and at least in part self-reported data, which introduce some uncertainties (e.g. exchange rate, timestamps of portfolios, boundaries in terms of Swiss / international business). As a result, there is always some margin of error in estimating coverage. Given the high degree of overlap, it seems likely that the coverage in 2017 was slightly over-estimated as a result of data limitations at the time. It may of course also be the case that this year's estimate slightly under-estimate the coverage. For full transparency, no estimation adjustments were made. However, all in all the coverage is despite the increase in institutions largely unchanged.

Table 5: Assessment of coverage and market share

Group	# of participants	Unit of comparison	Total Switzerland In billion CHF	PACTA participants In billion CHF	% represented by participants
Banks[40]	31	Balance sheet total	3 317	2 914	88 %
Pension Funds[41]	106	Total Assets	876	715	82 %
Insurance[42]	24	Total Assets	582	458	79 %

For asset managers, calculating this percentage is more difficult. It can be said however that organizations representing 82% of the assets managed by the top 25 asset managers participated in the climate compatibility test. (Asset managers participating in the climate compatibility test represent 2.1 trillion CHF).

The climate compatibility test covers global equity and corporate bonds as well as Swiss real estate and mortgage portfolios. Based on institutions' self-declared distribution of asset classes in their total portfolio, this means that around 56% of the portfolios are covered by this test.

As shown in the graphic below, equity and corporate bonds typically make up 20-40% of the participants portfolios. In addition, real estate and mortgages make up another 20-40 % of the portfolio. This share is especially high for banks and asset managers. The table below shows the average percent of assets covered by the climate compatibility test, by type of financial institution. The data is based on participants' self-reported composition of asset classes.

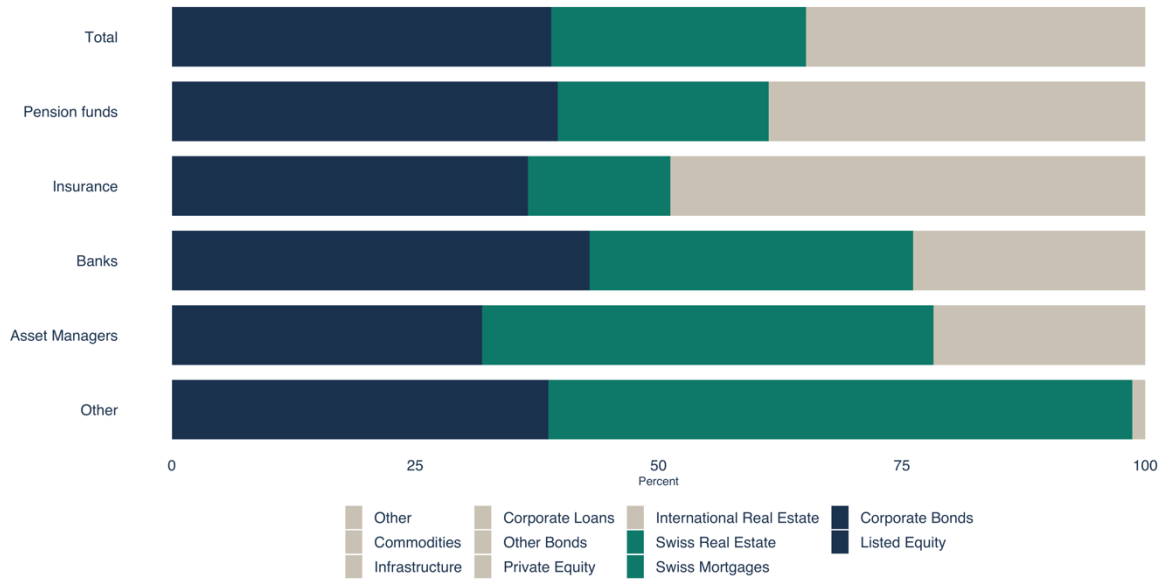


Figure 3: Distribution of holdings to different asset classes, as reported by participants in the survey. 100% of survey respondents answered this question.

[40]https://data.snb.ch
[41] https://www.sif.admin.ch/sif/de/home/dokumentation/publikationen/kennzahlen-finanzstandort-schweiz.spa.kennzahlen.app/index.html
[42] https://www.versichererreport.finma.ch/ReportPortal/

Climate scenario analysis of listed equity and corporate bonds portfolios

3.5 trillion USD in holdings were submitted for climate scenario analysis. A total of 1.3 trillion USD in equity holdings and 0.7 trillion USD in corporate bonds could be analyzed using the PACTA methodology.

The largest share of equity and corporate bond holdings were submitted by banks with a total of 2.5 trillion USD in equity holdings, and 0.4 trillion USD in corporate bonds.

Table 6: Portfolio value uploaded in different asset classes.

Group (in billion CHF)	Listed Equity	Corporate Bonds	Funds	Other	Total
Pension Funds	128.4	105.0	123.1	308.5	665.3
Insurance	43.4	137.4	31.7	75.4	288
Banks	950.2	415.4	199.5	726,5	2,291.7
Asset Managers	188.0	59	11	45	303.1
Overall	1,310.0	717	365.4	1,155.6	3,548.0

Overall, more 1 million holdings were uploaded across more than 4,000 portfolios. In each peer group, more than 85% of holdings were mapped to financial and asset level data and included in the analysis.

The figure below provides the breakdown by type of participating institutions in terms of coverage.

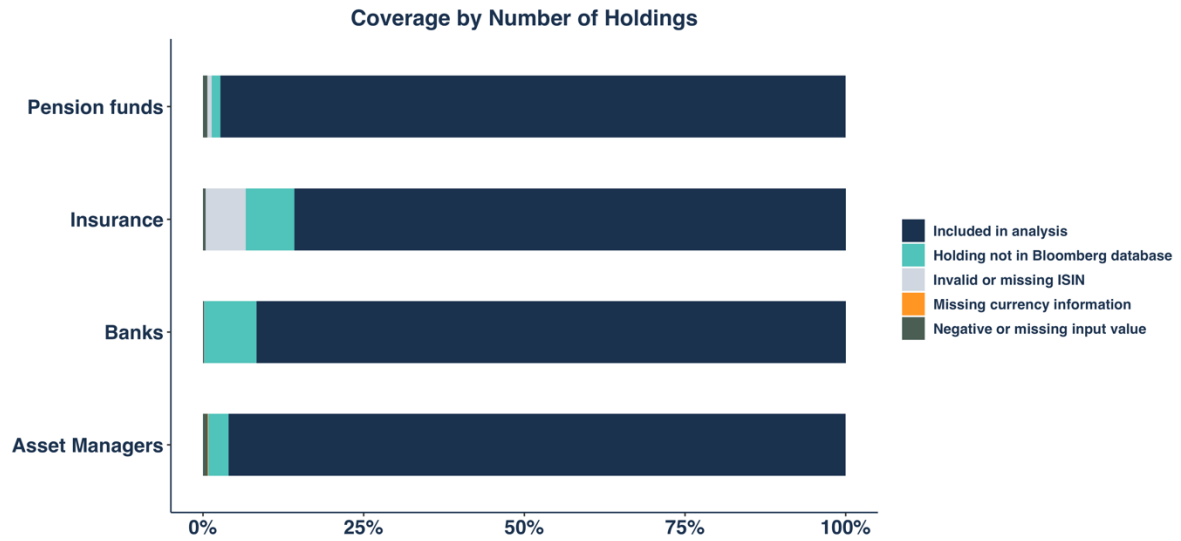


Figure 4: Coverage by number of holdings submitted by participants.

Sectors covered in this section represent around 75% of global CO_2 emissions and around 10-15% of the portfolio exposure of Swiss financial institutions.

The exposure to climate relevant sectors is slightly higher for the corporate bonds than for the listed equity portfolios submitted.

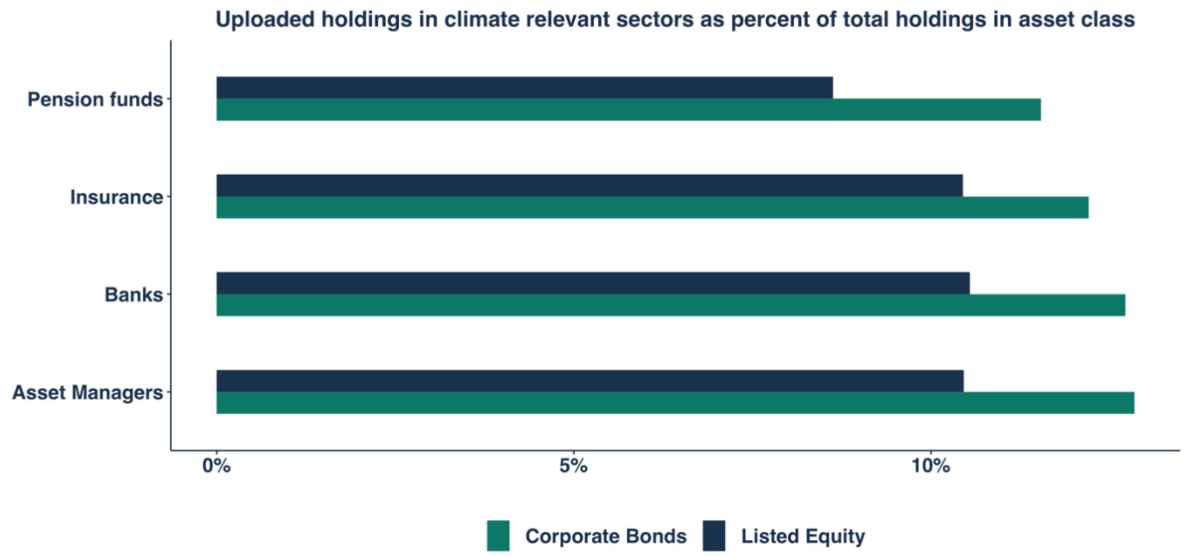


Figure 5: Percent of aggregate portfolio invested in climate-relevant sectors

Table 7: Value uploaded in climate relevant sectors as percent of total value uploaded in the asset class.

Organization Type	Asset Class	Value in climate relevant sectors in billion USD	Total value submitted in this asset class in billion USD	Percent in climate relevant sector
Asset Managers	Corporate Bonds	7.4	59	12.9
	Listed Equity	19.4	188	10.5
Banks	Corporate Bonds	51.4	415.4	12.7
	Listed Equity	100.1	950.2	10.5
Insurance	Corporate Bonds	16.6	137.4	12.2
	Listed Equity	4.5	43.4	10.4
Pension funds	Corporate Bonds	12.4	105	11.5
	Listed Equity	11.3	128.4	8.6

Within climate relevant sectors, oil & gas, power, and automotive continue to dominate the overall picture, representing around three-quarters of portfolio value across these sectors in equity portfolios, and around four-fifths in bond portfolios.

Composition of Listed Equity holdings in climate relevant sectors

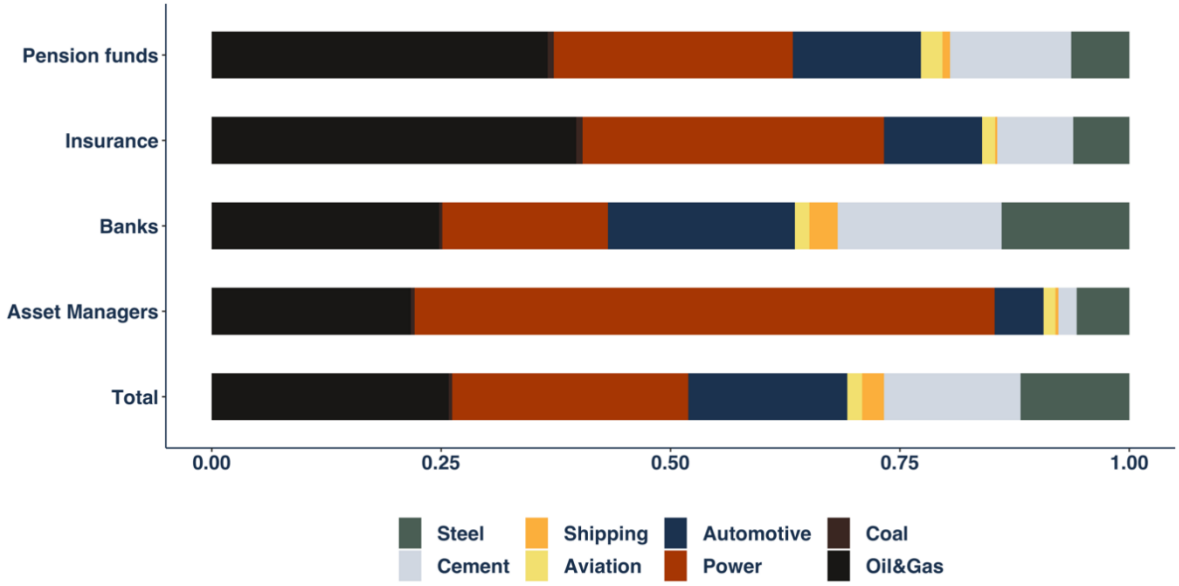


Figure 6: Listed Equity holdings in climate relevant sectors

Composition of Corporate Bond holdings in climate relevant sectors

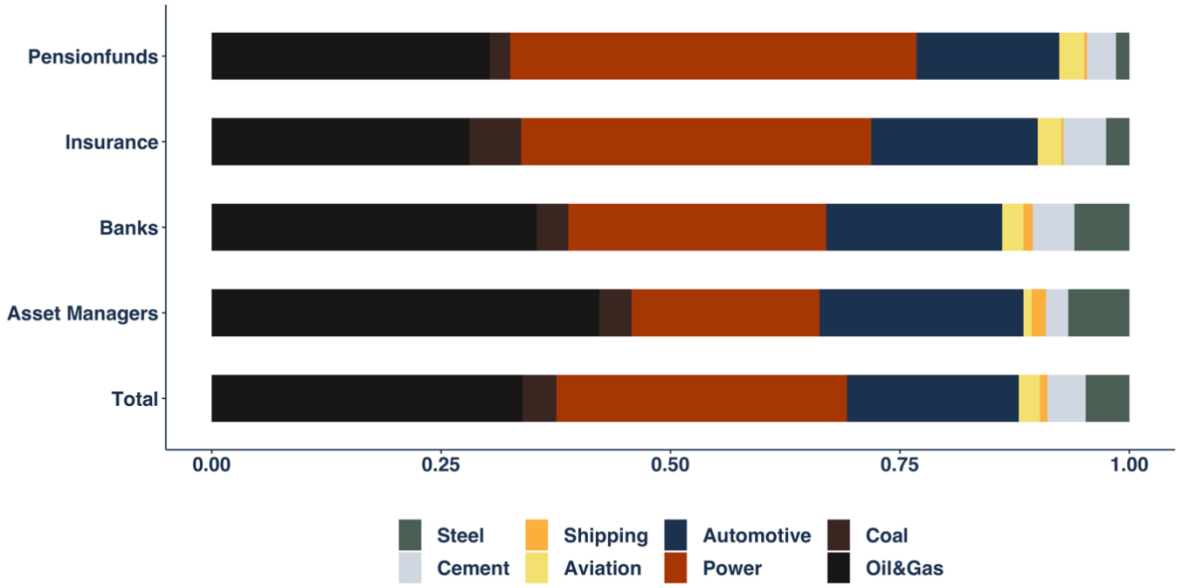


Figure 7: Corporate Bonds holdings in climate relevant sectors

Real Estate and Mortgage Portfolios

This report estimates that around half of all buildings held directly by institutional investors have been submitted for the climate compatibility test.

In total, over 23,000 buildings were submitted to PACTA 2020 for analysis. The pension funds submitted the largest share, accounting for 43% of all portfolios. Banks and insurance companies are on par, while asset managers (including investment foundations) submitted slightly fewer portfolios.

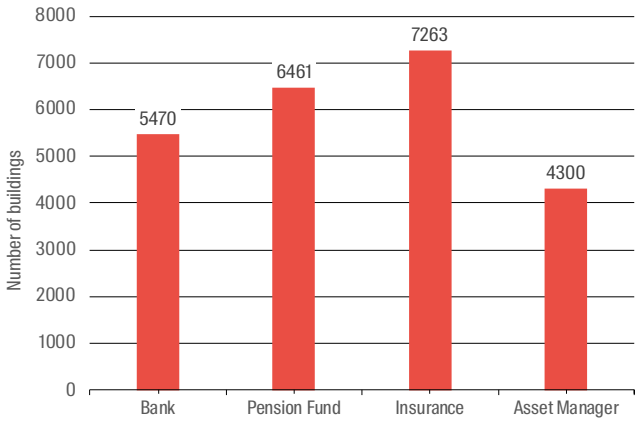


Figure 8: Distribution of the tested portfolios of directly owned buildings (2020)

In the mortgage segment, around 1.15 million residential buildings were submitted to PACTA 2020, which corresponds to around two thirds of all residential buildings in Switzerland.

It can therefore be assumed that the Swiss real estate market is well covered in this year's PACTA analysis. A total of 28 mortgage portfolios were submitted. The banks submitted the largest share with 12 portfolios (43 %), compared to 29 % for both pension funds and insurance companies. On average, banks submitted the larger buildings for testing, whereas insurance companies submitted around 30% more buildings, although each of these are slightly smaller. Overall, around 7% of Swiss energy reference areas (EBF) were analysed in the directly held real estate segment.

Quality of submitted data

More than half (55%) of the submitted buildings directly owned by institutional investors fall into the best category "good", 44% are categorized as "medium".

Due to a lack of information on the parameters necessary for the calculation, CO_2 emissions could not be calculated for 9% of the buildings submitted for the test. Of the 91 % of the remaining buildings, only 1 % had to be rated "moderate" for data quality. The highest proportion of buildings that could not be assessed due to missing data belongs to the banking segment.

Pension funds appear to know their directly held buildings very well, as almost 80 % of the tested buildings are of "good" data quality. Over 60 % of the data submitted by insurance companies and asset managers was placed in the category "good". Overall, no calculation was possible for around

30% of the buildings in the mortgage segment. Of the remaining more than 880,000 buildings, almost two thirds (64 %) have a data quality of "medium", 21 % of "good" and 15 % of "moderate".

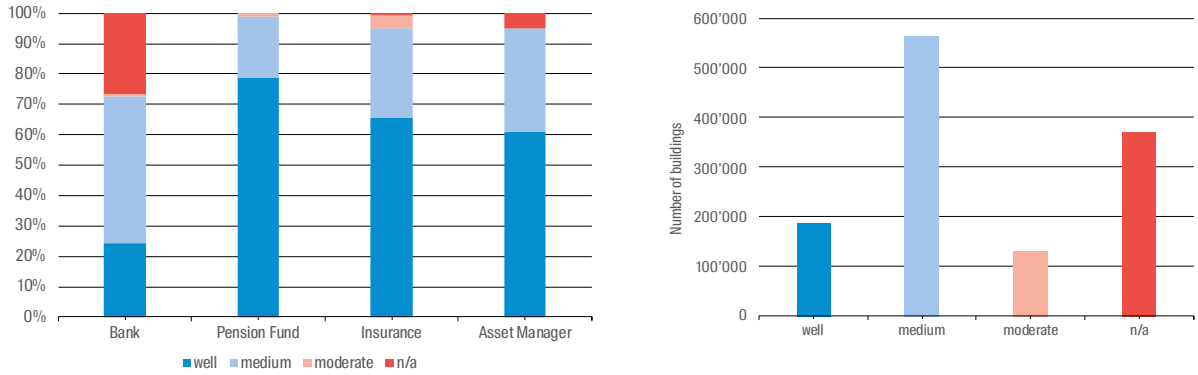


Figure 9: a) Quality of data submitted for directly owned buildings (2020, Data quality of buildings (number) with mortgages (2020)

Overall the quality of data available for mortgage portfolios was not as good as the data provided for directly held properties by institutional investors. There are a number of reasons for this such as missing linkages between databases. Also, certain information on the technical equipment of a building, such as the type of energy source, has so far not been considered directly relevant for the granting of a mortgage and has therefore not been systematically recorded by the lender.

In the case of mortgages, there is a slight difference in data quality between the proportion of buildings and the proportion of energy reference area. The energy reference area, which is decisive for absolute CO_2 emissions, has a higher proportion in all categories of data quality, which has a positive effect on the reliability of the calculated results.

Table 8: Share of categories per data quality by buildings and energy reference areas

Quality	Share of buildings	EBF share
good	15 %	21 %
medium	45 %	56 %
moderate	10 %	11 %
n/a	30 %	12 %

IV. Evaluation of the Swiss Real Estate Sector [43]

The Swiss Real Estate Market

CO2 emissions of the Swiss building stock

According to the FOEN greenhouse gas inventory[44], CO_2 emissions from the Swiss building stock currently account for just over a quarter of Switzerland's total CO_2 emissions.

The proportion of buildings powered by non-fossil energy sources has been rising sharply since 2000. Nevertheless, the change in the total stock of all buildings in Switzerland is rather slow. For example, according to the Federal Statistical Office[45], in 2017 around 40% of all buildings were still being operated with heating oil and around 20% with gas as the main energy source. Compared to the initial situation in 1990, the share of heating oil has been reduced by around a third, while the share of gas has doubled. However, almost one in five buildings is now equipped with a heat pump and, according to the convention on the electricity mix used here, does not produce CO_2 in Switzerland (territorial principle according to the Paris Convention).

Of the directly owned buildings submitted for testing, 29% were powered by oil and 41% by gas. In the case of mortgages, 59% of the buildings were powered by oil and 20% by gas.

CO_2 emissions from buildings have fallen steadily in the past. By 2020, CO_2 emissions from buildings should be at least 40% below 1990 levels. The interim target of minus 22% by 2015 compared to 1990 (Art. 3 CO2 Regulation) has been exceeded.[46] However, the indicative target for 2020 of minus 40 % compared to 1990 is unlikely to be met.[47]

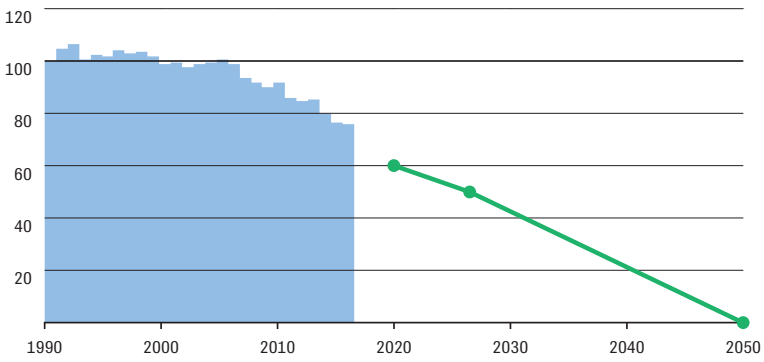


Figure 10: Development of CO2 emissions from buildings and the Federal Council's target path

This section presents the results of the evaluation of the Swiss Real Estate Sector. A stand-alone report of the results is also published in German and available for download.

44 https://www.bafu.admin.ch/bafu/de/home/themen/klima/daten-indikatoren-karten/daten/treibhausgasinventar.html

45 https://www.bfs.admin.ch/bfs/de/home/statistiken/bau-wohnungswesen/gebaeude/energiebereich.html

46 https://www.bafu.admin.ch/bafu/de/home/themen/klima/fachinformationen/klimapolitik/gebaeude.html

47 https://www.bafu.admin.ch/bafu/de/home/themen/klima/mitteilungen.msg-id-78720.html

The use of various climate policy instruments, such as the buildings programme and cantonal support programmes, has helped to reduce emissions in recent years.

Since 2008, a CO_2 tax has been levied on fossil fuels. This provides an incentive to consume less fossil fuels. One third of the revenue from the CO_2 tax is used for the federal and cantonal buildings programme. This programme promotes renovation of the building envelope, investments in renewable energies, waste heat recovery and building services, and since 2018, geothermal energy projects. The cantons also make an important contribution with specific promotional instruments and legal provisions.

However, in order to achieve the Federal Council's declared goal of "net zero" in 2050, the entire Swiss building stock will have to reduce its CO_2 emissions more rapidly in future than has been the case in the past.

Today, technologies to further reduce CO_2 emissions are largely available in the buildings sector. Thermal insulation measures for facades, windows and roofs are offered in the market. There is also a wide range of options available for the substitution of fossil fuels. In 2017, for example, heat pumps (17.9 % of all buildings with residential use), wood (10.1 %) and district heating (4.2 %) were used. In the segment of new buildings, newly constructed buildings are already largely equipped with renewable heating systems.

New buildings today use around 4 to 7 times less energy than buildings built before 1980[48] and the market share of investments in renewable heating systems for new buildings is already around 90%.

However, when heating systems are converted or replaced, the market share of renewable systems will still be below 20 %[49] in 2014. In addition, only about half as much is currently invested annually in the renovation of existing buildings (approx. CHF 13 billion) as in the construction of new buildings (approx. CHF 27 billion).[50]

As part of the total revision of the CO_2 Act, limits on CO_2 emissions from buildings are to be introduced.

Parliament decided that from 2023, a CO_2 limit value of 20 kg/m2 in one year should apply when heating systems are renewed. This limit will be increased by 5 kg every 5 years. This would mean that homeowners would only be able to install a new oil-fired heating system if the house is very well insulated. From 2023 onwards, new buildings may in principle no longer produce CO_2 emissions from fossil fuels for heating and hot water. In addition, the maximum rate of the CO_2 levy from fuels is to increase from CHF 120 today to up to CHF 210 per tonne of CO_2 if emissions from fuels do not fall sufficiently. The buildings programme and the cantonal promotion programmes and regulations will also be continued.

48 http://www.sia.ch/de/themen/energie/modernisierung-gebaeudepark/

49 BFE (2017): Gebäudepark 2050, Factsheet

50 Wüest & Partner (2015): Heizsysteme: Entwicklung der Marktanteile 2001-2014, Aktualisierung 2015

The real estate and mortgage portfolios submitted in the climate compatibility test will therefore be examined to determine the extent to which they comply with the limit values of the totally revised CO_2 Act for heating replacement in existing buildings. These limit values also serve as a reference to the Federal Council's "net zero" target for 2050 for the building park in 2050.

Depending on use, between 10 and 20 % of all rented properties are owned by institutional investors such as pension funds, insurance companies and investment foundations.

The total value of all rented properties in Switzerland is around CHF 1,800 billion. According to a rough estimate by Wüest Partner, the majority of residential properties are privately owned, accounting for around 67 % (market share by value). In terms of value, institutional investors own about one fifth of all rented residential properties in Switzerland with an estimated total value of CHF 100 billion.

In the case of commercial properties, the share of institutional owners is smaller, at only around 10% or 85 billion, with pension funds being the largest group of owners here too, with almost a third. A quarter of the buildings belong to real estate funds, which means that they are much more heavily invested in this segment than in the residential segment. Institutional investors such as pension funds, insurance companies and banks are therefore relevant owners of buildings and can play a corresponding pioneering role.

Mortgage loans consistently represent the largest share of the credit volume of Swiss banks.

The outstanding domestic credit volume in 2019 amounted to CHF 1,214 billion - of which CHF 171 billion came from covered and uncovered claims on customers (companies, public bodies and consumer loans) and CHF 1,043 billion from mortgage claims. Compared to the previous year, total domestic lending volume in 2019 increased by 3.3 %. Since 2009, this has increased by CHF 318 billion (+43.9 %) and the share of domestic credit volume has grown from 80.3 % to 85.9 %. Three-quarters of these are mortgage loans granted to private households. About one third of mortgage loans are used for rental properties. The market share of cantonal banks of domestic mortgage lending volume was just over one third at the end of 2017. This was followed by the big banks with 26.7 %. Domestic and foreign mortgage claims are the most important asset item of the Swiss banks with a share of around 30.6 % (2017) of the aggregated balance sheet total.

In the following sections, a separate analysis is carried out for the two segments "directly held properties" and "mortgages".

The owned buildings of the institutional owners will be examined first, as the owner’s influence on climate compatibility is more direct. In this segment, the data submitted is also of better quality, as the direct owners now have greater knowledge about their buildings. The second segment consists of mortgage-backed loans of buildings, whereby the actual buildings are not owned by the respective participants in PACTA 2020.

Results for directly held buildings

Data quality for directly held properties

Regarding the energy sources used, institutional property owners know their buildings well.

For 79% of all buildings, the analysis could be based on value information provided by the owners. Only for 17% of the directly owned buildings data on heating sources, energy reference area and refurbishment from the GWR had to be incorporated. In Switzerland as a whole, the proportion of buildings using a fossil fuel was 40% for oil and 20% for gas.

Where information on refurbishment measures was submitted by participants, it was taken into account for the calculation. This also applies to the refurbishment measures planned for the next decade and the calculations for 2030. At no point, i.e. not even for very old buildings, were refurbishment models used.

CO_2 emissions and climate compatibility of directly owned buildings

The overall assessment shows that buildings directly owned by institutional owners emit on average less CO_2 in kg/m2 than the rest of the building stock.

According to the analysis set out in the Methods Report, the average CO_2 emissions of the entire building park in Switzerland is 34.5 kg/m2. The average CO_2 emissions of the building park is likely to be overestimated as data from the Swiss Federal Statistical Office's buildings and housing register was used for this estimate and, in accordance with the principle of prudence, oil was assumed in each case if the energy source was unknown, as stipulated by the FOEN.

The figures are distributed fairly evenly across the four sectors under consideration, with a median range of 12.3 kg/m2 to 15.5 kg/m2. This means that on average all buildings tested in PACTA 2020 are below the limit value of 20 kg/m2 of the new CO_2 Act. In the segment of directly held real estate, a good result can therefore be noted today in terms of climate compatibility. The effects of the planned renovation and substitution measures will be discussed later in more detail.

The distribution of absolute CO_2 emissions across the four peer groups is relatively balanced. Asset managers have the lowest share with 20% of the emissions, while insurance companies have the highest share with 31%. Banks and pension funds are in between with values of 24% and 25%.

Table 9: Shares of absolute CO2 emissions by industry

Industry	**Share of absolute CO_2 emissions**
Bank	24 %
Pension Fund	25 %
Insurance	31 %
Asset managers	20 %

The limit value of 20 kg/m2 is already met by the vast majority of participants. However, around half of all participants would exceed the future limit of 15 kg/m2 without additional heating replacement and renovation measures.

The median CO_2 emissions of all directly owned buildings of all participants in PACTA 2020 amount to 15.2 kg/m2 for the year 2020. Taking into account the refurbishments planned by the participants over the next 10 years, this value drops to 11.5 kg/m2, which would represent a reduction of 9% of total CO_2 emissions per year.

A large heterogeneity can be observed with regards to the EBF-related CO_2 emissions of the portfolios of all participants, the bandwidths range from around 45 kg/m2 to just over 1 kg/m2. The bandwidth of relative CO_2 emissions for pension funds ranges from 35 kg/m2 to 6 kg/m2.

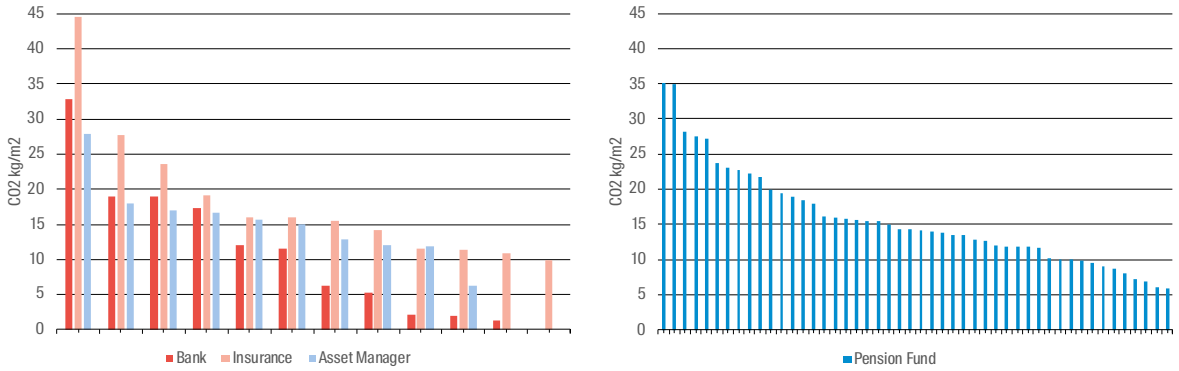


Figure 11: a) Distribution of the average relative CO2 emissions for each portfolio submitted by sector (2020) and b) Distribution of the average relative CO2 emissions for each submitted portfolio of pension funds (2020)

Heating sources and planned renovation measures

70 % of all buildings submitted by institutional owners are powered by oil or gas. For all buildings in Switzerland, the share is around 60%.

The buildings powered by oil consistently show values of over 25 kg/m2, which is above the first valid limit value of 20 kg/m2 of the new CO_2 law. The higher values for 2030 in the banking sector compared to the other sectors are due to the fact that more often no planned refurbishments were listed in the submitted documents than was the case in the other sectors.

Figure 12: a) Relative CO2 emissions of oil as an energy source, taking into account the planned refurbishments between 2020 and 2030 by industry (2020) and b) Relative CO2 emissions of gas as an energy source, taking into account the planned refurbishments between 2020 and 2030 (2020)

Pension funds, insurance companies and asset management can achieve reductions in CO_2 emissions, particularly in the case of heating oil, through renovation and substitution measures planned for this decade and thus make a further contribution to the climate compatibility of their directly held properties.

If the refurbishment measures submitted by the participants, which are planned in the period from 2020 to 2030, are taken into account for the calculation of CO_2 emissions, lower average emissions per m2 will be achieved. Renovation measures are understood to mean the replacement of the building sections "facade", "windows", "roof" and "basement ceiling" with a new building section based on current technology. Substitution is based on the replacement of a fossil fuel with a renewable energy source. With such a substitution, CO_2 emissions will be reduced to zero due to the assumption of a CO_2-neutral electricity mix in Switzerland.

The highest CO_2 reductions will be achieved by asset managers with their planned renovation measures for the energy source gas, with a new value of 14.4 kg/m2 in 2030 compared to 17.2 kg/m2 in 2020, which corresponds to a reduction of -16%. For oil, the reduction is 14 %. The pension funds will achieve a reduction of the same height of 14% with their planned renovation measures for gas as an energy source and reach a new average relative CO_2 emission of 12.6 kg/m2. Insurance companies are reducing their average CO_2 emissions for both fossil fuels by less than 3% through planned renovation measures.

Regarding the substitution of fossil fuels, pension funds will make the main significant contribution in the next 10 years.

For example, more than 300 buildings that use oil or gas will each be equipped with a renewable energy source. This corresponds to 20 % of the directly owned buildings of the pension funds with oil as the energy source and 10 % with gas. The other sectors are much more cautious in this respect and arrive at substitution rates of 1 to 2 % by 2030. It is important to bear in mind here: Only the submitted data on substitution were taken into account. It can be assumed that further substitutions are planned, but these were not submitted by the participants in the PACTA analysis 2020.

Only in a few portfolios were the banks able to provide information on the planned remedial and substitution measures. Therefore, no reduction of CO_2 emissions until 2030 can be determined here. However, it should be clear that this segment of owners has also planned such measures for the next decade but has not submitted them in the current PACTA analysis.

A quarter of all buildings tested were built before 1980 and have CO_2 emissions per m2 of energy reference surface area that are about 80% higher than those in the latest generation of buildings.

The share of old buildings in the portfolios is more or less consistent across all four sectors. Unsurprisingly, the oldest buildings built before 1980 show the highest relative CO_2 emissions due to the construction and poor insulation of these buildings. The newest buildings, which are still powered

by fossil fuels, show relative CO2 emissions of around 5 kg/m2. This good result is due to the excellent thermal insulation properties of these buildings. These buildings are thus exactly on the limit value of 5 kg/m2 of the CO_2 law after the third tightening. The difference between buildings from the oldest and the most recent construction period is therefore considerable. For these buildings, the primary approach to improving climate compatibility is therefore a substitution of fossil fuels, prior to a renovation.

The majority of buildings were built in most recent construction period, accounting for around two-fifths of the total, while around a quarter of all buildings directly owned by institutional owners are from the oldest construction period with the highest CO_2 emissions. The approx. 40% youngest buildings emit only 8% of total absolute CO_2 emissions due to their high efficiency, while around two thirds of absolute emissions come from the oldest buildings. The distribution within the four sectors considered is quite even, with slightly higher shares in insurance and banking. In the other construction periods, there are no significant differences in the distribution within the sectors.

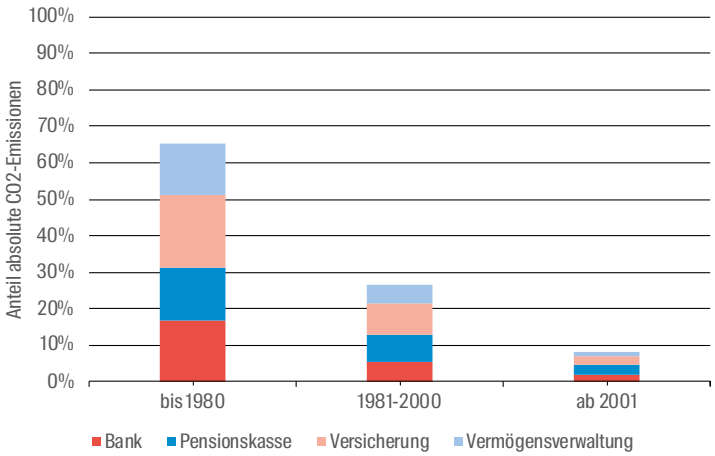


Figure 13: Distribution of absolute CO2 emissions by construction period (2020)

Pension funds are planning to reduce absolute CO_2 emissions by around 20% by 2030 through renovating their oldest buildings - irrespective of the energy source used.

In the asset management sector, the submitted renovation plans for the oldest buildings result in a reduction of 10 %, while the other two sectors are planning improvements by renovating the oldest buildings only in the low single-digit range.

The investment properties with residential use dominate with 90% of all tested buildings directly owned by the institutional owners and at the same time show the highest relative CO_2 emissions with 16.8 kg/m2.

When considering the energy reference area, which is decisive for the absolute CO_2 emissions, residential property also accounts for the largest share, at 71%. Here, the administrative and sales uses are considerably larger than when looking at the buildings, with shares of 16 % and 10 % respectively.

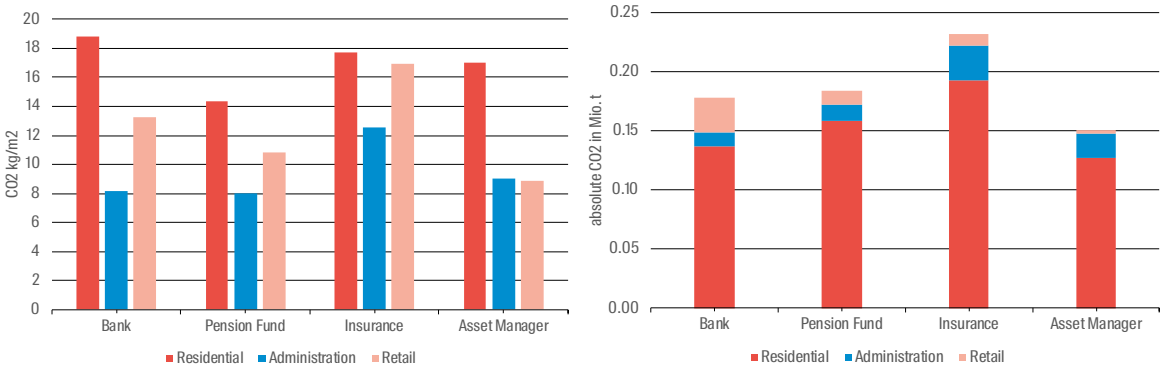


Figure 14: a) Relative CO2 emissions by use and sector (2020) b) Absolute CO2 emission by use and sector (2020)

Due to the large fossil-fuelled energy reference areas owned by insurance companies, this sector accounts for the largest share of absolute CO_2 emissions, although the value of relative CO_2 emissions per square metre of energy reference area for residential use, at 17.7 kg/m2, is slightly lower than for banks.

A total of 99.4% of all uses submitted can be assigned to the three categories housing, administration and sales, which is why these are presented here as the main uses.

The highest CO_2 emissions are found in the residential segment - which accounts for 90 % of all buildings tested and 71 % of the energy reference areas - with values of between 14 and almost 19 kg/m2 in each case. The lowest values are found in the use of administrative buildings (offices etc.), which accounts for only 7% of all buildings tested, but 16% of the energy reference area. This means that a few large buildings with a good level of refurbishment can have a significant impact on the average value for the whole category.

Results Mortgages

Data quality for mortgages

For 95% of all mortgages submitted, only the address was given. Thus, in these cases, all building characteristics required for the calculation of CO_2 emissions were obtained from the Swiss Federal Register of Buildings and Housing (GWR).

More than 40% of the submitted mortgage portfolios were submitted by banks, the rest is divided equally between insurance companies and pension funds. No statement can be made about the value in Swiss francs of the mortgage portfolios tested, as this information was not provided by the participants and is not directly relevant to the analysis of climate compatibility. For the interpretation of the results, the reservations about the data quality in the GWR must be taken into account.

Table 10: Shares of buildings by use in mortgages (2020)

Use	Share of buildings	EBF share
Living	98.2 %	88.5%
Administration	0.7 %	1.7%
Sale	0.2 %	0.9%
Industry	0.8 %	8.3%
Other	0.1 %	0.6%

As expected, residential use plays the most important role in mortgages.

When considering the energy reference areas, 89% of the areas are classified in this category, followed by industry with 8%.

CO_2 emissions and climate compatibility of mortgage portfolios

The average CO_2 emissions for mortgages are 26.2 kg/m2. This means that the relative CO_2 emissions are above the future first limit of 20 kg/m2.

Of the buildings that can be used for a calculation, 59% use oil and 20% gas as energy sources, while the rest have a non-fossil fuel. For oil-fired buildings, the relative CO_2 emissions are 41.1 kg/m2 and for gas 23.9 kg/m2. The effects of renovation measures for the energy-rich building envelope are presented in Chapter 6 Options for action.

In terms of absolute CO_2 emissions, buildings from the oldest construction period, built before 1980, contribute around 70% and the most recent buildings only 10%.

The relative CO_2 emissions of the buildings from the two oldest construction periods are both above the first limit value of the CO_2 law of 20 kg/m2. Buildings constructed after 2000 on average already comply with this limit today.

An analysis of the results for the fossil fuels for each participant according to the respective sector shows a rather heterogeneous picture. The values tend to be higher for banks than for participants from the other two sectors.

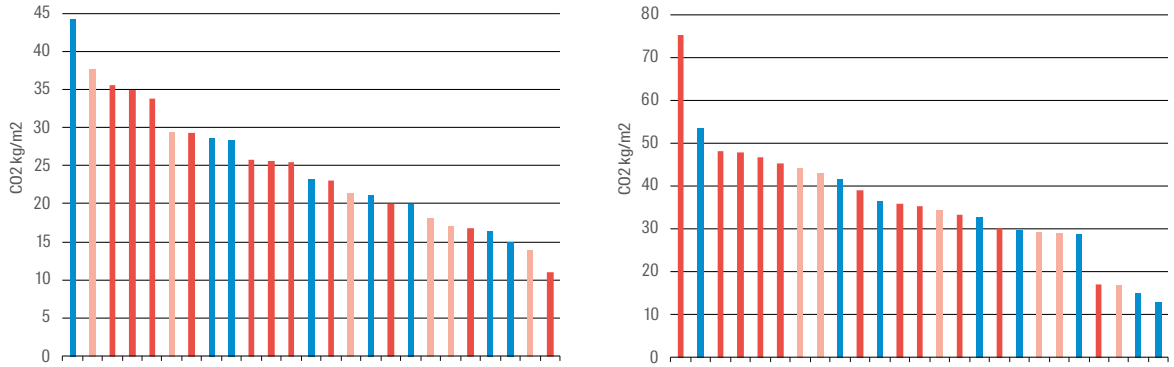


Figure 15: a) Distribution of the average relative CO2 emissions for each participant's portfolio by sector (2020) of fossil fuel mortgages (oil and gas together) and b) Distribution of the average relative CO2 emissions for each participant's portfolio by sector (2020) of oil-based mortgages

High average CO_2 emissions are reached in buildings powered by the energy source oil, with values ranging from over 50 kg/m2 to just over 10 kg/m2. Four participants have a mortgage portfolio that is on average below the limit of 20 kg/m2 of the new CO_2 law.

However, the same consideration for the energy source gas, which has a lower emission factor than oil, provides lower relative CO_2 emissions and the observed range is much narrower. About half of all portfolios with mortgages are above the 20 kg/m2 limit of the new CO_2 law, while four portfolios are already below the future second limit of 15 kg/m2.

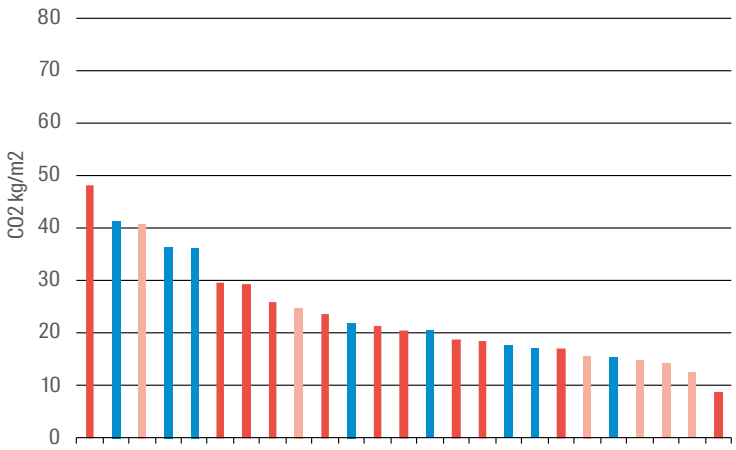


Figure 16: Distribution of the average relative CO2 emissions per participant by sector (2020) of gas-fired mortgages

Evaluation by canton

Because a large proportion of all Swiss residential buildings can be analysed via the mortgage portfolios, a cantonal evaluation is interesting here. It should be noted that only 70 % of the buildings

submitted for the test met the requirements for a calculation and that the majority of these are residential buildings.

Using the building characteristics available from the GWR, the average cantonal CO_2 emissions can be calculated in kg per m2 of energy reference area. As only the addresses were available for the vast majority of the buildings in the mortgages, the results are strongly influenced by the quality of the data in the GWR. The municipalities in the respective cantons are primarily responsible for updating this data, and the mortgage lenders have little influence on this process.
The low values in Canton Basel-Stadt are due to the high distribution of district heating in this canton. By definition, district heating is climate-neutral in the PACTA analysis and thus significantly reduces relative CO_2 emissions. The result reflects the various cantonal influences such as the quality of the GWR data and climatic conditions (higher altitudes, etc.) in relative CO_2 emissions.

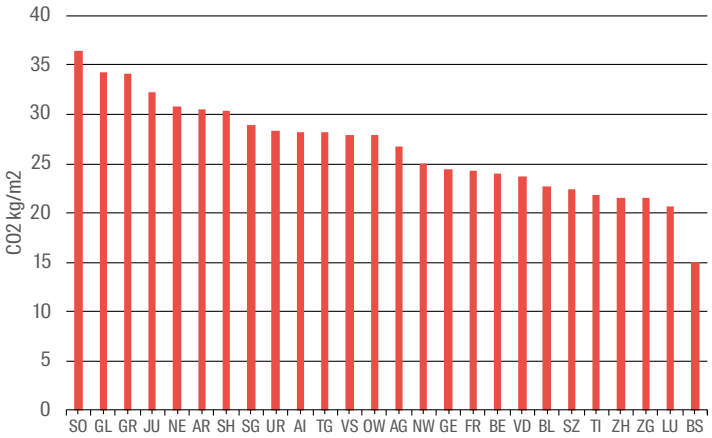


Figure 17: Average relative CO2 emissions of mortgages by canton (2020)

Possible measures and next steps

Institutional property owners have a direct influence on the climate compatibility of directly owned buildings.

The federal government, cantons and other bodies offer subsidies and advice to support them:

- Subsidies for energy-related refurbishments
- Consulting for the replacement of fossil heating systems
- Renovation guide for landlords
- Renovation guide for tenants

Ideally, the energy-related refurbishment of an investment property represents a gain for all three levels involved - for the environment, owners and tenants.

The environment benefits if, a building can be operated in a more environmentally friendly way, thanks to efficient refurbishment. Owners can increase the market value of their properties through higher rental income if they can finance the investment costs. And tenants benefit when the refurbishment reduces the ancillary costs to such an extent that the increase in net rent is more than compensated for. This mechanism is often achieved by saving or refunding the CO_2 taxes on the fuels.

As part of a pilot project conducted by Wüest Partner on behalf of the Swiss Federal Office of Energy, the energy-related refurbishment of twelve apartment buildings in the Swiss-German Mittelland region with a market value of CHF 230 million was analysed in terms of environmental, owner and tenant criteria. In ten cases, the value of the property increased as a result of the energy-related refurbishment. The gross rent - consisting of net rent, heating costs and other ancillary costs - decreased for the tenants in eleven of the twelve buildings examined, since the heating costs fell more sharply, as a result of the energy-efficiency improvements, than the net rent increased within the framework of the passing-on of rent permitted under rental law.

There are various labels in the building sector, which are supported by different associations and organisations. Labels can be a condition for receiving subsidies and offer market advantages due to an accredited quality level. Four of these labels are now aiming for closer cooperation. They form the building label family of the vision for the SFOE's Building Park Switzerland 2050 and include:

- Association GEAK
- MINERGIE Association
- Swiss Sustainable Building Network NNBS
- 2000 watt areas

To this end, the supporting organisations have signed a joint declaration of intent and published the Swiss Building Label Charter. The aim is to use synergies and maintain the high quality. However, the entire real estate module of this year's PACTA analysis does not address the financial aspects of renovation and substitution measures.

Although the mortgage lenders have no direct influence on the buildings of the current owners, measures in this segment are also conceivable.

Eco-mortgage, Minergie-mortgage, GEAK-A-mortgage, eco-credit, environmental loan or sustainability mortgage are only some of the bank-specific terms behind which the same principle is always hidden: customers who build or renovate an energy-efficient home receive favourable interest rates. The eco-rebates offered are usually a few basis points off the usual mortgage interest rates. For example, advance financing could be offered for switching from fossil fuels to renewable energy sources. The costs for such a loan could be lower for the customer than the CO_2 taxes on fossil fuel consumption, depending on the individual design. Models of energy-saving contracting are already available on the market and can be supported by mortgage lenders at best.

For this report, we have simulated a hypothetical complete refurbishment of all buildings for the year 2030.

The costs required for this are explicitly not taken into account. As mentioned, the first limit value of the CO_2 law for the year 2020 of 20 kg/m2 will not be reached. However, this limit value will only apply to a heating replacement in an existing building. If, however, the outlined renovation of the relevant building features - facades, windows, roofs and basement ceilings - is carried out using components of the latest generation, this value can be met. As a result, three quarters of all CO_2 emissions could be saved by 2030 if the buildings analysed in PACTA 2020 were completely refurbished with a mortgage.

However, in addition to the pure refurbishment, the replacement of a fossil energy source by a non-fossil one also makes an important contribution to climate compatibility.

The combination of the two available options can be considered optimal for achieving the Federal Council's "net zero" target. The largest reductions are to be achieved in the oldest construction period, while there is not much leeway left for the most recent construction period. In any case, however, a replacement of fossil fuels is more appropriate.

V. Climate Scenario Analysis: equity and corporate bonds

Energy - Fossil Fuel Extraction and Coal Mining

Around 2-4% of the listed equity and 3-5% corporate bonds portfolios of Swiss financial institutions is invested in the direct extraction of oil and gas as well as coal mining.[51]

The extraction and burning of fossil fuels (oil, natural gas, coal) is the primary cause of anthropogenic climate change, responsible for more than 75% of total CO_2 emissions, while also covering around 80% of global primary energy demand.[52] While oil is primarily used for transportation, both coal and gas are primarily used for electricity and heating.

The figure below show the exposure to upstream operations in the fossil fuel sector (oil and gas extraction, coal mining) as percent of the total portfolio invested by type of Swiss financial institutions, as well as in relation to the global equity and bond market respectively.

The exposure overall, especially to coal mining, is higher in corporate bonds portfolios. In the aggregate corporate bonds' portfolios, the exposure is slightly higher for banks and asset managers than for asset owners, although the aggregated insurance portfolio is exposed to a noticeably high share of coal mining. All aggregate portfolios are nevertheless significantly less exposed than the global equity or bond market.

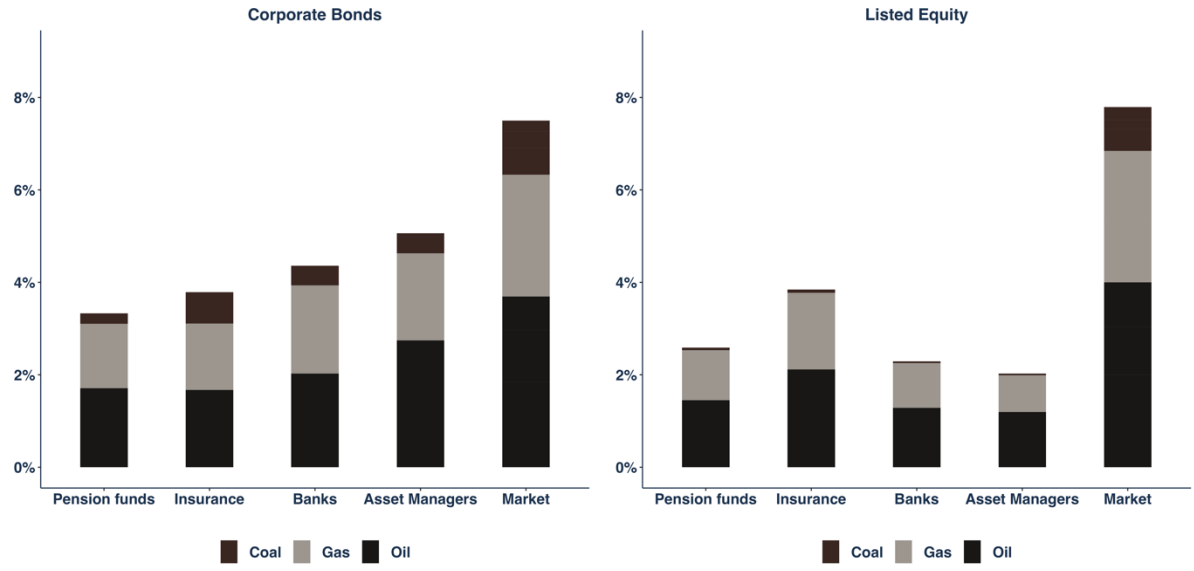


Figure 18: Exposure to coal mining, oil and gas extraction, as percent of total portfolio value

[51] Note these figures do not include downstream oil & gas activities and companies servicing the upstream exploration and production. It does however include integrated oil & gas companies.
[52] Carbon Tracker Initiative *Decline and Fall*, 2020 and IPCC, 2014: Summary for Policymakers. In: Climate Change 2014: Mitigation of Climate Change

While 15 % of participants submitted listed equity portfolios that are by value less than 0.1 % exposed to fossil fuel extraction and coal mining (5 % for corporate bonds), 8 % financial institutions submitted equity portfolios in which the exposure to this sector was greater than 10 % (8 % for corporate bonds). These portfolios could be exposed to significant transition risk as will be discussed in in the chapter on climate stress-testing scenarios. One pension fund represents one outlier, with over 60% of the portfolio value invested in fossil fuels.

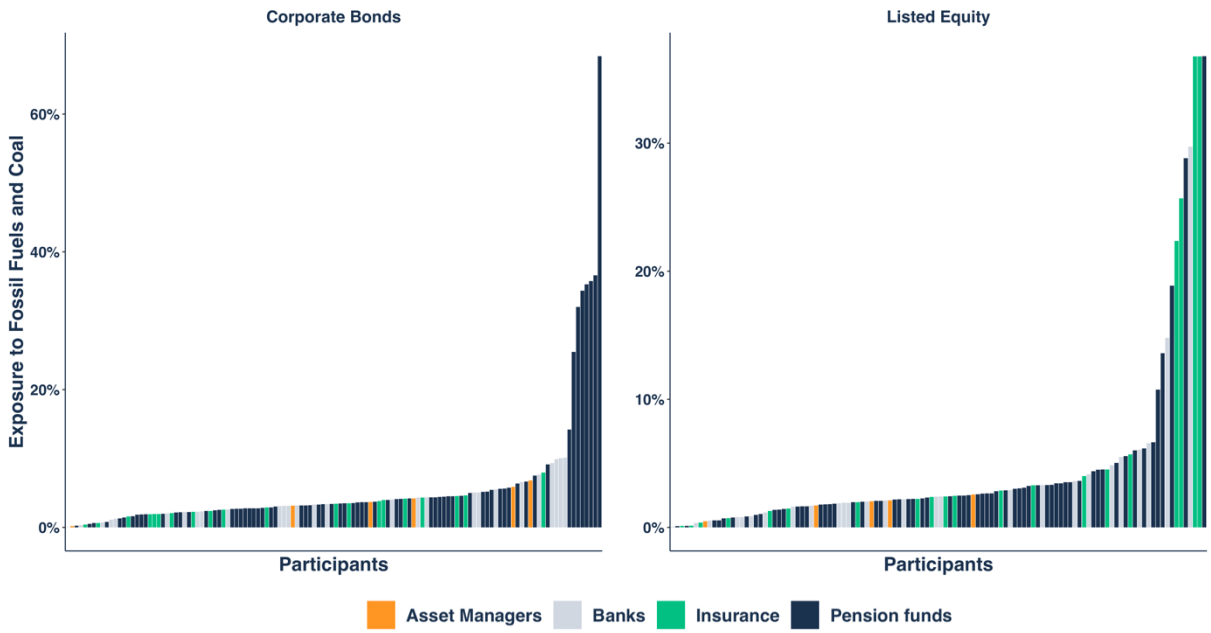


Figure 19: Share of holdings in Fossil Fuel sector as percent of total portfolio value

Swiss financial institutions still finance the expansion of oil extraction and coal mining in their listed equity and corporate bonds portfolios, with limited progress since the test in 2017.

Climate scenarios in line with the Paris Agreement require steep reduction in oil extraction and coal mining that neither Swiss banks, insurance companies, pension funds or asset managers are set to meet in aggregate, although there are some differences in trajectories across types of institutions. Moreover, coal production of companies in the corporate bonds portfolios is still set to increase, as is oil production in both corporate bonds and listed equity portfolios.

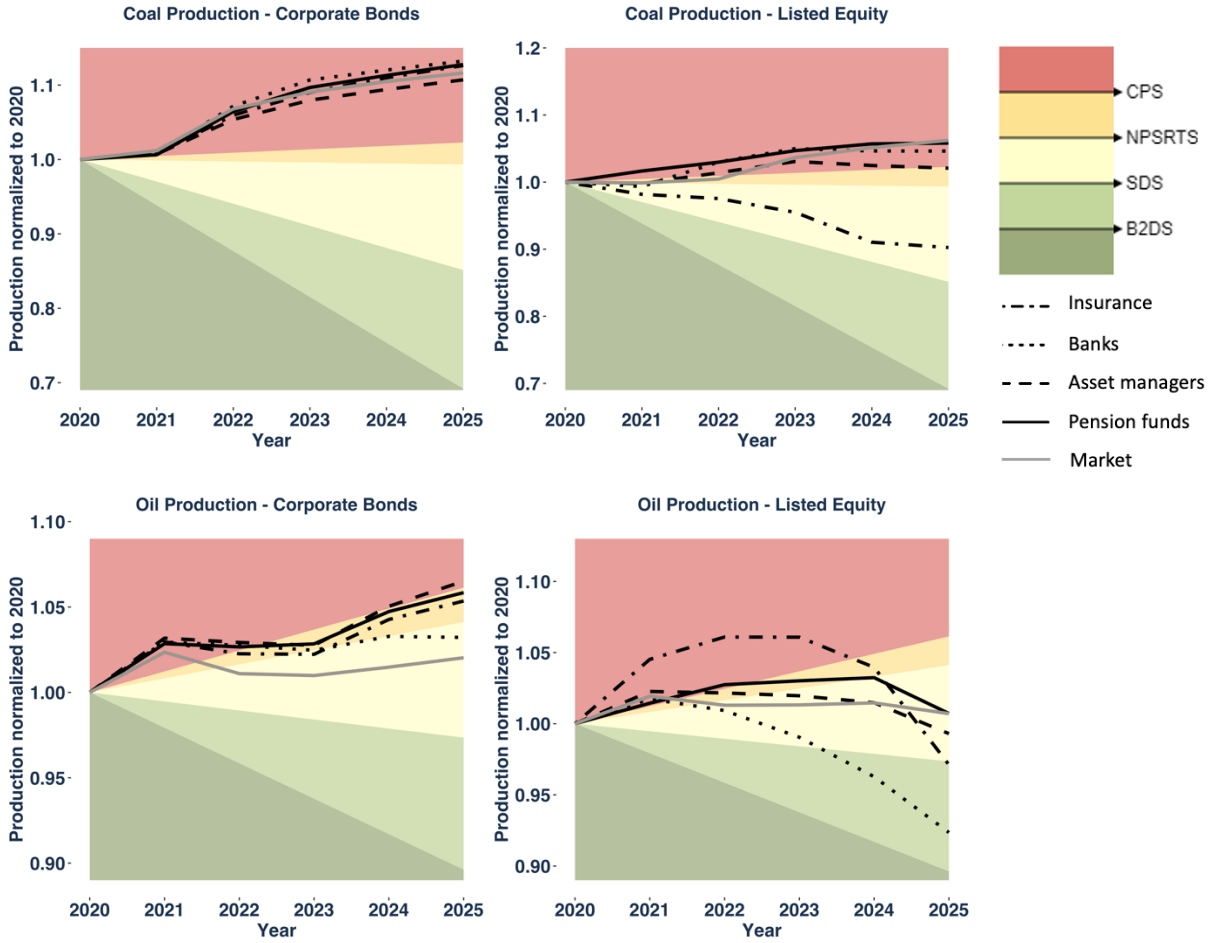


Figure 20: Production plans in coal mining and oil extraction, compared to the build-out required under different climate scenarios

This is consistent with the finding that oil production of all but one of the ten major oil and gas companies with the highest weight in the submitted Swiss portfolios is set to increase, based on current forward-looking production plans. This reflects the fact that the global economy is not on track to meet 2°C climate goals in this sector, at least not in the short-term.

Only 13% of financial institutions submitted portfolios that are aligned with a 2°C pathway with regard to oil or coal production.

A higher percentage of insurance companies (25%) is aligned with respect to coal mining, compared to the other peer groups. Only 7 % of banks are aligned with respect to coal mining, whereas pension funds score consistently average with around 15 % of institutions aligned in coal mining as well as oil production.

In these technologies, little progress can be observed since the 2017 test: of those institutions who participated in both years, 0 % were aligned in 2017, and 4 % in 2020 with regards to coal mining in the listed equity portfolio. The result is equally disappointing with regards to oil production: while 11% of the 53 institutions participating in both years were aligned in 2017, 10 % were aligned in 2020.

The production plans for gas are much better aligned, driven in part by the more generous treatment of that fuel in climate scenarios, as well as a drop in production consistently observed across all aggregate portfolios.

Gas production is set to increase even under a well below 2°C scenario in the short-term, a function of the role of gas in the IEA scenarios due its lower carbon intensity compared to oil and coal. This is somewhat controversial, and other scenarios do not allow such a "bridge fuel" function for gas. The other driver is a short-term significant increase coupled with a drop in production volumes post 2022, which then picks up again in some portfolios by 2025. Given this combination of factors, almost all individual financial institutions assessed (97%) are aligned with the Sustainable Development Scenario with respect to gas production, and the aggregate portfolios are almost all aligned with the Beyond 2D Scenario.

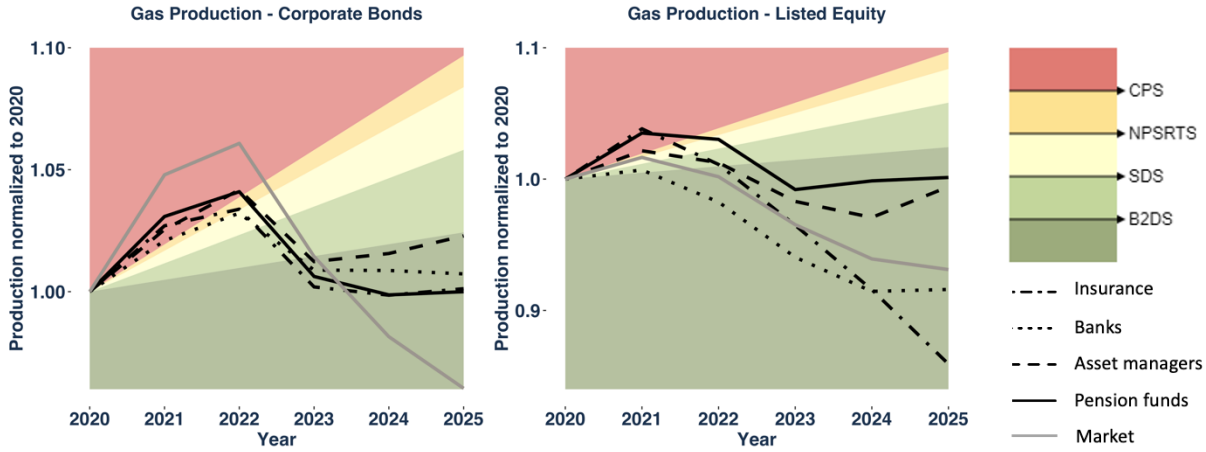


Figure 21: Production plans in gas extraction, compared to the build-out required under different climate scenarios

A large share of assets in oil and gas extraction are located in Russia, whereas the coal mining assets are primarily in South Africa and Australia.

The following table gives an overview of those countries in which more than 10% of the production allocated to the portfolio takes place.

Table 11: Location of assets in the fossil fuel sector, by asset class and percent of allocated production located in a certain country

Technology	Listed Equity	Corporate Bonds
Coal	South Africa (60 %), India (18%), China (12 %)	Australia (65%), South Africa (19%), Colombia (12%)
Oil	Russia (57 %), Iraq (16%)	USA (13%), Russia (12%), Brazil (10%), Mexico (10%)
Gas	Russia (43 %), Uzbekistan (15 %)	Russia (46 %)

The COVID-19 pandemic presents a major disruption to the energy system, with energy demand expected to drop by 5% in 2020 compared to 2019, and capital investments expected to decrease by 18 %, most notably in oil and natural gas extraction.[53]

This drop in investment is driven by weakened corporate balance sheets as well as a high degree of uncertainty regarding the evolution of future demand. Oil demand was heavily impacted by lockdown measures affecting road transport and aviation which together account for 60% of global oil use. Coal use is expected to fall by 7% in 2020 as it was, in many regions the first power source to be scaled back. Given this dynamic, it is possible that some of this over-investment is already being scaled back at time of publication.

A key question regarding climate strategies of financial institutions in the fossil fuel sector relates to the role today's oil and gas companies will take in a low-carbon energy transition.[54]

No oil and gas company will be unaffected by the energy transition and there will be different strategies companies can take to respond to this. Although commitments to reduce emissions or emission intensities have become more common, current investments in low carbon business do not represent more than 5 % of investment of any single major oil and gas company.

On the one hand side, 40% of Swiss participants indicated to apply exclusion strategies to fossil fuel investments (40% for coal, 14 % for oil and gas). In addition, more than one fifth of participants indicated to be members of the Climate Action 100+ initiative, as part of which investors are requesting 40 oil and gas companies to create and implement long-term energy transition plans.

A number of organizations have developed roadmaps as to what these types of transition plans could look like and how they could be disclosed ideally, notably the Carbon Tracker Initiative.[55]

[53] WEO 2020
[54] https://www.iea.org/reports/the-oil-and-gas-industry-in-energy-transitions
[55] https://carbontracker.org/reports/reporting-for-a-secure-climate-a-model-disclosure-for-upstream-oil-and-gas/

Energy - Power

The power sector is at the center of the low-carbon transition and accounted for 42% of energy-related CO_2 emission in 2018.[56] Additionally, the sector is essential for the decarbonization of other sectors such as transport, industry and buildings that rely on electrification to move away from the use of fossil fuels.[57]

Power markets are highly country specific - even within Europe, France, for example, generates 71 % of its electricity through nuclear power (the government owning 85 % shares in the largest utilities company), while Switzerland generates more than 50 % of electricity from hydropower[58]. In addition, the societal acceptance of different technologies such as nuclear power varies between countries and geographies, as do the non-climate environmental impacts of hydropower. The climate scenarios used for this sector are therefore region-specific and aggregated to global level depending on the location of assets.

The costs of renewables have been declining sharply over the past years. According to recent analysis by the Carbon Tracker Initiative, renewable electricity is now the cheapest source of new baseload for 85% of the world and new investments in renewables are cheaper than new investments in coal in all major markets today.[59] This was confirmed in the World Energy Outlook published by the IEA in October 2020. Even in power markets that currently rely heavily on coal such as South Africa, a recent study has shown that the decarbonization of the electricity system does not have to come at an additional cost.[60] In addition, renewable energy has so far been the energy source most resilient to Covid-19 lockdown measures.[61]

2-5% of the aggregate Swiss portfolios are exposed to the power sector, whereby the share invested in high-carbon power capacity is still four times as high as the share invested in renewable capacity.

In this analysis, onshore wind, bioenergy, solar PV, solar CSP, offshore wind, geothermal and ocean tidal are categorized as renewable and low-carbon sources of electricity generation, coal, gas and oil as high-carbon sources, whereas hydro-power and nuclear energy are treated separately due to their low CO_2 emissions, but partly high non-climate environmental impact.

The graph below shows the exposure of the aggregate portfolio for different peer groups, divided by asset type and compared to the Global Equity and Bonds Market, respectively. The current share of renewable power capacity is still low (although increasing), making up at most 15 % of the technology mix in the aggregate portfolios. The share of high-carbon power capacity (coal, oil and gas) on the other hand is around three to four times as high across all aggregate portfolios, except for the listed equity portfolio of pension funds.

[56] https://www.iea.org/data-and-statistics/charts/global-co2-emissions-by-sector-2018
[57] For more information on the electrification of the energy system: https://climatescenarios.org/sector-transition/
[58] IEA https://www.iea.org/countries/switzerland
[59] CTI 2020 How to waste over half a trillion dollars: The economic implications of deflationary renewables energy for coal power investments
[60] https://meridianeconomics.co.za/wp-content/uploads/2020/07/Ambition.pdf ; https://researchspace.csir.co.za/dspace/handle/10204/11483
[61] WEO 2020

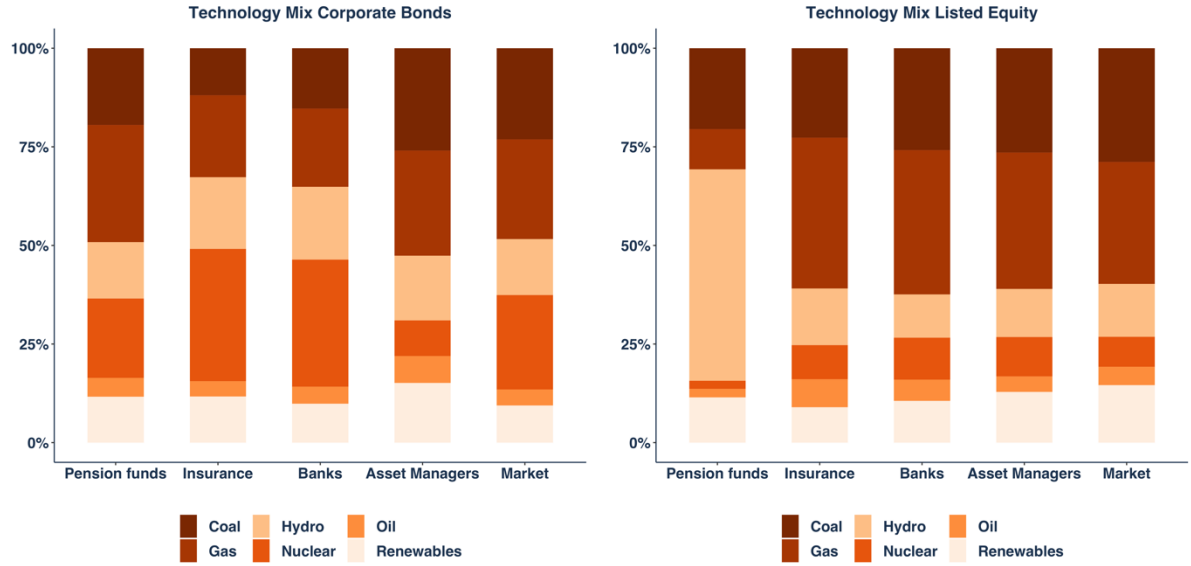


Figure 22: Technology mix of investments in the power sector by peer group, calculated using the ownership weight approach for listed equity and the portfolio weight approach for corporate bonds

Banks and insurance companies have a significantly higher exposure to nuclear power capacity than the market, pension funds or asset managers in their corporate bonds' portfolios. Asset managers hold the highest share of renewable technologies in their listed equity portfolios. With regards to the listed equity portfolios, pension funds have a significant share in hydro power. As analyzed further below, primarily located in Switzerland. The market overall has a higher share of coal, as well as renewable power capacity compared to Swiss financial institutions.

Some participants are leading the way with respect to their current exposure to renewable power capacity: particularly across the listed equity portfolios submitted, 15 financial institutions submitted aggregate portfolios with a greater than 25 % exposure to renewable power capacity.

The following graph shows the share of renewable power capacity in the total power capacity of participants' total portfolios. The graph illustrates the more general point that while there are already a small number of institutions who have allocated their investments towards low-carbon sources, this re-allocation is not yet implemented by mainstream Swiss financial institutions.

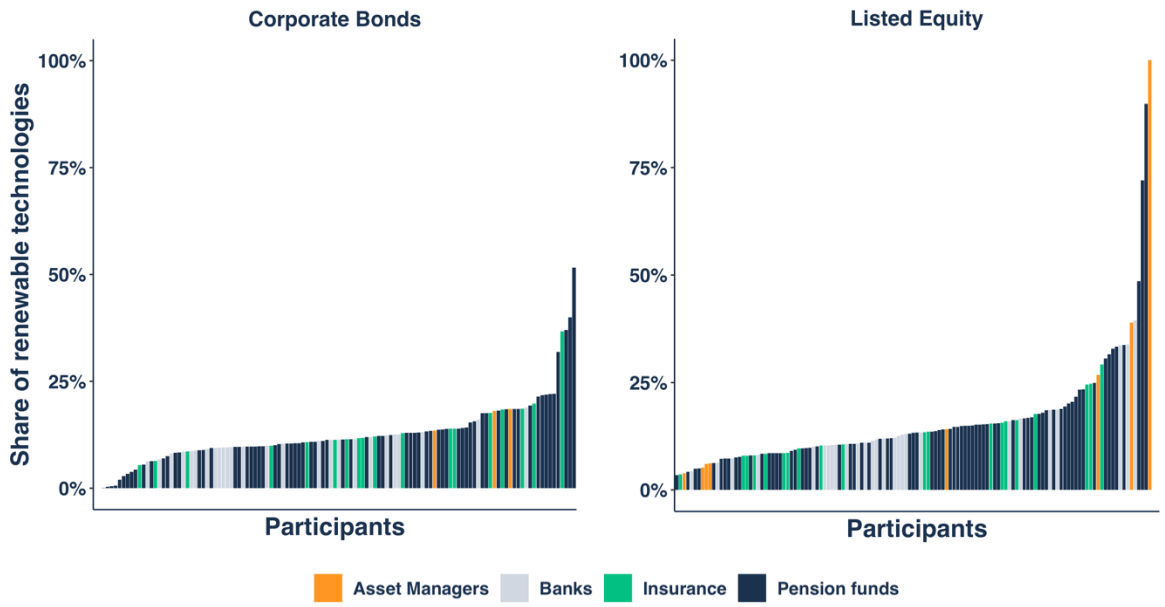
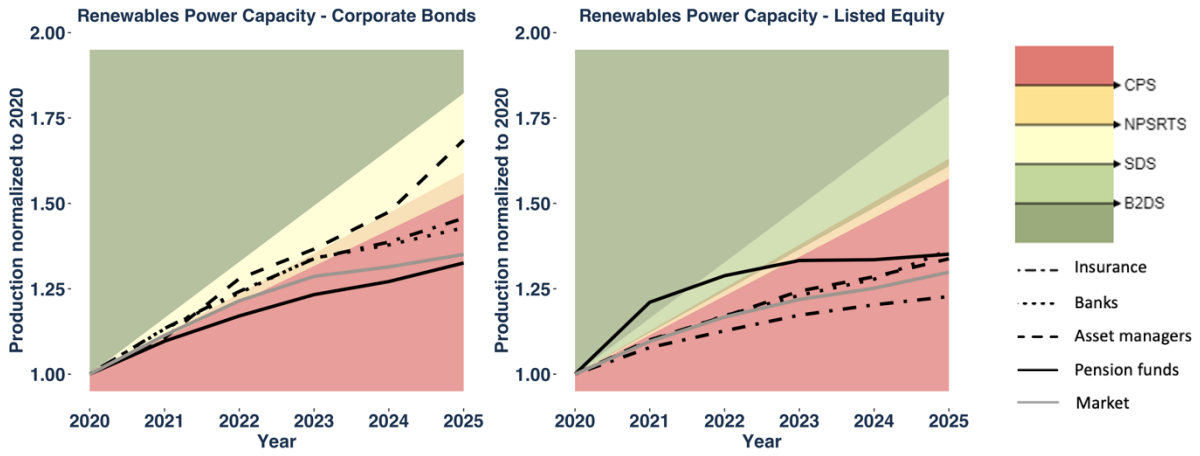


Figure 23: Share of renewables technologies (excluding hydro and nuclear) of the total investments in the power sector

Ambitious build-out of renewable energy capacity and retirement of the most carbon intense source of power generation, coal, are indisputably necessary to meet the goals of the Paris agreement. The power capacity currently financed by Swiss investor is neither set to increase fast enough in terms of renewables, nor retired fast enough with respect to coal capacity.

Although renewable power capacity is set to increase, based on current production plans, the increase is not fast enough to align with the IEA's sustainable development scenario. Only asset managers are financing a build-out of renewables in line with the 2°C scenario.



The following graph shows the current exposure to renewable power capacity and the build-out of companies in the portfolios as share of the build-out required by the Sustainable Development Scenario. We see that some participants are leading the way in terms of build-out and current

exposure, but that the majority remains at low build-out and low exposure to renewable energy capacity.

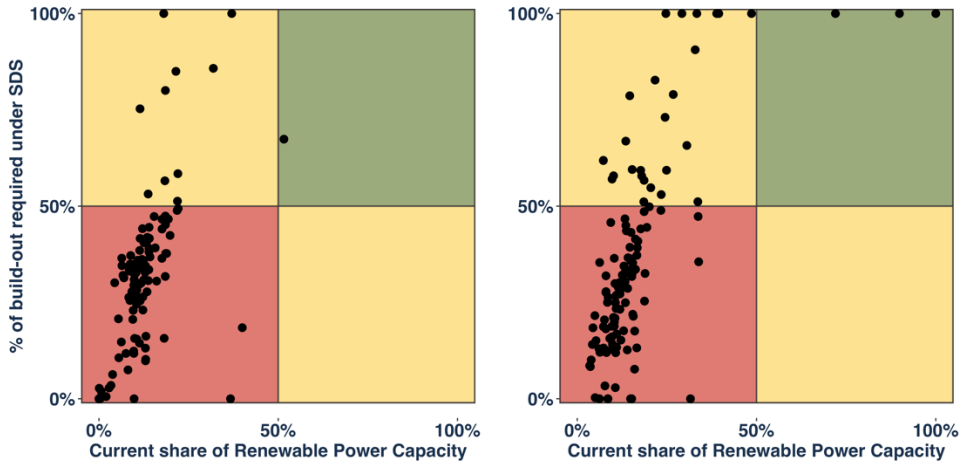


Figure 24: Build out of underlying companies as percent of build-out required by the SDS, plotted over the current exposure to renewables power capacity. Each dot represents the aggregate portfolios of one financial institution.

Coal power capacity, a technology that is expected to decrease even under the no-further-climate-policy scenario CPS, is still set to increase in some portfolios, most notably the aggregate listed equity portfolio of Swiss pension funds. Most of the coal power capacity in this aggregate listed equity portfolio of pension funds is located in China (33%) and India (20%) where coal power capacity is not yet set to decrease in the coming years, despite both countries leading globally in terms of renewable capacity additions.[62]

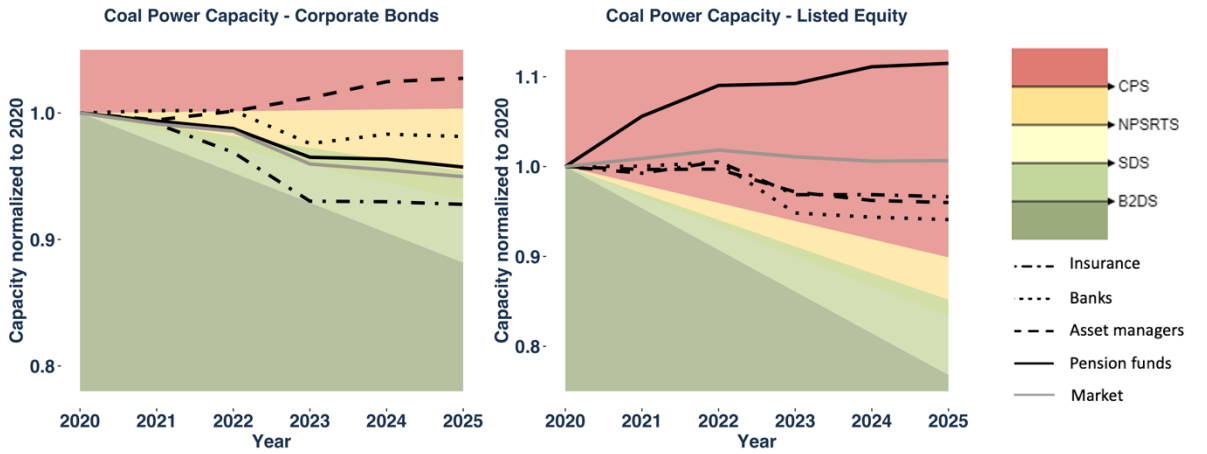


Figure 25: Build-out of coal and renewables power capacity, compared to the build out required under different climate scenarios as well as the Global Market.

The forward-looking production plans for gas and hydro power are better aligned than the other technologies.

[62] https://www.iea.org/reports/renewables-2019

The following two tables show the alignment of each peer group with the Sustainable Development Scenario in 2025, color coded as the graph above.

Listed Equity

Sector	Power					
Technology	**Coal**	**Oil**	**Gas**	**Hydro**	**Nuclear**	**Renewables**
Pension funds						
Insurance						
Banks						
Asset Manager						

Corporate Bonds

Sector	Power					
Technology	**Coal**	**Oil**	**Gas**	**Hydro**	**Nuclear**	**Renewables**
Pension funds						
Insurance						
Banks						
Asset Manager						

A large share of low-carbon power capacity in Swiss portfolios is located in Europe, specifically in Switzerland and France, whereas the largest share of coal, oil and gas power capacity is found in China, Saudi Arabia, India and the USA.

The following table shows the location of assets where the highest share of production allocated to the portfolio is found:[63]

Table 12: Location of assets in the power sector, by asset class and percent of allocated production located in a certain country

Technology	Listed Equity	Corporate Bonds
Coal	China (30%), India (16%), Greece (13%)	USA (32%)
Oil	Saudi Arabia (27%), Brazil (13 %), USA (13 %), Thailand (12%)	Saudi Arabia (34%), USA (20%)
Gas	USA (22 %), Thailand (15 %)	USA (32%)
Nuclear	Czech Republic (57%) and USA (22 %)	France (67%) and USA (14%)
Hydro	Switzerland (72 %) and Brazil (18 %)	France (28%) and Italy (19%)
Renewables	France (19%), Switzerland (18%) and Brazil (13%)	USA (20%) and France (10%)

[63] Only exposure exceeding 10% are shown.

Although this regional distribution is, among other things, driven by the scale and financing structure of many renewable energy projects, it also points to a larger issue: while most of the global financial capital is still concentrated in developed economies, the largest share of demand growth in the power sector over the next decades will occur in emerging economies.

Overall, the global investment in the power sector is set to decline by 10% in 2020 due to the ongoing COVID-19 pandemic. Imbalances in the access to financing for renewable energy projects could be exacerbated through the ongoing pandemic through an increase in borrowing costs as well as equity market risk premiums in certain countries.[64]

[64] WEO 2020

Transport

Road Transport – Light- and Heavy-Duty Vehicles

At present, the transportation sector relies almost exclusively on oil and accounts for one-quarter of global anthropogenic CO_2 emissions.

Next to the considerable climate impact, the transportation system also has significant non-climate related environmental impacts through other pollutants such as NOx, So2, carbon monoxide, black carbon and ozone.[65] These pollutants not only contribute to the warming impact of the sector, but also significantly contribute to air pollution which is the cause of around 4 million deaths per year, according to the World Health Organization.[66]

Road transport accounts for almost 80% of global transport-related CO_2 emissions in 2020. Decarbonization pathways in this sector depend primarily on the build-out of electric and hybrid vehicles, R&D in low-carbon fuels (biofuels and eFuels) as well as modal shift.

This analysis focuses on those technologies that are currently widely available in the market. This is not to say that targeted finance for companies investing in R&D in other technologies does not contribute to decarbonizing the economy, it is however out of the scope of this country-level alignment analysis. Fuel cell vehicles currently make up less than 0.05% of technology exposure in Swiss portfolios and are therefore not shown.

Estimations of the current full life-cycle emissions of electric and hybrid vehicles can vary widely, obviously depending on the carbon intensity of the grid they are operating in, as well as other assumptions around their use and lifetime.[67] Overall, electric and hybrid vehicles have lower average full-life cycle CO_2-eq emissions than internal combustions engines, and, more importantly, offer the possibility to operate with significantly lower CO_2 emissions on a renewable grid. It is therefore important to bear in mind that electric and hybrid vehicles rely on the decarbonization of the electricity sector as a necessary condition for contributing to decarbonization.

Efficiency improvements of internal combustion engines are necessary to decrease emissions in the short-term,[68] and are currently targeted by a number of government policies in different countries. This analysis focuses on the build-out of existing low-carbon technologies (electric and hybrid), rather than efficiency improvements of internal combustion engines, as the build-out of these new technologies are necessary to actually transition the transportation sector and reach Net-Zero.

[65] IPCC AR5
[66] https://www.who.int/health-topics/air-pollution#tab=tab_1
[67] 'Estimation of CO2 Emissions of Internal Combustion Engine Vehicle and Battery Electric Vehicle using Life Cycle Analysis' *Sustainability*, 2019
[68] https://theicct.org/publications/vision2050

Light-Duty Vehicles

2-4% of the total portfolios of participants are invested in light-duty vehicles. Low carbon technologies such as hybrid and electric vehicles currently account for around 10% of light-duty vehicle production.

The graph below shows the exposure of the submitted portfolios to light-duty vehicle production in different technologies, compared to the global equity market and corporate bonds market, respectively.

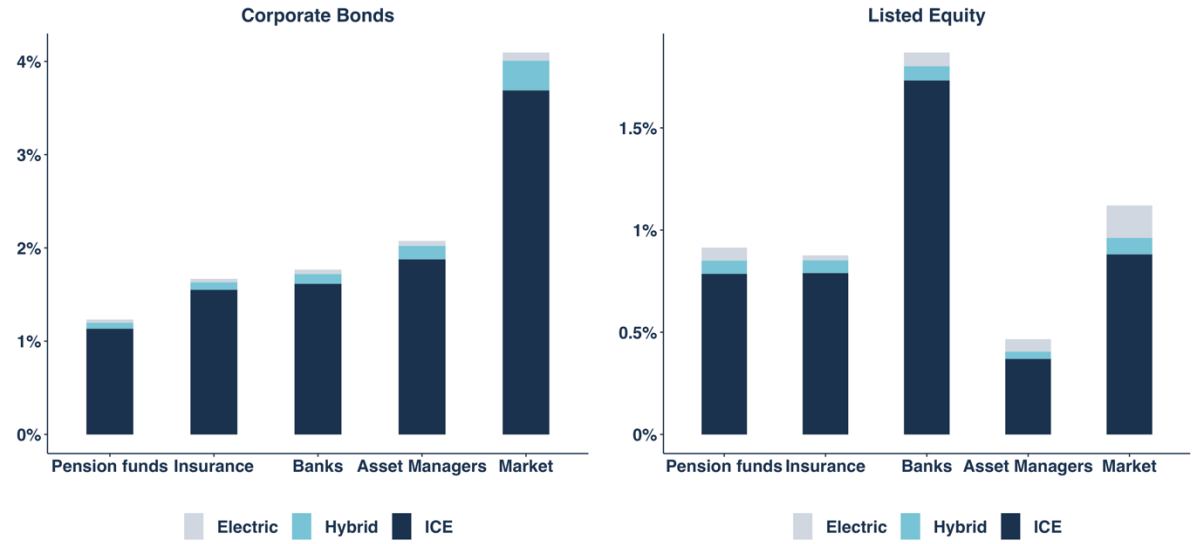


Figure 26: Exposure to different LDV technologies in the Automotive Sector, compared to the Global Equity and Bonds market, respectively.

While electric vehicles currently account for a significantly lower share of production than hybrid vehicles, forward-looking production plans for electric vehicles are significantly better aligned with the energy transition scenarios.

The graphs below present the current technology share of Electric (or Hybrid) vehicles in the total exposure to the automotive sector. Each dot indicates the portfolio of one financial institution participating, the size of the dot being proportional to the production volume of this technology in the total portfolio.

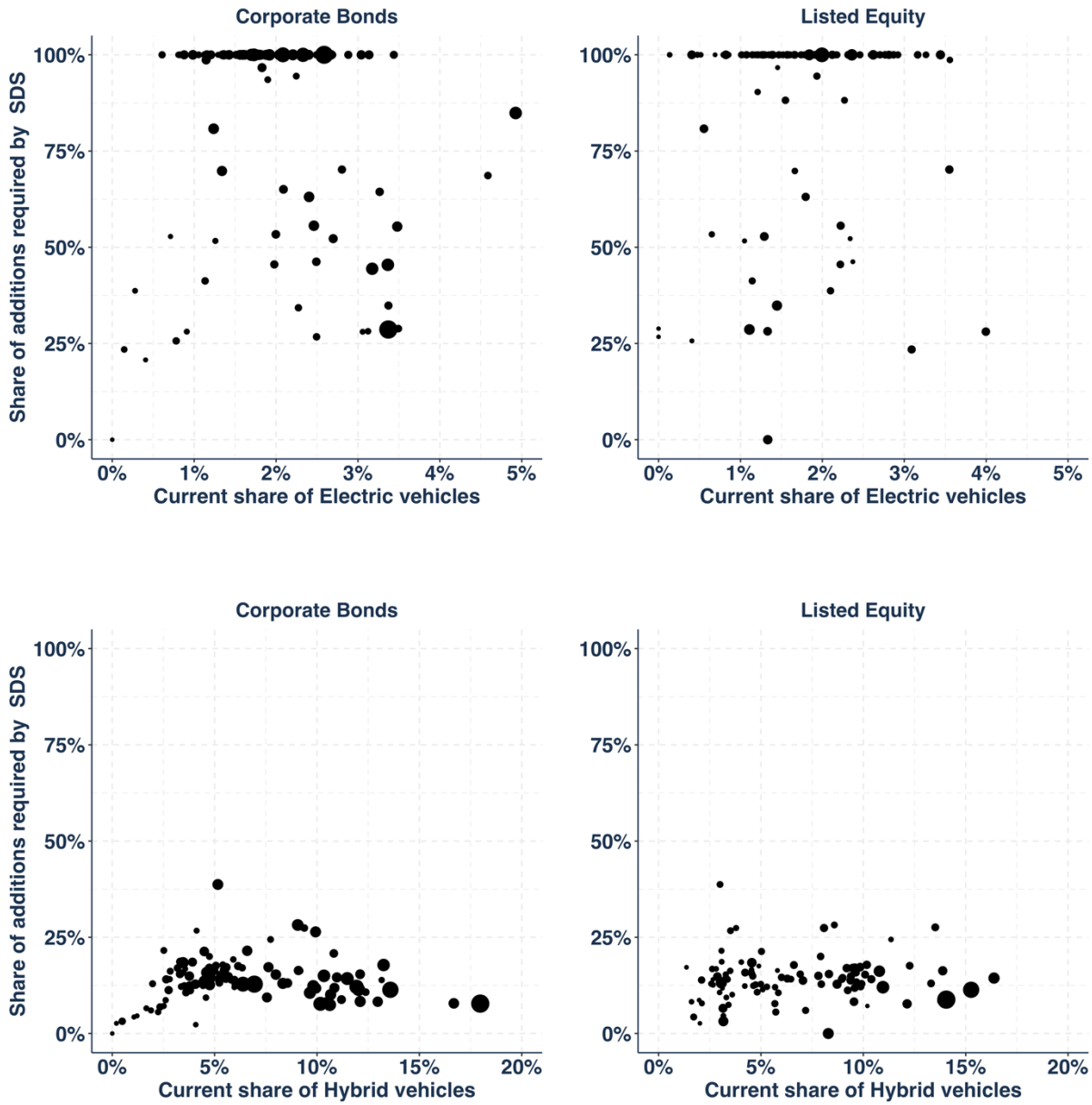


Figure 27: Current Exposure vs Future Build-out as % of build-out required by the Sustainable Development Scenario, for Electric and Hybrid Vehicles.

Turning to the analysis of aggregate portfolios, the listed equity as well as corporate bonds portfolio are not aligned with regards to the production of internal combustion engine or hybrid across all peer groups, but moderately well aligned in the production of electric vehicles.

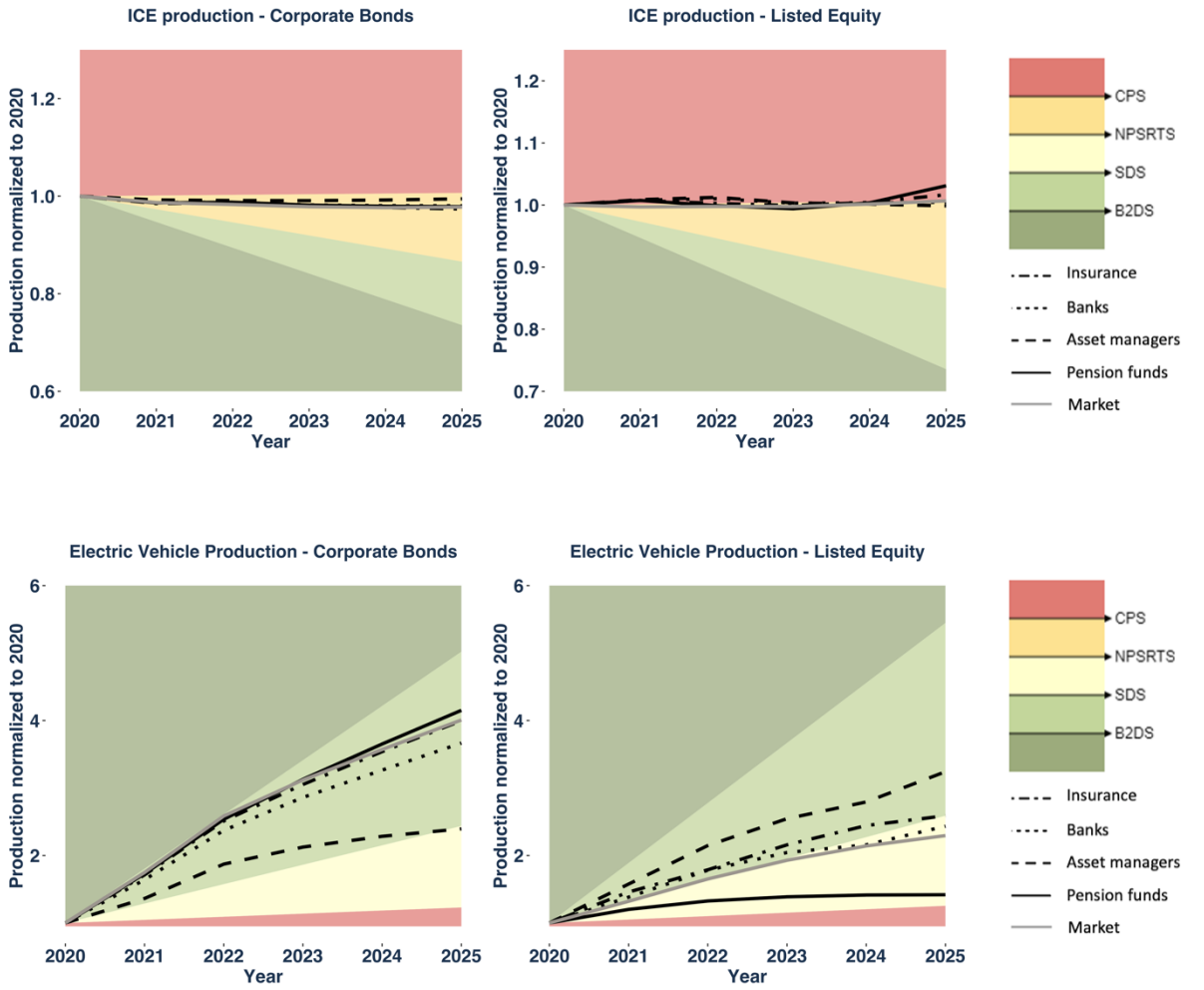


Figure 28: Production plans for ICE and Electric vehicles, compared to different climate scenarios and the Market (green)

It is important to note in this graph that the 2°C scenario use actually requires a reduction of the total ICE vehicle stock, as well as a doubling of electric vehicle stock by 2025, or even a five-fold increase in the case of the Beyond 2°C Scenario. Striking however is that the growth path identified in 2017 for ICE vehicles has now flattened dramatically, even if still lagging the scenario benchmarks.

These results are consistent with the fact that of the largest international car companies, almost none are aligned with a 2°C scenario in their production of ICE or hybrid vehicles, however that there has been a scale-up of ambition regarding electric vehicles across a number of companies in recent years.

The structure of the automotive sector is very different from the power sector in that global production of light-duty vehicles is mainly driven by a relatively small number of large international car manufacturers and, as opposed to the power sector, production is less dependent on regional acceptance or availability of certain resources (nuclear, hydro).

A recent in-depth study of the production plans and climate alignment of the 14 largest international car companies shows, that none have production plans for hybrid vehicles consistent with a 2°C

pathway. None except one have production plans for ICE vehicles consistent with a 2°C pathway, and a handful of companies have production plans for electric vehicles compatible with a Beyond 2°C Scenario or 2°C Scenario.[69]

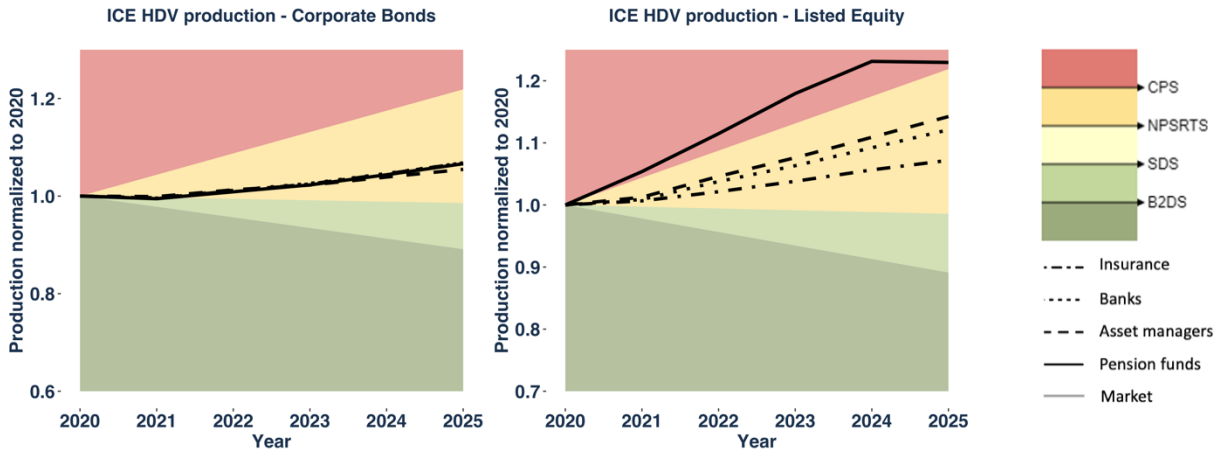
The total portfolio of asset owners, as well as asset managers and banks are dominated by exposure to these 14 companies. It seems that the alignment of Swiss financial institutions in this sector is driven by the production plans companies in their portfolio, and alignment is determined by exposure to more ambitious companies.

Heavy Duty Vehicles

Heavy-Duty vehicles are trucks, buses or coaches and are defined as freight vehicles of more than 3.5 tons or passenger transport vehicles of more than 8 seats.

They make up a smaller share of the global fleet, and Swiss portfolios are exposed to the production of these an order of magnitude less than to light-duty vehicle production. However, HDVs contribute disproportionately to climate and air pollution, in part due to their significant non- CO_2 emission, including nitrous oxide and black carbon, which has a high, short-term warming potential.[70] Another factor is that they are used dramatically more than a typical car, covering more distance in the life-cycle use.

Although the HDV fleet is very heterogeneous, most vehicles are currently powered by diesel engines. Decarbonization of this sector requires efficiency improvements, a shift towards low-carbon technologies as well as an optimization of supply chain activities.[71] Low-carbon technologies currently make up a barely visible share of production, and slight expansion of production is still planned.



[69] 2DII, Changing Gear Report 2020
[70] ICCT Vision 2050
[71] https://theicct.org/heavy-duty-vehicles

Aviation

Aviation accounts for 2.4% of global CO_2 emissions from fossil fuel use and is the most emission intense form of travel.[72]

The total climate impact from aviation is even higher, as non- CO_2 emissions are estimated to currently account for twice the warming impact of CO_2.[73] Current fuel efficiency improvements in the sector are in the order of 2% per year compared to an annual 6% growth of flights taken. Alternative fuels are still in their infancy with some progress being made on very small scale. In 2018, alternative fuels accounted for less than 0.1% of aviation fuel consumption.[74] In addition, most alternative fuels rely on the use of biomass which is potentially limited as it would compete with other types of land-use, for example for food production.

Most climate targets set by airlines include carbon offsets. A carbon offset is the reduction of greenhouse gas emissions in one place, often by planting trees, to compensate for emissions somewhere else, in this case, the aviation industry.[75] This report does not integrate offsets into the analysis: even though offsets might reduce the carbon footprint of a company (given that the projects are legitimate), they do not indicate any improvement in the core business of an airline, namely flying.

Companies in the aviation sector typically account for less than 0.2% of the total portfolio value, across all types of financial institutions.

The following graph shows the current emission intensity of invested companies, as well as the emission intensity required in 2025 by the climate scenario.

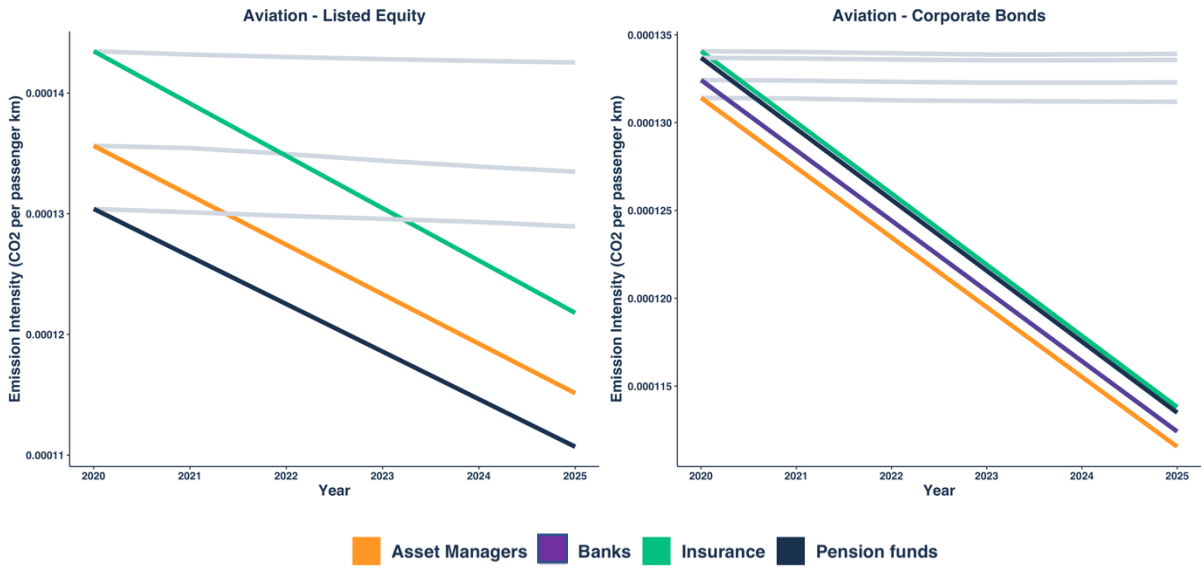


Figure 29: Current fleet intensity vs reduction required under Sustainable Development Scenario

[72] https://theicct.org/sites/default/files/publications/ICCT_CO2-commercl-aviation-2018_20190918.pdf
[73] https://elib.dlr.de/59761/1/lee.pdf
[74] https://www.iea.org/commentaries/are-aviation-biofuels-ready-for-take-off
[75] For more information on this topic : https://www.icao.int/environmental-protection/CORSIA/Pages/default.aspx

The result shows the disparity between emission intensity reductions that airlines should be aiming for, and their current plans. This finding is in line with a study published by the Transition Pathway Initiative which shows that show that most airlines do not have targets aligned with the Paris climate goals.[76]

The aviation industry is significantly impacted by the ongoing COVID-19 pandemic, with total losses estimated as $84.3 billion.[77] Companies such as LATAM, South African Airlines or Virgin Atlantic have already gone bankrupt, while others such as Lufthansa and Air France were bailed out by governments. Forecasts used in this analysis will likely have been significantly altered through the pandemic.

Shipping

International shipping currently accounts for 2% of energy related CO2 emissions[78] and 11% of direct transport emissions.

Most of the emissions during the lifecycle of a ship stem from the combustion of fuels, whereby the carbon intensity of a ship varies significantly by size and vessel type.[79] Gains in efficiency can help reduce emissions in the short term, whereas a switch to low carbon fuels is necessary in the future to fully decarbonize the sector. However, low carbon fuels currently account for only 0.1% of total fuel used in the shipping sector.

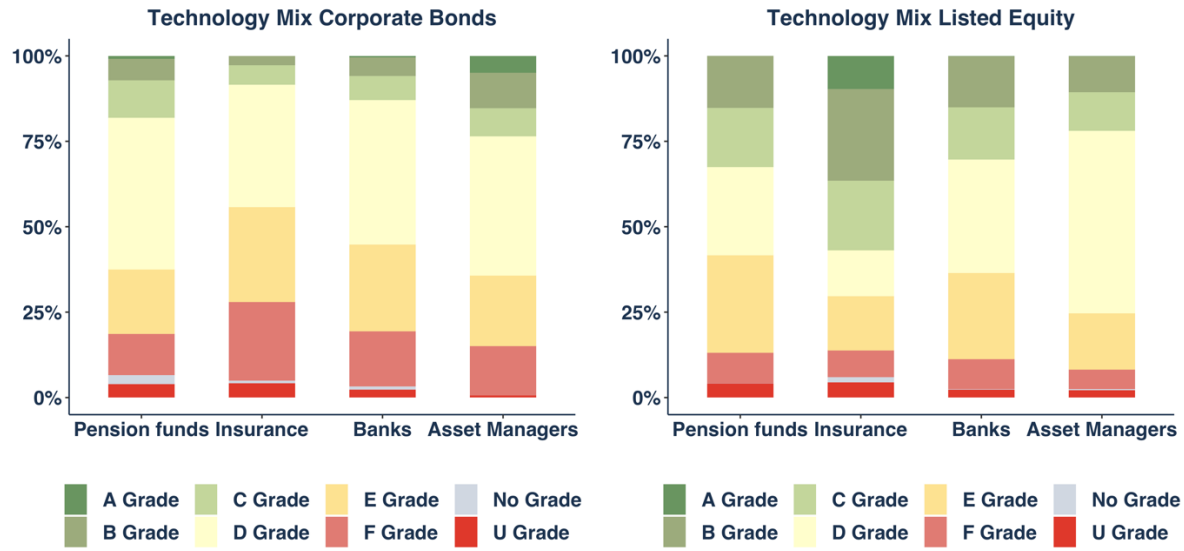
Swiss investors currently hold less than 0.05% of aggregate listed equity or corporate bonds portfolios in the shipping sector.

This analysis uses a greenhouse gas emission rating for ships published by RightShip that assesses the estimated emissions of a vessel compared to vessels of a similar size and rate the performance on a scale from A-G. More information on this methodology is available here.

Insurance companies hold the largest share of A-C rated vessels in their listed equity portfolios, and the largest share of <F rated vessels in their corporate bonds portfolio, compared to other peer groups.

In 2050, the International Maritime Organization announced that it would aim to reduced emission by 50% by 2050, compared to 2008 baseline. For financial institutions, the Poseidon Principles, launched in 2019, provide a framework agreement for integrating climate considerations into lending decisions in the shipping sector.[80]

[76] https://www.transitionpathwayinitiative.org/publications/42.pdf?type=Publication
[77] https://www.iata.org/en/pressroom/pr/2020-06-09-01/
[78] IEA 2020, *Report on International Shipping*, https://www.iea.org/reports/international-shipping
[79] Transition Pathway Initiative https://www.transitionpathwayinitiative.org/publications/42.pdf?type=Publication
[80] https://www.poseidonprinciples.org/



Cement and Steel

The steel sector accounts for 7% of CO_2 emissions from the energy sector and 8% of global final energy demand[81]. 0.1-0.6% of aggregate Swiss portfolios are currently invested in the steel sector.

Global annual steel production has doubled over the past two decades from 850 to 1,850 tones, largely driven by the rapid expansion in emerging economies, where 85% of current global capacity is located. More specifically, China accounts for 51% of global steel production and therefore plays a pivotal role in the decarbonization of the steel sector. The steel sector is currently the largest industrial consumer of coal, which is used to cover 75% of its energy demand.

In the Sustainable Development Scenario, the energy intensity of crude still is required to decline by 1% per year. In comparison, the actual energy intensity of steel fell by 0.7% per year between 2010 and 2016, and by 2.2% in 2017. According to the IEA, this drop in 2017 was driven by energy efficiency improvements and an increase in scrap-based production. However, deep decarbonization of this sector will require transformative change towards low-steel production methods[82].

Currently, 30% of raw material input into the steel-making process comes from recycled steel scrap. Steel production from iron ore requires eight times the energy required for producing steel from scrap. Furthermore, this energy is mainly required in the form of electricity when steel is produced from scrap, which makes the process easier to decarbonize. However, due to the growing demand, the quantity of steel scrap cannot meet the current material requirements (81).

There are two routes of producing steel, corresponding to these different input materials and methods: one is in integrated steel plants either in an open-hearth (OHM) or a basic oxygen furnace (BOF) and fed by hot metal produced by a blast furnace. The other is in scrap based mini mills, where

[81] International Energy Agency, ETP Iron and Steel Technology Roadmap, October 2020
[82] https://www.iea.org/fuels-and-technologies/iron-steel

an electric arc furnace (AC-EAF or DC-EAF) is fed mostly by scrap, which accounts for 29 % of global production.

The graph below shows the current exposure of the aggregate portfolios to different these different technologies. Listed equity portfolios have a slightly higher exposure than corporate bonds portfolios and are mainly invested in basic oxygen furnace, whereas bonds portfolios are more exposed to Ac-Electric Arc Furnace technology. This is likely due to the geographical location of assets in the two asset classes.

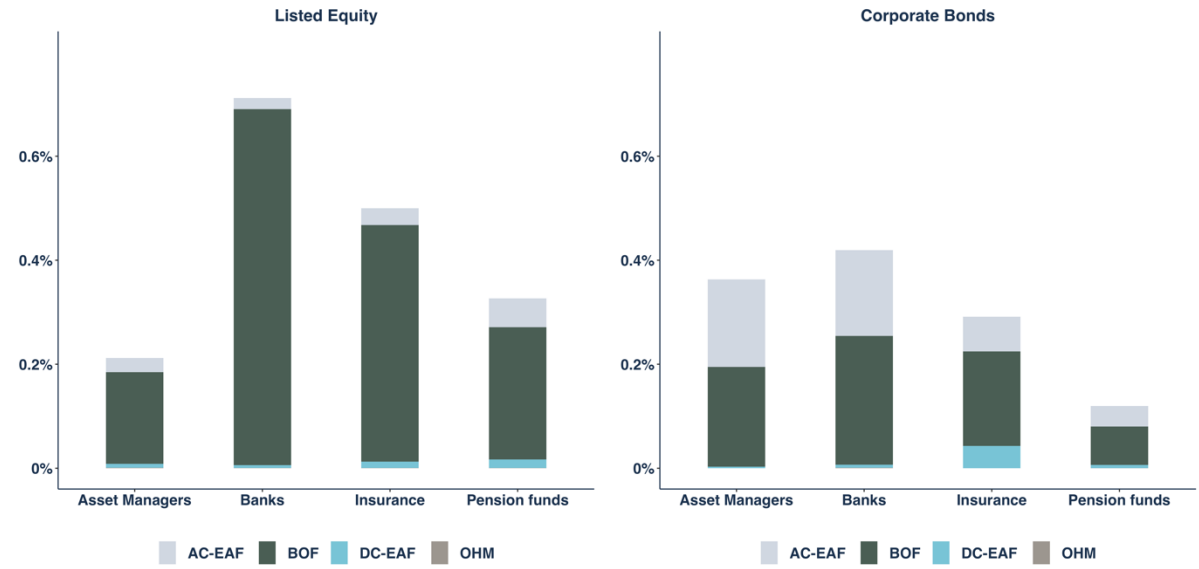


Figure 30: Exposure to different technologies in the steel sector, as percent of total portfolio value

The graph below shows the current emission intensity of the two technologies most present in Swiss portfolios: basic oxygen furnace and Ac-electric arc furnace as a starting point in 2020. The estimate of the current emission intensity is available in the asset-level data. The coloured line then represents the emission reductions necessary to align steel production with the Sustainable Development Scenario, based on the Sectoral Decarbonization Approach.

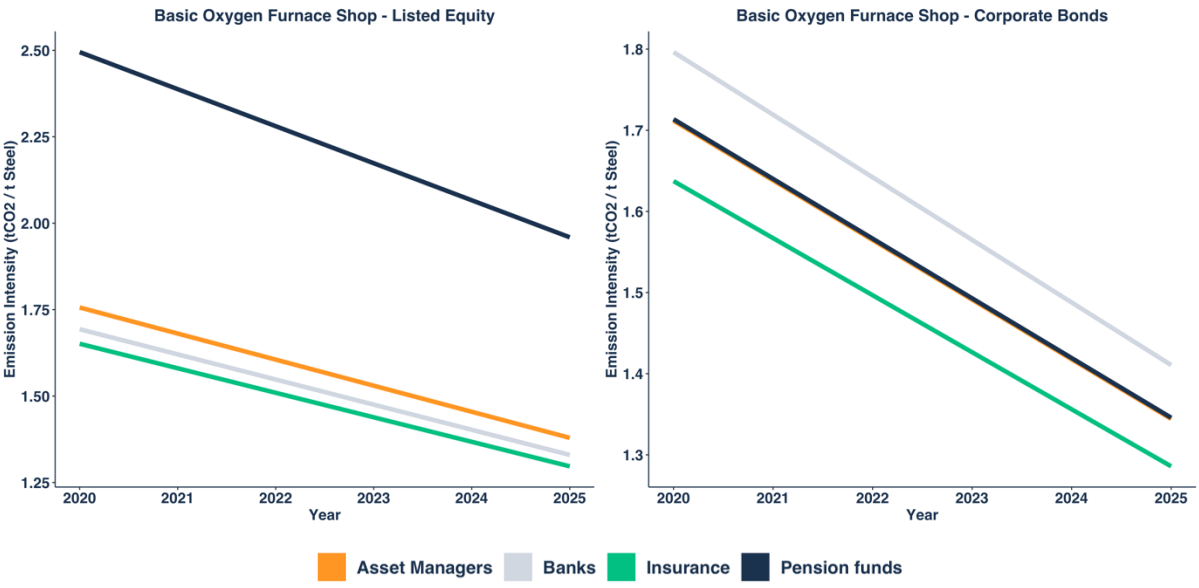


Figure 31: Current emission intensity and intensity reduction required under Sustainable Development Scenario in the next 5 years.

Pension funds have a significantly higher emission intensity in both technologies in their aggregate listed equity portfolio than banks, asset managers or insurance companies. The emissions intensities in the corporate bonds' portfolios are overall lower than in the listed equity portfolios, with banks currently invested in companies with the highest emission intensity out of all peer groups.

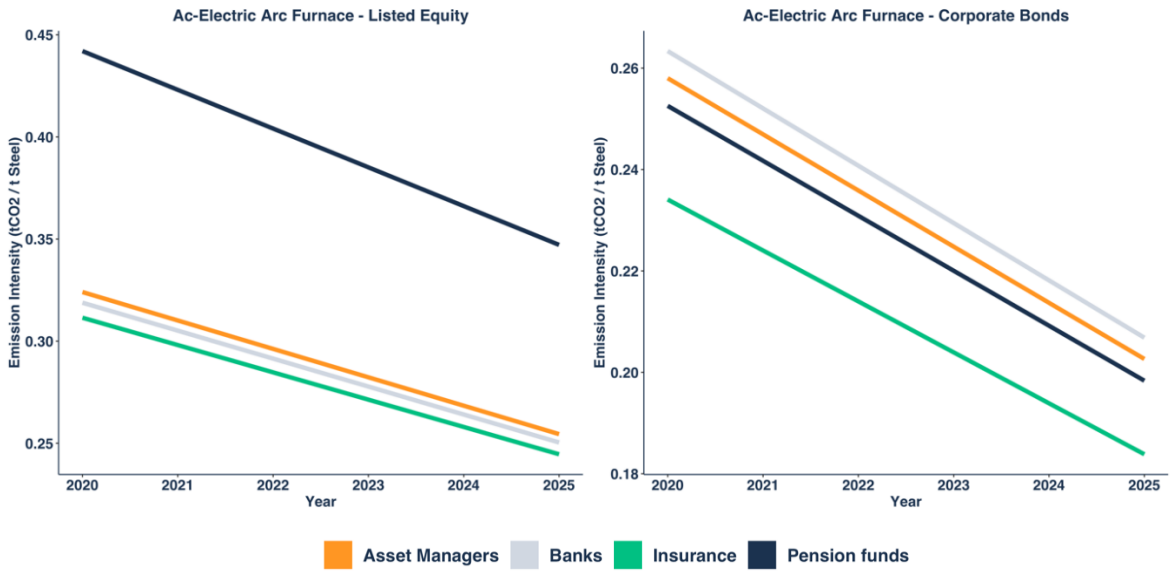


Figure 32: Current emission intensity and intensity reduciton required under Sustainable Development Scenario in the next 5 years

Cement is the second-largest industrial CO_2 emitter and accounts for 1-2 % of value invested in Swiss portfolios.[83]

Used to bind together the elements that make up concrete, cement is the world's most widely used manufactured material[84]. Driven by population growth and urbanization, demand for cement is expected to continue to rise. The CO_2 intensity of cement production increased from 2014-18, but actually has to decrease at 0.8 % per year to meet the sustainable development scenario. Two key action points are recommended by the IEA: a reduction in the clinker-to-cement ratio, as well as the development of innovative technologies including carbon capture, use and storage.

The graph below shows the current emission intensity in 2020, and the emission reductions necessary to transition to a 2°C pathway.

[83] https://www.iea.org/reports/cement
[84] https://www.transitionmonitor.com/wp-content/uploads/2020/09/cement_ef_final_pacta_banks_v1.2_14-09-2020.pdf

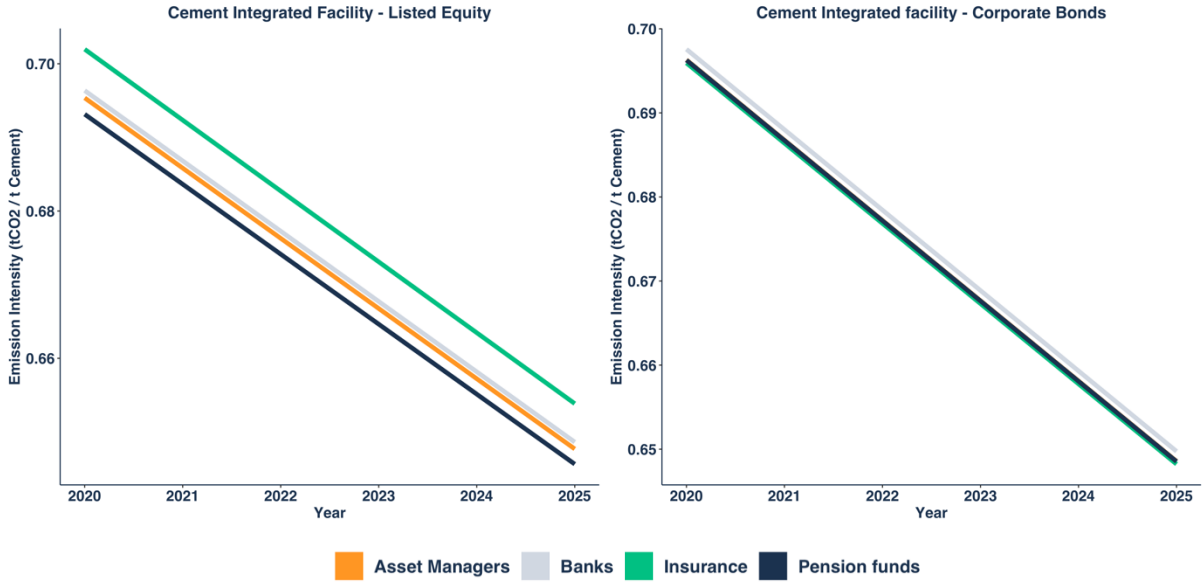


Figure 33: Current emission intensity and intensity reduction required under Sustainable Development Scenario in the next 5 years.

Scaling ambition to meet a 1.5°C temperature target

In article 2.1.a of the Paris agreement, parties signed the long-term goal of 'holding the increase in the global average temperature to well below 2°C above pre-industrial levels *and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels.'*

Article 2.1.a recognizes that the impacts and physical risks of climate change are highly unequally distributed across different countries and that significant impacts can be expected even below 2°C in some regions of the world.

The IPCC 1.5°C report published in 2018 provided more urgency to this matter, investigating how the impacts of a 2°C global mean temperature increase would differ from a 1.5°C increase. The report consolidates peer-reviewed literature on the topic. There is a robust difference between 1.5°C and 2°C not only in terms of mean temperature but also, among other things, in terms of hot extremes and heavy precipitation in the most inhabited regions, the probability of droughts in some areas and yield reduction in essential crops. The carbon budget for a 50% chance of limiting global mean temperature increase to 1.5°C lies at 580 Gt CO_2, which corresponds to 14 years of 2019-level emissions (instead of 1000 Gt CO_2 for reaching a 50 % chance of reaching 1.75°C), and the global economy would have to reach net-zero carbon emissions by around mid-century.

The report also laid out possible scenarios and pathways for achieving the transformation required, based on different integrated assessment models. To meet this more ambitious temperature goal, a transformation of the energy system at an unprecedented scale is required.

In addition to this, all models either rely on assumptions regarding negative emissions through bio-energy carbon capture and storage (or other related means) or significant behavioral change and, therefore, lower future energy demand.

The International Energy Agency, whose *Energy Technology Pathways* and *World Energy Outlook* publications are currently used in the PACTA analysis, had so far not included an explicit 1.5°C scenario in their publications. Instead, the IEA published a Beyond 2°C Scenario (B2DS), which is used in this report. The B2DS, in some sectors, this meets or exceeds the ambition of those 1.5°C scenarios published by the IPCC that rely heavily on BECCS, which B2DS does not as much. This underlines the importance of interpreting sector and technology pathways within scenarios not in isolation but considering them as a set of technology pathways that together achieve a certain temperature outcome.

The World Energy Outlook (WEO) published in October 2020 now included a net-zero in 2050 target that requires *"low emission sources of electricity would need to provide nearly three-quarters of electricity generation in 2030, and more than half of passenger cars sold in 2030 would need to be electric."* The WEO net-zero scenario also requires behavioral changes as well as carbon capture utilization and storage. Given the timing, this scenario could not be considered for this analysis.

In order to investigate the ambition required to reach a 1.5°C temperature target, this report shows the scenarios published in the *Global Energy and Climate Outlook 2019* using the POLES model.

POLES is an energy system model that is structurally similar to the energy models used by the IEA but is published by the European Commission Joint Research Centre. A detailed comparison between the two models can be found in the annex[85].

The graphs below compare the production plans that would have to be financed by Swiss participants under different climate scenarios, as well as their actual production plans.

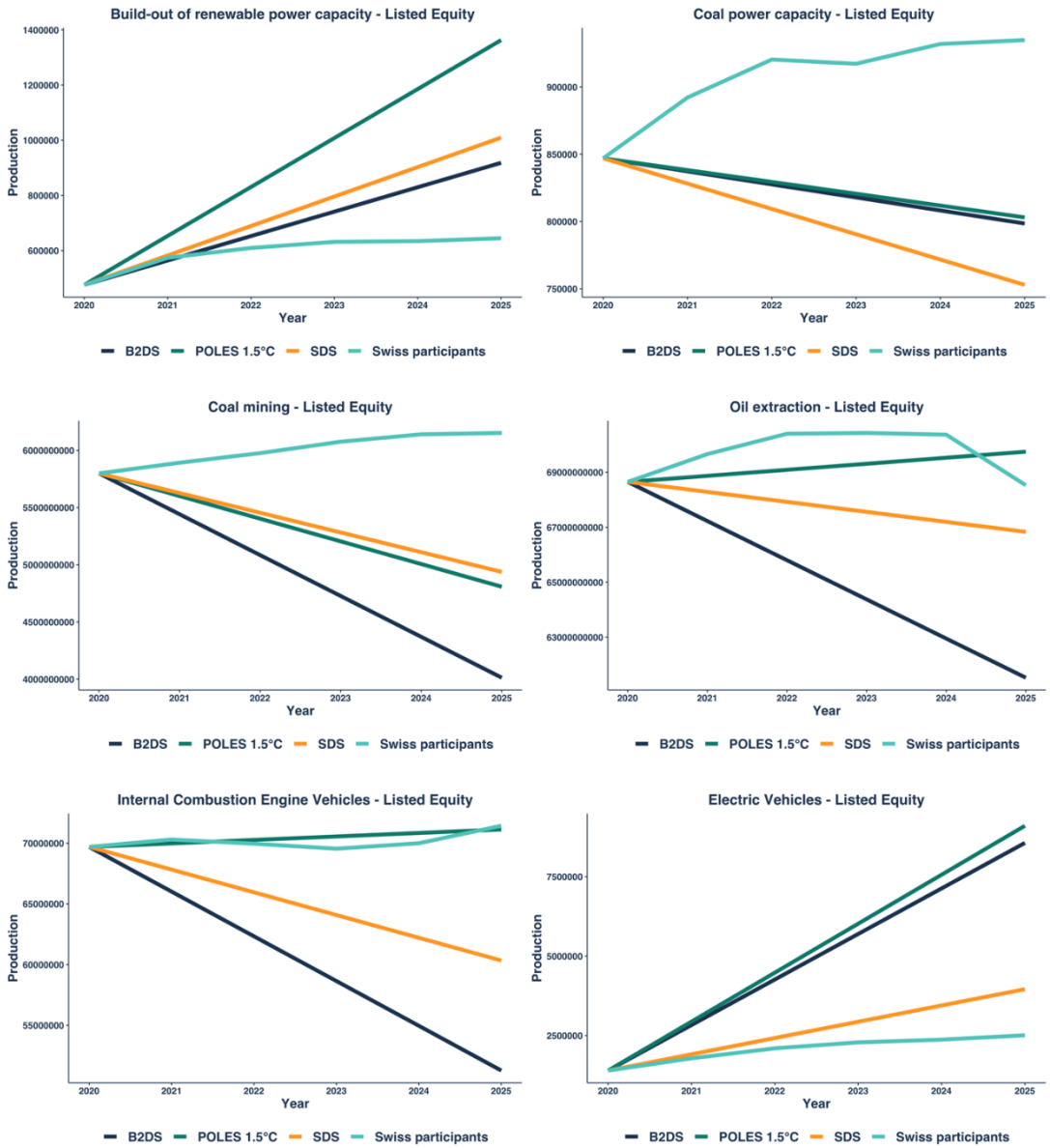


Figure 34: Build-out required in different technologies under different climate scenarios, compared to aggregate Swiss build-out.

[85] The annex is published in a separate document, available on the 2DII website.

The POLES 1.5°C scenario requires significantly steeper expansion of renewable energy capacity than the Sustainable Development Scenario or the Beyond 2°C scenario. Neither of these ambitions is met by the expansion plans of Swiss investors, as already discussed in the previous section.

The build-out of electric vehicles required under the POLES 1.5°C scenario is also steeper than the build-out under the two IEA scenarios. This ambition too is not met by the portfolios analyzed. On the other hand, the POLES 1.5°C scenario gives more leeway to high-carbon technologies such as internal combustion engines, coal power capacity and oil production. In the case of coal power capacity and coal mining, the portfolios analyzed are still far from meeting the ambition required under any scenario. In the case of ICE vehicles and oil extraction on the other hand, portfolios analyzed align with the assumptions of the POLES 1.5°C.

This section is not direct comparison between the models, but rather as an illustration of one among many different pathways required to meet the 1.5C temperature goal.

It is important to note that the scenarios contrasted in this section are built with different models. These models use different baseline assumptions, different assumptions about the development of key socioeconomic indicators as well as the development of different technologies and allocate different shares of the carbon budget to different sectors.

This illustrates the point already made in the introduction, namely that climate scenarios should be interpreted as different pathways of how to achieve net zero greenhouse gas emissions, rather than seen as a forecast of the future.

VI. Results of the climate Stress-test scenario application

The transition to a low-carbon economy will involve an industrial transformation that will create "winners" and "losers". That transformation will likely also have an effect on the risk and returns to financial portfolios.

A growing body of literature over the past decade has sought to conceptualize, identify, and measure climate-related risks in financial markets. They identify the reasons why these risks may be mispriced,[86] the mechanism by which they materialize,[87] and potential impacts.[88] It is important to note that these risks – while often classified as "sustainability risks" – are not strictly speaking sustainability risks proper, but rather *financial risks materializing as a result of the response of the larger sustainability risk related to climate change*. The Financial Stability Board (FSB) Task Force on Climate-Related Disclosures divides these risks in physical risks (from climate change) and the transition risks associated with mitigating climate change. Technically, there is also a third class of risks usually somewhat less prominently considered related litigation risks. The stress-test results discussed in this chapter only address transition risks.

The potential scale of that effect will be a function of how financial markets prepare today.

While the transition to a low-carbon economy will impact the economic viability of economic assets, the actual effect on financial prices can be largely mitigated. Preparing and anticipating the transition can ensure that financial asset prices integrate transition risk considerations and thus – when the transition materializes – face little repricing. Investing in companies transitioning – and supporting their transition through climate actions – can equally contribute to reducing economic dislocation and thus the overall effects on financial markets. There is thus a direct relationship between portfolio alignment, financial institutions' climate actions, and the ultimate transition risk that will materialize.

A growing body of evidence demonstrates that there are three primary determinants of the ultimate transition risk level. First, the level of decarbonization. Second, the anticipation level and timing of the decarbonization. Third, the "preparation" in terms of alignment of financial portfolios when the decarbonization trajectory materializes. For example, in the decarbonization stress-test scenarios developed by 2° Investing Initiative, different losses are calculated based on the year the "climate transition shock" (i.e. the moment of repricing) materializes, with higher losses at later dates. The figure below demonstrates the total portfolio losses assuming different start years for the transition shock, highlighting higher costs at later transition dates. When taking into account alignment, these shocks can also be significantly lower.

[86] http://degreesilz.cluster023.hosting.ovh.net/wpcontent/uploads/2018/02/transition_risks_and_market_failure_a_theoretical_discourse_on_why_financial_models_and_economic_agents_may_misprice_risk_related_to_the_transition-1.pdf
[87] https://www.wri.org/publication/carbon-asset-risk-discussion-framework
[88] http://et-risk.eu/

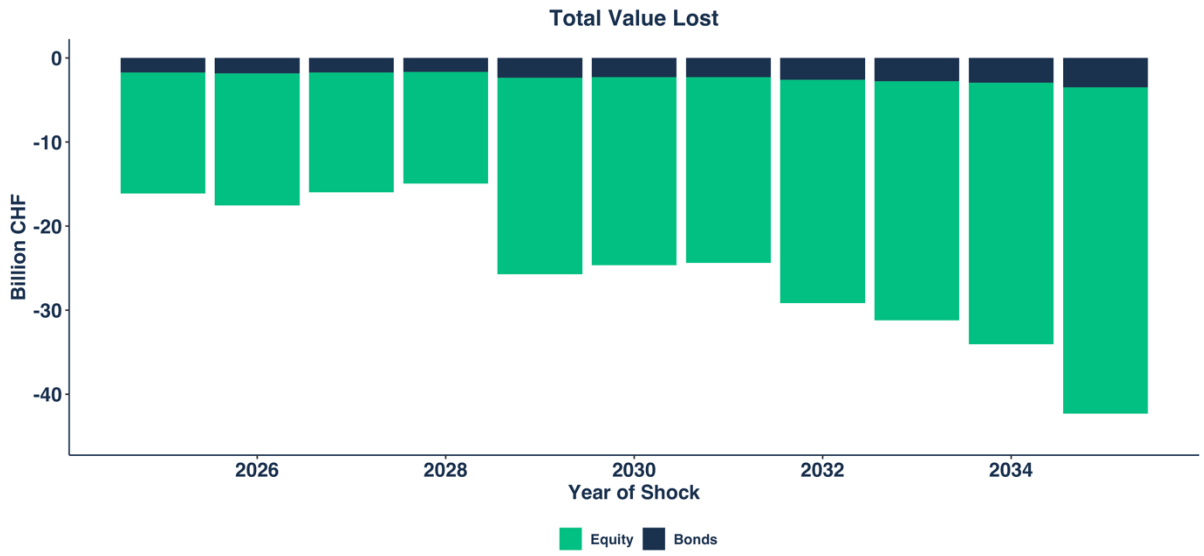


Figure 35: Total value lost as a function of the year of shock

A number of approaches have been developed to try to quantify transition risk as part of stress-test scenarios.

For the private sector, a range of commercial organizations (e.g. VividEconomics, 427, OliverWyman, PWC Climate Xcellence Tool) have started to develop methods, models, and tools to quantify transition risk. At the same time, financial supervisors and central banks have also developed climate stress-test scenarios from the vantage point of identifying potential systemic risks and mitigating these risks. Notable examples include work by the Bank of England,[89] ACPR,[90] and EIOPA.[91]

To date, stress-testing approaches by financial supervisory authorities and central banks generally fall into four approaches:

a) **"Historical ratings downgrade":** This approach involves looking at historical case studies for ratings downgrades related to environment events (e.g. BP Deepwater Horizon, German utilities) and simulating such downgrades related to future events. These downgrade simulations can either be explicitly tied to historical events or simply based on potential orders of magnitude. The European Central Bank (ECB) has applied this approach recently.[92]

b) **"Equity multiplier":** This approach involves the application of a valuation model (e.g. discounted cash flow model) for the listed equity portfolios and using a multiplier (e.g. 15%) to map that to credit portfolios. This approach was applied by the Bank of England Prudential Regulatory Authority (PRA) as part of an exploratory climate scenario analysis exercise in 2019.[93]

[89] https://www.bankofengland.co.uk/climate-change
[90] https://acpr.banque-france.fr/scenarios-et-hypotheses-principales-de-lexercice-pilote-climatique
[91] https://www.eiopa.europa.eu/sites/default/files/events/climate_risks_sensitivity_analysis_workshop_discussion_paper.pdf
[92] https://www.ecb.europa.eu/pub/financial-stability/fsr/focus/2020/html/ecb.fsrbox202005_03~eaf7ae06be.en.html
[93] https://www.bankofengland.co.uk/prudential-regulation/letter/2019/insurance-stress-test-2019

c) **Credit risk / stress-test model.** The third approach is to actually develop a credit risk model using new modeling techniques or building on the existing internal stress-test frameworks already developed by financial supervisors and central banks. While this can be considered to be the most sophisticated approach, these models are not necessarily well adapted for climate-related risks and may act as "black boxes" that make interpretation difficult.

d) **Simulations.** The fourth approach are simulations based on ad-hoc assumptions or by applying approaches a)-c) and developing distributions around them. One example for this is an early paper by Battiston et al. (2017)[94] that assumed 100% losses for certain sectors. Another approach is currently being developed by the 2° Investing Initiative, partly applied in this report. That approach simulates different values for a set of model parameters and calculates results across larger number of scenarios.

As part of the 2020 exercise, financial institutions received the results of a stress-test scenario simulation for their listed equity and corporate bond portfolio.

The simulation was designed to emulate the application of a climate stress-test scenario of the kind applied by the private sector and financial supervisory authorities. Specifically, the exercise involved the application of the potential losses developed in the Inevitable Policy Response commissioned by UN Principles for Responsible Investment (UN PRI) and developed by Vivid Economics. They also received the results of the 2° Investing Initiative stress-test scenarios developed in partnership with and for a range of financial supervisory authorities currently applying these scenarios.

It is important to note that losses can materialize through channels not covered in this analysis as a number of financial instruments (corporate loans, real estate/mortgage portfolios, sovereign bonds, etc.) are not covered in this analysis.

As with the results for alignment, there is a wide distribution of outcomes.

The table below shows the percent portfolio value lost (cumulative) across the listed equity and corporate bonds portfolios of participating institution using the stress-test scenario model developed by the 2° Investing Initiative[95]. The model assumes a delayed, uneven transition that materializes only in 2030, and takes into account the lack of alignment today across most sectors and technologies analysed.

The results highlight both the wide distribution as well as the uneven distribution, with some portfolios having very concentrated losses in bonds and others in equity. The results show that while the average loss is relatively limited, for certain institutions portfolio losses could be significant and material. In particular, roughly 5% of institutions have losses of upwards of 10% of the portfolio value.

[94] https://www.unpri.org/pri-blogs/assessing-climate-risks-in-investors-portfolios-a-journey-through-climate-stress-testing/5526.article
[95] Hayne et al. 2020, *Factoring transition risks into regulatory stress-tests: The case for a standardized framework for climate stress testing and measuring impact tolerance to abrupt late and sudden economic decarbonization,* ACRN Journal of Finance and Risk Perspectives

Interestingly, there are a small minority of portfolios that have positive results in the stress-test exercise. This highlights the extent to which climate-related stress-test scenario exercises – unlike traditional exercises – can actually yield positive results for those portfolios invested in the "winners".

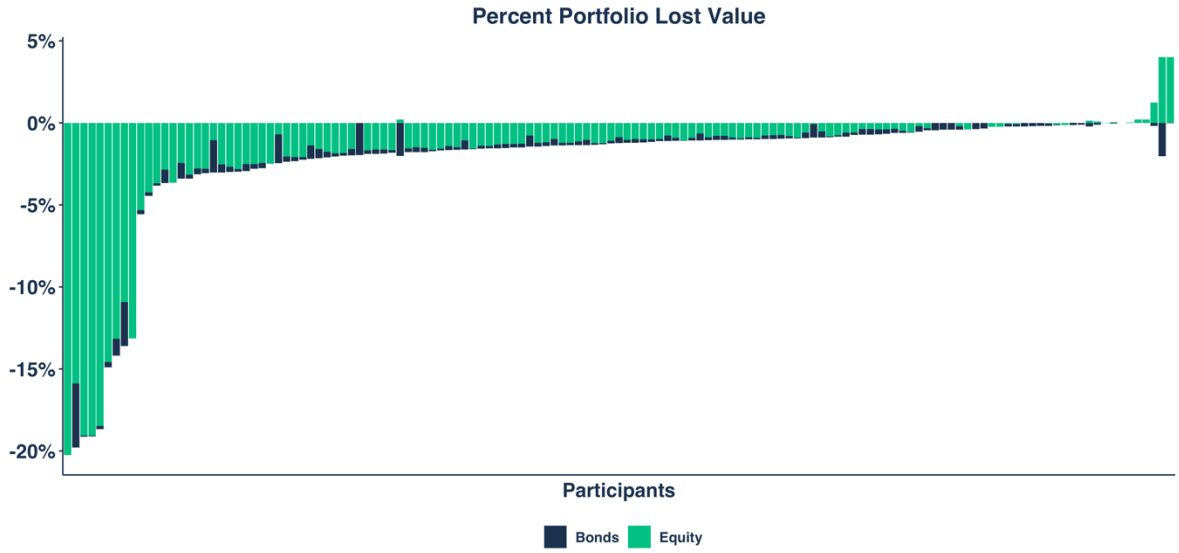


Figure 36: Percent portfolio value lost by participating financial institution.

While distribution is wide, the overall potential losses for the analysed portfolios under the stress-test scenarios applied in this exercise remain limited.

The majority of portfolios face losses of 5% or less under the stress-test scenario involving a transition shock in 2030. These figures are relatively limited, considering equity losses of 20-30% at the beginning of the year related to the COVID-19 pandemic (many of which have since recovered). Of course, the overall materiality is a function of the capital being held and – in the case of banks / asset managers analysed – may not be liabilities of the institution at all but rather those of the ultimate asset owners and pension fund beneficiaries.

Despite the overall losses being limited compared to other stress-test scenarios used in mainstream stress-test exercises or the types of losses evidenced during the COVID-19 pandemic, the results are nevertheless cause for concern. First, the scenarios demonstrate the extent to which these losses can be reduced through early and ambitious action. Second, even if not necessarily material from a financial stability perspective, they are likely to have negative (and arguably avoidable) welfare effects. Finally, they may be compounded by other factors. The limited losses also demonstrate the relative advantage of losses due to transition risk versus potentially much higher losses related to physical risk from a financial sector perspective. They also demonstrate the possibility of implementing ambitious climate policies without necessarily dramatically disrupting financial institutions – outliers notwithstanding.

VII. Comparison to the 2017 pilot test

One of the key advantages of *continued* tracking of Paris Agreement alignment of the Swiss financial sector is the ability not just to measure alignment, but also better understand drivers of change and progress over time.

This test marks the first systematic climate scenario analysis across a large sample of financial institutions that includes measurements at multiple points in time. It therefore provides an insight into the evolution of these portfolios in addition to considering progress against the Paris Agreement.

Understanding that evolution is complex, as a number of aspects have changed. First, the financial portfolios themselves will have changed. Second, the companies' investment and production plans will also have changed, as well as potentially the ownership structure and assets they operate due to mergers, acquisitions and divestments. Finally, the climate scenarios themselves evolve over time. Isolating drivers of changes is thus relatively complex. At the same time, this exercise presents a unique research opportunity to better understand the real-world impact of financial institutions and to more systematically and scientifically track progress. Despite these complexities, first insights can be gleaned from looking at the portfolios over time.

This report presents a first sample of these insights, focusing on 53 financial institutions that participated both in 2017 and 2020. We address the following two questions:

- *How has the total production allocated to the portfolios in different technologies changed?*
- *What are the drivers of this change?*

We focus on equity portfolios submitted and use the ownership weight approach to allocate the company level production to the portfolio.[96]

Since 2017, participants have decreased the aggregate coal power capacity and coal production in their portfolios and increased the renewable power capacity and electric vehicles produced, beyond what had been planned in 2017.

The following figure shows the total production in different technologies that was allocated to the Swiss portfolios in 2017, that was planned for 2020 based on 2017 production plans, as well as the actual production allocated to the portfolios in 2020. This is compared to the production that would have been required to take place in 2020, based on the 2017 2°C climate scenario. The change in allocated production is also compared to the change of the capacity/production in the entire global equity market between 2017 and 2020.

Renewable energy capacity was built-out more than was planned in 2017, or even indicated by the IEA climate scenario used in 2017 as a reference point. In other words, the portfolios in renewable power actually ended up *meeting* the scenario pathway despite lagging significantly in 2017, thanks

[96] This approach, described in more detail in the Methodology chapter, allocates company level production to the portfolio based on the percent of the total outstanding shares that the financial institution owns.

to additional efforts made in the interim. One important caveat to that conclusion is that this analysis does not distinguish real additions versus additions purchased through acquisitions (either at plant or company subsidiary level). Although the two are not equivalent in their impact on the total renewable energy capacity installed, the latter are still a positive trend: the related deal flow could be a feature of the renewable power sector where developers develop assets that are then purchased by utilities upon completion. It should be noted that one of the objectives of the assessment is to support financial institutions in driving the change in the companies that allows for redress of gaps. It is for this reason that this report also carries that title.

Electric vehicle production capabilities also increased beyond original plans in 2017, however, not enough to match the ambition set by the 2017 climate scenario, and, as was the case for renewables power capacity, also lagging behind the global equity market.

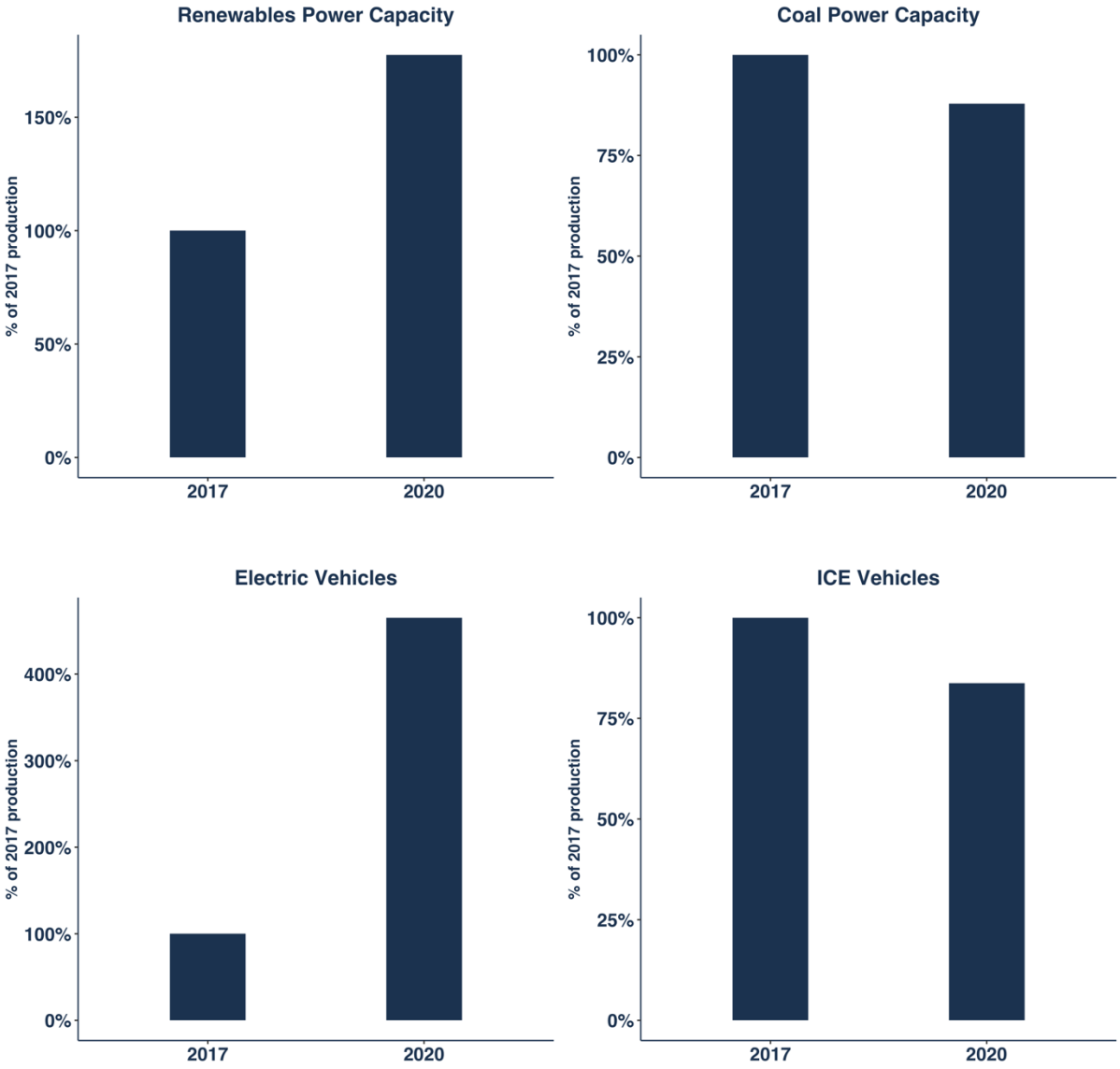


Figure 37: Production allocated to the 53 financial institutions who participated in both tests. The production is normalized to the 2017 value.

Coal power capacity and ICE vehicle production on the other hand were expected to be increased, based on 2017 production plans, but were in fact decreased in the actual 2020 portfolios. The same caveats apply as for renewables, where the analysis cannot yet distinguish retirements vs. divestments by companies. Further data upgrades will however allow for such distinctions in the future.

As part of the qualitative survey, participants also reported on whether they had taken climate action on the basis of the 2017 test. More than half of participants who indicated to have taken part in both tests also reported to have taken climate action.

A higher share of participants who reported to have taken actions based on the test in 2017 decreased their share of coal power capacity and increased the share of renewable power capacity, compared to the participants who did not report to have taken climate action.

However, the change is inconsistent and not homogeneous across participants. While at aggregate level it is material, there is wide dispersion.

The analysis conducted up to this point does not give any indication of the driver behind this change in allocated production. The next step of this investigation explores possible drivers of this change.

Addressing the question of drivers behind the observed shift is difficult as the possible drivers are numerous, as discussed earlier. We therefore construct the following 'cases' to isolate the change contributed by each driver, and investigate the following portfolio configurations:

1. **Portfolios 2017,** representing the capacity/production of the portfolios submitted for the 2017 analysis in the year 2017. This was effectively the "current" capacity in 2017. The portfolio is analyzed using financial and asset-level data from 2017.
2. **Planned additions***.* Based on the forward-looking production plans available in 2017, this shows the additions that companies in the 2017 portfolios had already planned for 2017-2020. In 2017, this data informed the "alignment charts".
3. **Actual additions***:* In this step, we analyze the capacity/production additions that those same companies actually implemented in 2020, in addition to those that had already been planned for in 2017. The analysis cannot yet distinguish between new additions versus acquisitions at corporate level. Further research is planned to better distinguish these cases moving forward.
4. **New companies***:* The portfolios submitted in 2020 also contain companies that were not yet present in the portfolios in 2017. To analyze the contribution of these companies, we subset the holdings only present in 2020 at investor level and calculate their aggregate weighted production/capacity.
5. **Reweighting old companies***:* The number of shares an investor holds in a company present in both the 2017 and the 2020 portfolio will have most likely changed over those three years. This affects the weighted production/capacity as the production allocated to an investor under this methodology is a function of the percent of outstanding shares that this investor owns. This also means that the allocated production is affected by the number of outstanding shares. Both these effects are accounted for in this step by evaluating those companies present in both portfolios with their 2020 weight.

6. **Divestment:** Some companies are no longer present in the 2020 portfolios and hence the weighted production of those companies is no longer part of the production allocated to the investor. These were labeled as “divestment” effects. Although the reweighting of holdings also represents a type of divestment, we consider the reweighting of shares in step 5 and focus on fully divested companies in step 6.
7. **Portfolios 2020***:* These are the portfolios, as they are in 2020, evaluated using asset-level and financial data from the same time stamp, looking at the current production in 2020.

We analyze these steps for the two of the technologies shown above, namely renewable and coal power capacity. As noted above, the analysis focuses on the listed equity portfolios of the 53 investors who participated in both years.

Through the mechanism of portfolio reallocation, Swiss investors in aggregate shifted their holdings away from renewable capacity. Effects of company engagement on the other hand could be noticeable in the capacity additions that investees installed between 2017 and 2020, which accounts for most of the increase in allocated production.

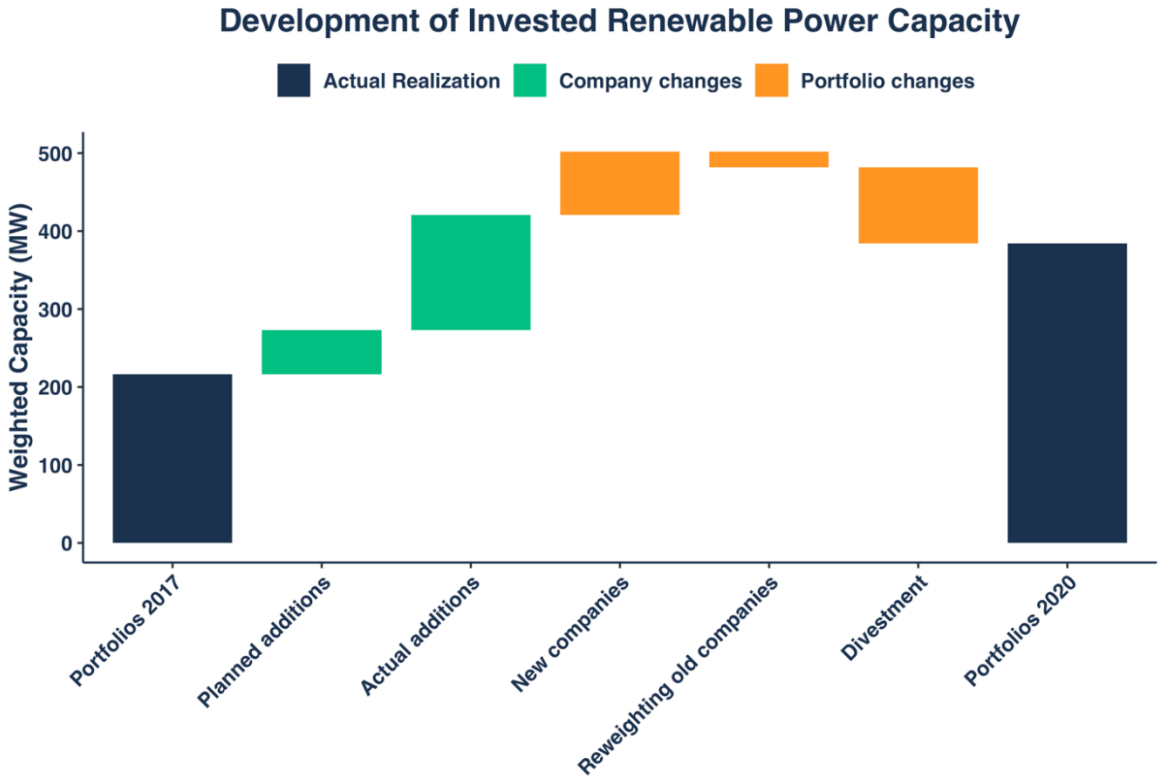


Figure 38: Development of invested renewables power capacity.

Companies built out more renewable power capacity in 2020 than had been originally planned. On the other hand, divestments from companies and reweighting of companies that had already been in the portfolio in 2017 decreased the weighted capacity more than the addition of new companies in the 2020 portfolio increased it. Swiss investors would therefore have invested in a higher share of renewable power capacity if they had not changed their portfolio since 2017. This is a striking result. It suggests that the 53 Swiss investors participating in 2017 in 2020 actually over the past 3 years

reduced their exposures to renewables in their portfolio in terms of allocation, but overall still saw increased exposure due to the build-out of the underlying companies.

However, as will be outlined on the next page, this divestment may be the result of significant divestments from coal-heavy utilities with some renewable power capacity. In other words, significantly reducing exposure to coal power also by default leads to some reweighting away from the renewables business of those utilities also operating coal-fired power plants.

The overall coal power capacity allocated to Swiss portfolios decreased from 2017 to 2020. The reduction is entirely due to the exclusion of companies who own coal fired power plants from the 2020 portfolio that had previously been in the portfolios in 2017.

Although companies with holdings in coal power were also added to the portfolios and the coal power capacity of existing firms was built out more than had previously been planned, the overall capacity reduction due to the exclusion of companies outweighs the former. Especially the build-out beyond what had been planned in 2017 is striking, although, given the limitations of this analysis, this will also have been due to acquisitions. As outlined above, the exclusion of companies with coal power capacities inadvertently potentially led to the divestment of some in relative terms smaller share of renewable power.

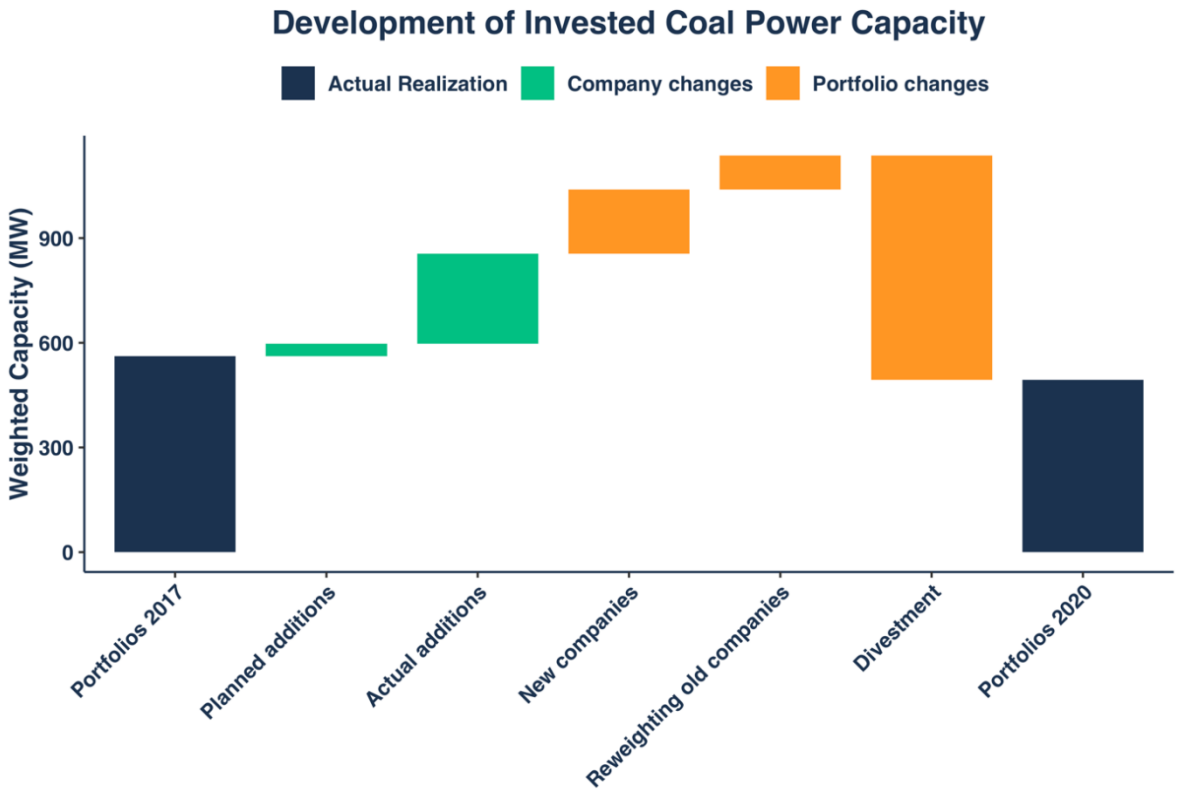


Figure 39: Development of invested coal power capacity.

This analysis demonstrates the shortcomings of investigating aggregate changes in portfolio alignment and exposure. Without further context information, the result appears to indicate a positive change - we see a significant reduction in the exposure of Swiss investors to coal-fired power capacity. And

indeed, all other things being equal, this can be considered positive from a climate risk perspective. However, we also see that those companies held in the portfolios in 2017 actually increased their coal power capacity by almost 50% relative to 2017[97]. This suggests that the assets may have simply been moved to another actor in the financial system. As the Swiss financial sector indicators improve, another financial market hosting the financial institutions that have bought these assets will have likely worsened.

This demonstrates the importance of moving beyond measuring the alignment of financial institutions to assessing the impact that a strategy or action in the financial sector has on real-world emission reductions. The point of this discussion is not to downplay the significant efforts to reduce the exposure to coal-fired power exposure. From an alignment perspective, progress is visible. From an impact perspective however, emissions have 'leaked' to another actor in the system. In the real economy, carbon emissions can be 'outsourced', for example by moving carbon intensive manufacturing and industries to other countries – these emissions still exist, even though they are no longer accounted for in the carbon balance of Switzerland. Similarly, carbon intense assets may have been excluded from Swiss portfolios but still exist and are 'outsourced' to the account of other financial institutions.

[97] part of which will have been due to company acquisitions

VIII. Taking Action: Climate Strategies and Impact

This section seeks to understand the climate strategies and actions complementing the portfolio exposures and alignment described above.

Portfolio alignment analysis is simply a comment on the production and investment plans of portfolio companies and their consistency with climate goals. In aggregate, the analysis speaks to the broader trends in financial markets as it relates to the Paris Agreement. However, for an individual financial institution such analysis only shows one side of the equation. The other side is the extent to which climate issues are integrated into the actions and strategies that these institutions deploy. A financial institution may for example be exposed highly to fossil fuel sectors but use engagement tools to seek to influence these companies to decarbonize. Similarly, low exposures may be associated without any climate actions or "intent" to contribute to the Paris Agreement.

One of the key feedbacks from the 2017 pilot exercise was the need to integrate the qualitative component into the analysis in addition to the quantitative portfolio alignment. In response to that feedback, the 2020 climate analysis involved a questionnaire (attached in the annex[98]) that sought to capture – at least in part – the nature of climate strategies and actions deployed by financial institutions. The survey also allows the Swiss government to begin to better understand the potential effectiveness of different climate actions and strategies. It also provides more color to the broader understanding of the integration of climate goals in Swiss financial markets. Furthermore, it enables us to tentatively explore the relationship between self-reported climate strategies in different asset classes and the quantitative alignment results.

The results are based on the responses of 83% of participants that filled out the qualitative questionnaire. The questionnaire covered three major themes and areas of potential engagement that are not covered by the quantitative analysis of the portfolio: climate action and strategies in different asset classes, political engagement, and consultation of clients on climate and sustainability preferences.

As will be shown in the subsequent pages, while the majority of Swiss financial institutions have begun to define climate targets or aspirations and implement climate actions, the focus of these actions and the type of actions are still highly tilted to specific approaches and asset classes. Moreover, there is some evidence that these actions are not being consistently applied and / or not yet translating into "real world impact". It should be noted however that in particular for engagement, many of these actions are still recent and so it may be in some cases too early to expect to see results in the data.

[98] The annex is published in a separate document, available on the 2DII website.

69% of survey respondents reported a climate related target or aspiration.

On a peer group level, this share is higher for banks (88 %) and asset managers (75 %) and slightly lower for pension funds (63 %) and insurance companies (68 %). The majority of reported targets consist of investing according to ESG criteria, a combination of best-in class and exclusion and engagement. A number of financial institutions also stated that they had set a high-level intention to reconsider their climate strategy and were currently in the process of developing the details of this strategy.

Most climate strategies are applied in the asset classes listed equity and corporate bonds, followed by Swiss real estate.

The graph below shows the percent of assets invested in different asset classes, averaged across all respondents within a certain peer group. Colored in dark blue are the percent of assets that were reported to be managed with a climate target or aspiration / strategy, although the precise nature of the climate strategy (e.g. ambition, scope) was not specified.

We observe that more than half of the assets invested are invested in asset classes that are covered by the quantitative analysis (corporate bonds, listed equity and real estate). These asset classes are also those in which the highest percentage is indicated to be managed with a climate strategy across all peer groups. These results confirm that the quantitative analysis covers those asset classes driving the climate strategy of financial institutions. The most significant asset class not covered in the analysis is 'other bonds' .

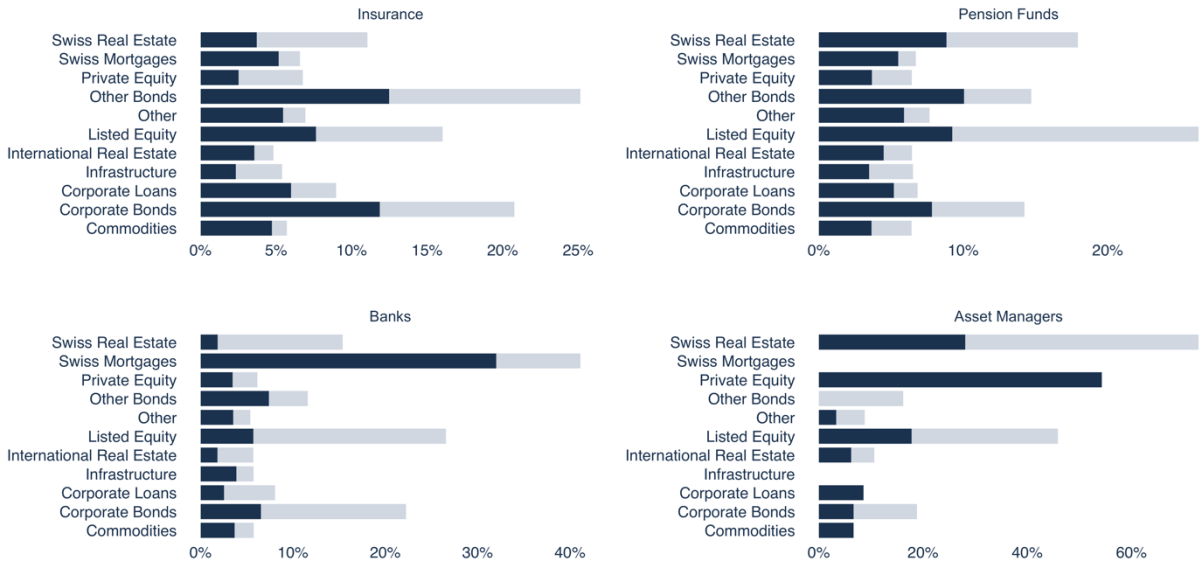


Figure 40: Average share of holdings invested in different asset classes. Dark blue: percent of holdings invested with a climate strategy, based on self-declared information. 100% of participants responded to this question.

The climate strategies most frequently employed by Swiss participants include engagement as well as exercising shareholder voting rights, and exclusion of coal and best-in class investing.

The following chart shows the frequency of climate-relevant strategies used by participants in Switzerland in different asset classes. Climate relevant strategies that investors could choose from included engagement, exercising shareholder voting rights, exclusion criteria for oil, gas or coal, best-in-class investing, sustainability criteria in loan contracts and impact investing.

The strategies were "pre-defined" as options to select and thus may not fully capture all types of approaches deployed by Swiss financial institutions. Moreover, the distribution of strategies is of course at least in part driven by the actual exposure to that asset class, with a large share of participants for example not invested in commodities. They also speak to some natural constraints, as use of "voting rights" is not an intuitive approach for certain asset classes.

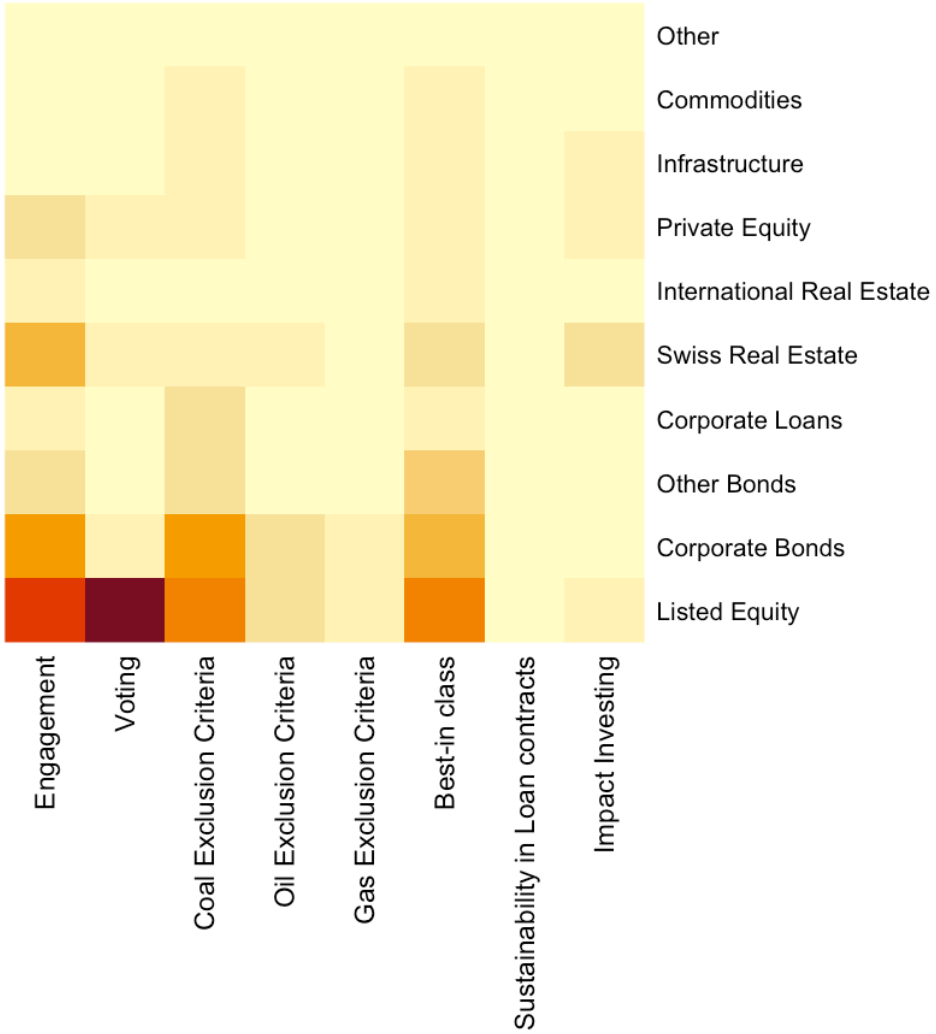


Figure 41: Climate Strategies in different asset classes: frequency of application by respondents. 73% of respondents answered this question. Percentages were calculated as percent of valid answers.

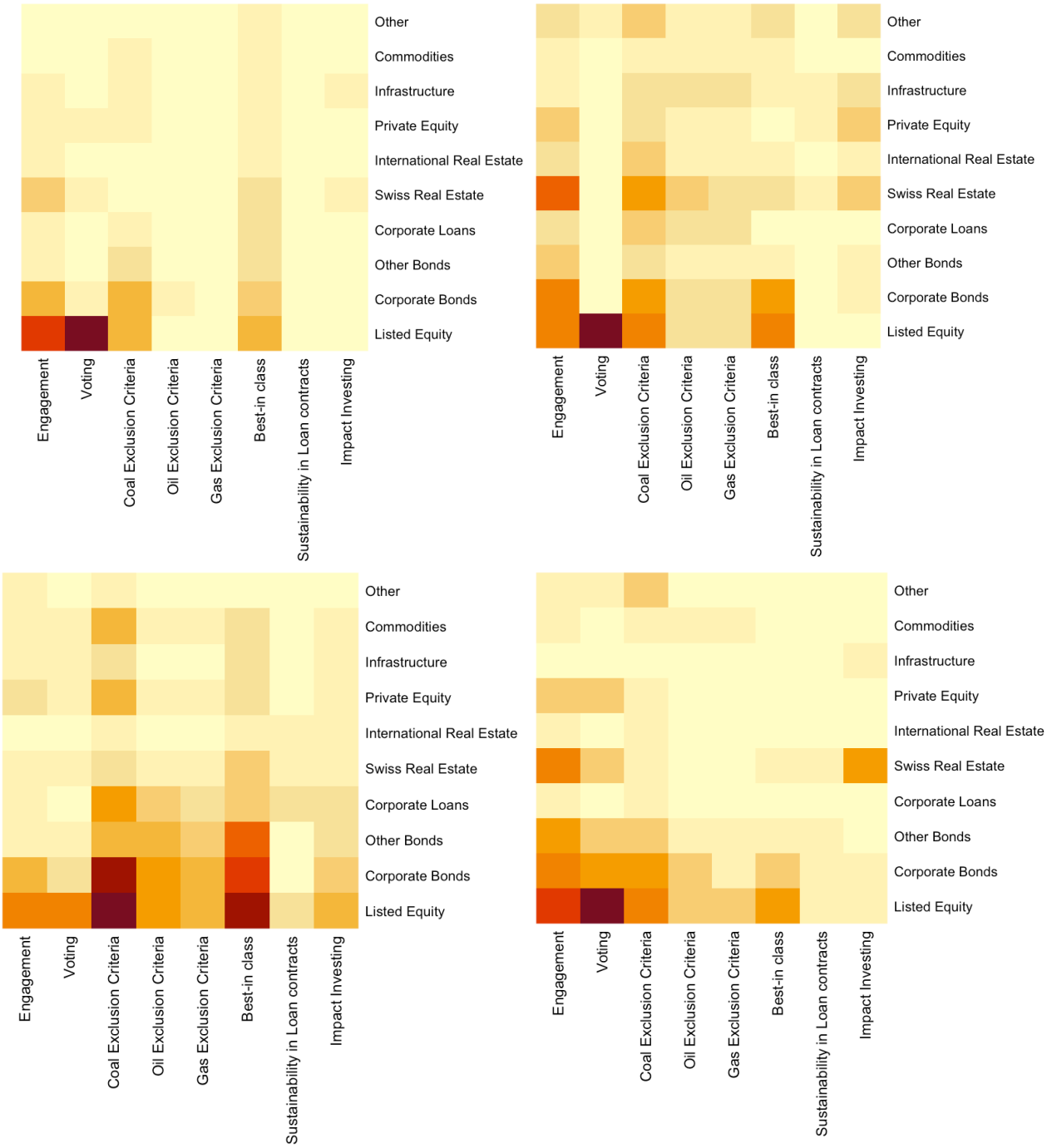


Figure 42: Climate Strategies in different asset classes: frequency of application by respondents. 73% of respondents answered this question. Percentages were calculated as percent of valid answers. a) Insurances b) Pension Funds c) Banks d) Asset Managers

Respondents, on average, indicated that they employ 2-3 different strategies. Participants who only reported one or two strategies most frequently employ engagement strategies and/or exercise of voting rights.

An analysis of the number of strategies employed by each institution shows that around 30 % of respondents employ more than four of the suggested climate strategies, 43% employ one to three different strategies, whereas 27 % of investors indicated that they do not employ any climate strategy mentioned above.

The results shown above are mainly driven by the replies of the participating pension funds, as they constitute the majority of respondents. A more granular analysis on peer group level shows that the responding banks apply more climate strategies than the average, focusing heavily on exclusion strategies and best-in class investing. Exercising voting rights on the other hand is the single most employed strategy by pension funds and insurance companies. A number of asset managers participating focus on real estate investments, therefore strategies in this asset class are more common for asset managers, especially engagement and impact investing. The results on a peer group level are shown below.

Reported strategies and intentions do not necessarily translate into measurable action, notably when it comes to coal divestment policies.

Financial institutions who apply a coal exclusion policy in their listed equity or corporate bonds portfolio on average show a lower exposure to coal mining in the respective asset class. However, 72 % of institutions who apply a coal exclusion policy in their corporate bonds portfolio still have holdings in coal mining (54 % for listed equity respectively). The following graph shows the distribution of portfolio exposure to coal mining for those participants who did not indicate an exclusion policy (0) vs those who did (1).

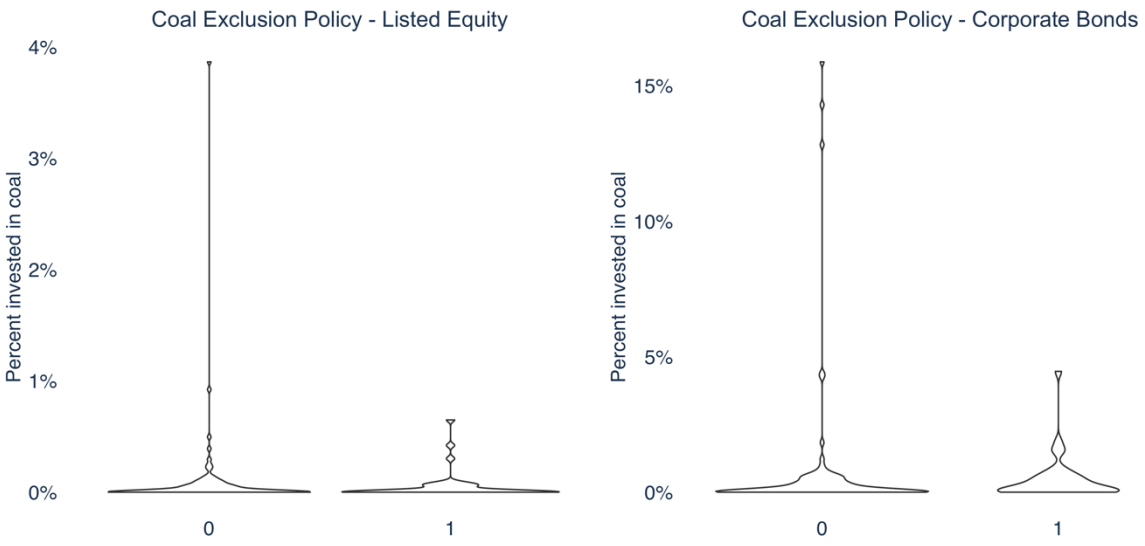


Figure 43: Percent of portfolio invested in coal, for financial institutions with (1) and without (0) a coal exclusion policy

It is worth noting here that the ambition of the coal exclusion policy was not part of the questionnaire. As a result, the results by themselves do not necessarily show that the coal exclusion policy is "misapplied". Coal exclusion policies may have carve-outs, exceptions, or thresholds whereby some type of coal mining / exclusion is still tolerated. However, these findings do raise concern as to the

stringency of certain policies or perhaps of certain controlling gaps in implementation. Particularly noteworthy in the Fig. above are institutions with nearly 5% of their corporate bonds portfolio in coal suggesting that they implement a coal exclusion policy.

The differences in the results are also consistent with qualitative evidence showing different "stringency" of coal exclusion policies across participants. They highlight a potential communications challenge as "coal exclusion" may be considered a type of strategy that may actually hide dramatic differences in application. Ultimately, these results demonstrate the potential gaps in translating strategy into action. Of course, even when the coal exclusion policy is consistently implemented, it does not guarantee that such policies translate into real world impact in terms of GHG emissions reductions. Further research and analysis is needed to interrogate this question.

More than 50 % respondents reported to apply engagement or exercise voting rights. Financial institutions applying engagement strategies do not, on average, have a higher share of Paris aligned companies in their corporate bonds and listed equity portfolios.

In order to assess whether results of applying and engagement strategy can be observed in the quantitative alignment analysis, we analyze the percent of aligned companies in a participants' portfolio. The concept of alignment is defined as percent deviation from the build out required under the Sustainable Development Scenario, as in the quantitative analysis. We compare the mean as well as the distribution of the share of aligned companies across financial institutions who apply an engagement policy in their listed equity or corporate bonds portfolio, (or exercise voting rights in their listed equity holdings) to those who did not indicate to use this strategy.

As climate-relevant engagement strategies tend to focus on carbon-intense sectors and either relate to the reduction of high-carbon or the build-out of low-carbon technologies, the assessment is conducted across the following technologies: Renewable power capacity, coal power capacity, oil extraction and coal mining. We should note that since we did not ask specifically for which sectors the engagement and voting strategies are applied, this may somewhat misrepresent the results as an investor may focus engagement on e.g. cement or steel sector.

No significant difference was found between the two groups when comparing the build-out of renewable energy capacity or coal power capacity, neither in average nor in the distribution of results. In the corporate bonds' portfolios, it rather seems as though there are a number of investors who do not apply engagement and still hold a very large share of companies whose build-out of renewable energy capacity is aligned with the Paris climate goals. In oil extraction and coal mining, some difference can be noticed, particularly in the listed equity portfolio. Participants who apply engagement have a lower share of non-aligned companies and a higher share of aligned companies in their portfolio.

Crucially, this is not necessarily a criticism of the approach. Engagement may be recently applied and not yet visible in the results or prove to be ineffective in the face of broader macroeconomic trends. Once again, further researched and progress tracking is needed.

Similarly, financial institutions who indicated to exercise voting rights in their listed equity portfolio do not, on average, have a significantly higher share of aligned companies in their portfolio, with the exception of coal mining.

Overall, this result is to be expected as investors were not asked to report the scope or ambition of the engagement policy within the asset class and therefore an effect across all investors is unlikely to manifest itself. Similarly, indicating the use of shareholder voting rights does not imply the ambition, strategy or voting behavior of the financial institutions. As for the coal exclusion policies analyzed above, this shows that even though engagement and exercising shareholder voting rights are applied, they are potentially not applied consistently or ambitiously enough to have a noticeable effect on the alignment of the portfolio overall, at least not at this stage.

This finding is consistent with a recent report that analyses the voting behavior of investors in key shareholder resolutions: it shows that even though investors are using their voting rights to enact positive change, voting behavior is not consistent and in particular a number of CA 100+ signatory investors have failed to support resolutions at CA100 + target companies.[99]

As will be outlined later, a lot of the qualitative evidence provided as part of the survey suggests many of these engagement actions have only recently begun and so it may also simply be too early to see hard evidence of its impact.

20 % of portfolios submitted were labelled as ESG portfolios. A comparative analysis between ESG and non-ESG portfolios shows that although the average exposure to high-carbon technologies is lower and the share of low-carbon technologies higher in these portfolios, this result does not hold consistently across portfolios.

The performance of ESG labelled portfolios was compared to non-ESG labelled portfolios along the following indicators: share of coal power capacity in the power sector technology mix, share of renewable power capacity in the power sector technology mix, portfolio exposure to coal mining and portfolio exposure to oil drilling.

The graph below shows the result of this analysis, “1” indicates that a portfolio was labelled as ESG, and “0” that it was not. The first two boxplots show the technology share in coal and renewables power capacity as percent of the total exposure in the power sector. ESG labelled portfolios, on average, fare better with respect to both of these indicators, although the results are not consistent across portfolios and not statistically significant. The two bottom figures show the exposure of the portfolio to coal mining and oil extraction. We see that there is a slight difference in mean between ESG and non-ESG, in particular that there are a number of portfolios with very high exposures in the non-ESG labelled category that do not occur in the ESG category. This underlines the point that although ESG analysis relates to, but it is not necessarily to be equated with climate compatibility.

[99] https://shareaction.org/wp-content/uploads/2019/11/Voting-Matters.pdf

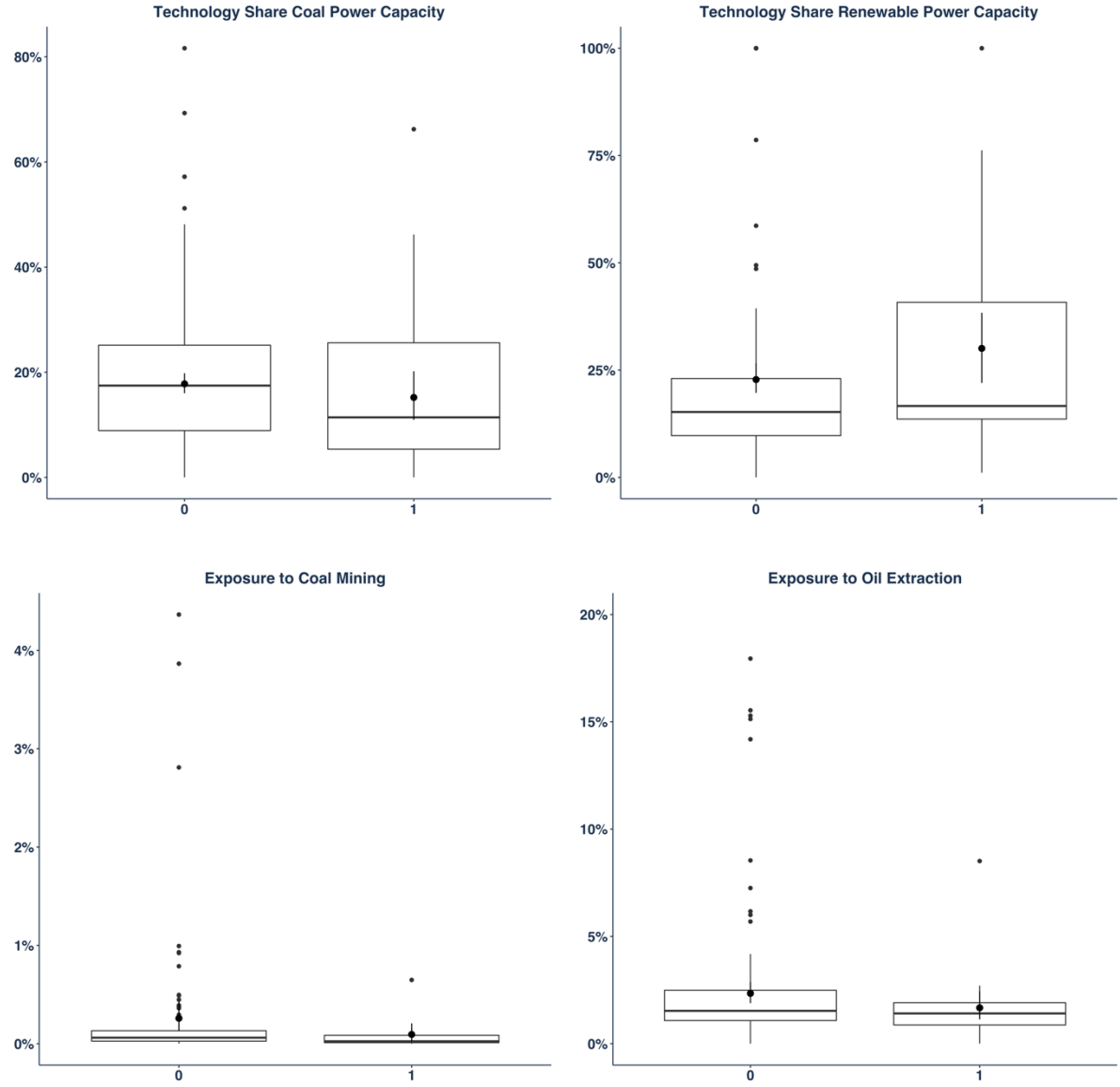


Figure 44: Performance of ESG (1) vs non-ESG (0) labelled portfolios across a number of indicators.

65% of participants indicated to be member of at least one sustainable finance initiative. This share was slightly higher for banks (75%) and insurance companies (79%). While participation in initiatives is high, the participation in initiatives requiring concrete target-setting is still very low - only 7 % of respondents are member of either the Asset Owner Net Zero Alliance (AOA), the Principles for Responsible Banking (PRB), or the Science-based Targets Initiatives (SBTi).

In recent years, a number of sustainable finance initiatives have emerged to enable collaboration and drive ambition in the financial sector. However, the concrete objectives and strategies employed by these initiatives also vary widely. Whereas the Initiative Climate Action 100+ aims to lead concrete engagement efforts targeted at carbon-intensive companies, the UNEP-FI aims to inform and inspire the financial sector to take action by setting frameworks and enabling further initiatives, whereas the Swiss Sustainable Finance (SSF) platform aims to strengthen the position of Switzerland's financial market on sustainable finance. For more information on each initiative, please follow the links below.

Positive however is the relative prominence of the CA100+ initiative at roughly 22% of participants.

Table 13: 65% of respondents answered to participate in at least one sustainable finance association. Share is calculated as percent of total number of survey respondents.

Initiative	Banks	Pension funds	Insurance	Asset Managers	All participants
Target Setting Initiatives					
PRB (Principles for Responsible Banking)	17 %	0 %	0 %	8 %	4 %
AOA (Net-Zero Asset Owner Alliance)	0 %	0 %	11 %	8 %	2 %
SBTi (Science Based Targets Initiative)	12 %	1 %	11 %	8 %	5 %
Member of at least one target-setting initiative	17 %	1 %	11 %	16 %	7 %
Engagement Initiatives					
CA100+ (Initiative Climate Action 100+)	12 %	28 %	11 %	25 %	22 %
Other organization that leads dialogue with companies on climate topics	21 %	16 %	11 %	25 %	16 %
Member of at least one engagement initiative	25 %	36 %	11 %	50 %	31 %
Other					
SVVK-ASIR (Swiss association for responsible investments)	12 %	19 %	16 %	0 %	15 %
SSF (Swiss Sustainable Finance)	50 %	21 %	32 %	33 %	28 %
UN PRI (UN Principles for Responsible Investment)	46 %	23 %	37 %	33 %	28 %
UNEP-Fi (United Nations Environment Programme Finance Initiative)	17 %	0 %	16 %	8 %	6 %
Other (please specify)	62 %	43 %	47 %	33 %	45 %
Overall: Member of at least one of the above mentioned initiatives	75 %	61 %	79 %	67 %	65 %

'Other' initiatives mentioned by participants include the Ethos Engagement Pool and the Montreal Carbon Pledge. Participation in the initiatives mentioned here does not, in itself, lead to a climate impact or a climate aligned portfolio. However, participation can contribute to knowledge sharing and valuable exchange across institutions, mainstream of the issue within the organizations themselves and enable the collaboration of institutions on strategies such as engagement or exercise of voting rights.

58 % of respondents provided a more detailed explanation of their climate strategies as well as concrete actions taken.

As part of the survey, participants had the possibility to provide details on climate actions already taken. 58 % took this opportunity to provide more details on their climate strategy. The discussion here is based on those subsets of participants that responded to this question.

Activities listed as relevant climate actions include engagement with companies, partly through initiatives such as CA 100+, exclusion criteria in high-carbon sectors, selection of companies based on ESG criteria, targeted expansion of renewable energy and the setting of decarbonization targets. The scope of these actions was either reported as the entire portfolio, constrained to specific asset classes, most notably equity and real estate in Switzerland, or targeted at specific companies, mostly when the action was an engagement strategy. Most climate actions reported were reported to have been motivated by climate risk management.

In terms of their impact on emission reductions in the real economy, climate strategies vary regarding the evidence base backing their effectiveness. Of those institutions who gave concrete examples for their climate actions 45 % suggested that they measure the impact of a climate action taken, and 26 % reported to have gathered evidence for impact in the real economy.

With regard to the nature of the impact itself, respondents referred to changes in the behavior of a targeted company as a result of the engagement process, improvements of the internal or external ESG ratings of assets, the development of electricity generation from renewable sources, reduced energy consumption per m2, increased transparency around the emissions of a company, or the reduction of CO_2 emission intensity of a specific company.

Engagement was by far the most frequent strategy on which impact was reported in this survey. In contrast, a number of participants mentioned divestment or exclusion policies as a climate action taken, but none reported an associated impact, or answered that no impact was measured. This aligns with recent publications on the topic of investor impact which concludes that evidence for the impact of shareholder engagement is the most established, whereas impact through capital reallocation and indirect impact are often not based on empirical evidence[100].

Regarding the measurement of impact, details given by respondents range from a reference to the voting results of a specific resolution, an internal review of the measure conducted within the institutions, ESG reporting by the asset manager, power generated in KW or the reduction of CO_2 emission intensity of a company's operation.

This suggests that although financial institutions take first steps regarding the evaluation of impact, a wide range of interpretations exist regarding the meaning of climate impact and evidence needed to back the impact claim. Moreover, the majority of indicators do not relate to impact in terms of real world GHG emissions reduction. This is not a comment on whether there was impact or not, but simply the challenge of expressing that impact in terms of concrete and measurable climate mitigation outcomes in the real economy.

As outlined in the introduction it is necessary to move beyond purely measuring alignment towards a better understanding of how investors can have impact in the real economy. Kölbel et al. (2018) give the following definition of investor impact: the impact of an investor ("investor impact") is

[100] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3289544

defined as the *change* that the investor has *caused* in the activities of the company benefiting from his investment.

There are a number of avenues outlined in the paper by which to achieve investor impact: In private markets, there is the possibility of enabling growth by to growing undersupplied markets, providing non-financial support or flexible capital. These avenues of impact are supported by empirical evidence. In public markets, investor impact is either based on encouraging improvement through shareholder engagement or market signals, or through non-market signals that impact matters. Especially for the latter two, the impact of this strategy is very difficult to evaluate.

A temporal evaluation of the climate actions taken suggests a significant increase of actions taken after 2018.

Most actions reported were initiated in 2018 or later, with 40 % of actions even taken later than mid 2019. Only 28% of actions published now were taken before mid- 2017, so before the first climate compatibility test. These findings are consistent with the feedback from Swiss financial institutions that already participated in the 2017 pilot. In a 2018 survey,[101] 41% of survey respondents that participated in the pilot advised that they intend to integrate climate issues into their investment decision-making processes *as a result of the pilot exercise.* When asked again as part of the 2020 test, over 50% responded yes to that question (n=37), although of course the sample is not consistent. Moreover, the survey may be biased to those interested in the analysis and thus overstate the impact of the voluntary exercise. That being said, the broader dynamic around the issue coupled with the tests clearly show an uptick in climate actions from 2018 onwards in the Swiss market.

Around 80% of respondents did not position themselves on any of the climate policies or agreements mentioned in the survey, which included the Paris climate agreement as well as the totally revised CO_2-law in Switzerland.

As part of the survey, financial institutions were asked to position themselves on different policy measures and agreements, including the Paris Agreement, the totally revised CO_2 law in Switzerland, as well as specific measures within that law targeting transport and real estate.

Across all institutions, 22 % overall indicated support for the Paris Agreement, and 15 % for the totally revised CO_2 law in Switzerland respectively. Across policy measures, support was consistently higher from banks and asset managers compared to pension funds and insurance companies. No single respondent indicated to actively not support any of the proposed policy measures.

This result shows a reluctance of financial institutions to position themselves politically, even on non-binding agreements such as the Paris agreement, at least in the context of this climate compatibility test. This is interesting, given that 65 % of participants are member in at least one sustainable finance organization, most of which support and work towards achieving the Paris climate goals.

[101] https://www.tandfonline.com/doi/figure/10.1080/20430795.2019.1673142?scroll=top&needAccess=true

Even though financial institutions are interested in referring policy makers to measures that drive climate action in the real economy as opposed to requiring action from the financial sector, it seems as though actual support for these measures, such as the totally revised CO_2 law, remains low.

30 % of participating Swiss financial institutions suggest that they consult clients regarding their climate or sustainability objectives.

Participants were asked to indicate whether they ask their clients about their climate objectives, and, if yes, how and when they do so.

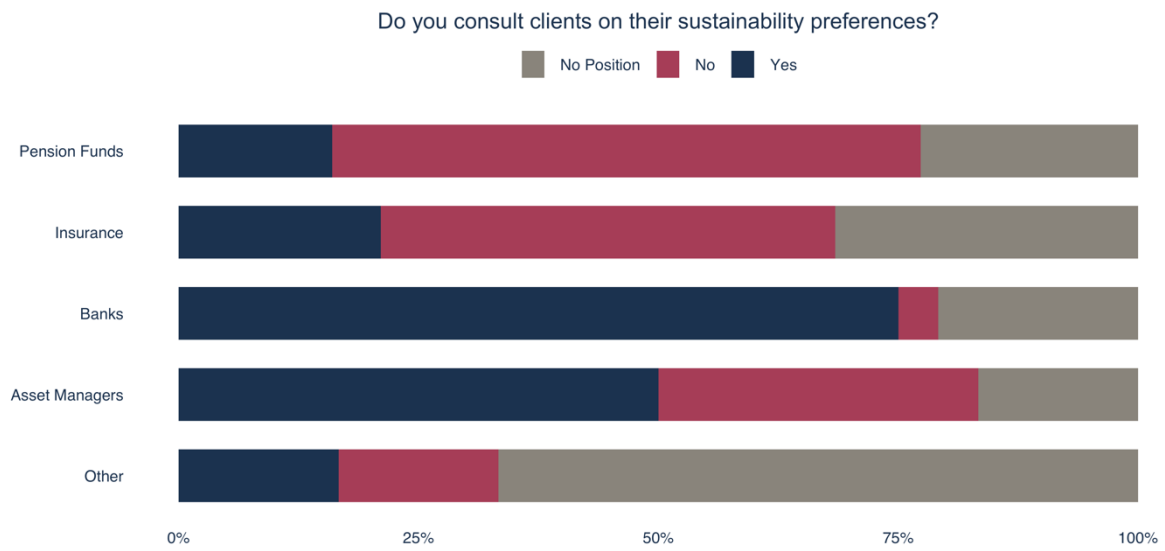


Figure 45: Participants responses to the question whether they consult clients on sustainability preferences.

17 % of institutions only advise their clients if this is specifically mentioned by the client. 8 % state that only individual advisors within the organization ask clients about their sustainability preferences, 8 % report that all clients are asked whereas 5 % institutions have a standardized way of asking all clients in a systematic manner.

This self-reported evidence is somewhat consistent with other analysis done in France, which suggests that initiating sustainability as an issue in client relationships only takes place in very limited cases. The numbers here are somewhat higher than in France however, which may be a function of the sample of participants, the Swiss market, or may suggest that there are some challenges between the policy and implementation in practice. Note that work in France suggests that while banks have policies, when conducting mystery shopping visits, these policies are not always consistently applied.

The key take-away here remains however, that while climate is a growing topic among participants and Swiss financial institutions more generally, improvement is still needed in how that translate into client engagement. Noteworthy here is that the number of client engagements on sustainability is significantly lower than the actual integration of climate issues by the institution itself.

Conclusion and Next Steps

The PACTA 2020 test provides a representative picture of the Swiss financial sector across key climate-relevant asset classes and sectors. It demonstrates that voluntary initiatives can engage a broad share of the market.

Around 80% of Swiss pension funds, insurance companies, and commercial banks, 179 institutions in total, participated in the 2020 exercise, more than twice the number of institutions that participated in 2017. While market coverage data does not exist for asset managers and others, the level of participation suggested broad support in terms of market coverage, in particular among the larger Swiss asset managers. It is worth noting that both the quantitative and qualitative exercise can be considered representative, with 83% of participants also filling out the accompanying survey.

Around half of all buildings held directly by institutional investors have taken part in the climate compatibility test and that around two thirds of all residential buildings in Switzerland have been tested. Around a quarter of Switzerland's total CO_2 emissions come from the building sector, and the proportion of fossil-fuelled buildings has been steadily decreasing since around 2000, and CO_2 emissions have been falling accordingly. Within the framework of PACTA 2020, over 23,000 directly owned buildings by institutional owners and around 1.15 million residential buildings were submitted for analysis.

The report represents a breakthrough in the area of progress tracking against the Paris Agreement Art. 2.1c finance commitments across a number of areas. The exercise represents a first across a range of issues.

For the first time, meaningful progress can be tested across a large number of financial institutions over a period of time (2017-2020). The benchmarking of participants from both years expands our understanding of the distinction between portfolio reallocation and emissions change on the ground. It is the first time a climate alignment exercise integrates in one framework the real estate and corporate finance (equity and debt) aspects of the alignment puzzle. It also is the first time a market can be comprehensively assessed across both qualitative and quantitative criteria, considering climate actions in conjunction with portfolio exposure and demonstrating consistencies and potential gaps. Finally, the exercise represents the largest and most comprehensive review of a national financial sector. It is the first time that banks, insurance companies, pension funds, and asset managers are all assessed under one framework.

The results give both hope as they signal progress and demonstrate the gaps that remain.

There is clear and measurable progress in the PACTA analysis across a number of sectors. The number of climate actions by financial institutions has ballooned, awareness has been raised dramatically, and the number of participants in the voluntary initiative has skyrocketed. In addition, there is clear and quantifiable evidence that the transparency exercise in 2017 with the pilot test has had measurable effects. 50% of participating institutions in 2020 that also participated in 2017 took actions inspired by or on the basis of the results. Measurable improvements and outperformance can be seen across those institutions versus those that did not.

However, there are also gaps. Coal mining and oil extraction has continued to expand. Gaps appear between climate actions and portfolio exposure. Finally, the historical analysis highlights that some of the gains in Swiss financial markets may have come as a function of 'carbon leakage' as high-carbon financial assets have been divested in Swiss portfolios and moved to another place in the system. This is just one of the reasons why coordinated international assessments are a helpful counterpoint to track this issue.

While alignment analytics has dramatically improved, we are still at the beginning of understanding real world impact.

The insights from this report provide a roadmap for thinking about impact and start to isolate potential effects from certain activities (e.g. engagement) at a very high level. They also point to the need for more research to fully understand the role of climate actions in financial markets in terms of contributing to the decarbonization in the real economy. Nevertheless, the road taken here is necessary, pairing climate actions information through qualitative surveys with quantitative data from portfolios.

The exercise also demonstrates however the shortcomings of portfolio alignment in terms of thinking about real world impact. When looking at the historical data, there is clear evidence that a pure portfolio alignment approach misses potential dramatic increases in emissions, "hidden" by portfolio reallocation to other parts of the system. While alignment as a concept is critical at system level and responds to the political objectives of the Paris Agreement, supporting private sector actions, target-setting, and effective implementation driving real world change requires going beyond alignment to impact. The Climate Action Guide provided to participating institutions is one step in that direction. The historical analysis is another.

As a result, the report represents a snapshot of a moment of time, as well as a roadmap to required steps to "bridge the gap" to meeting the Paris Agreement.

Further work is needed on supporting the private sector in designing effective climate actions and setting impact-oriented targets. Research is also needed on bridging methodological gaps for certain sectors (e.g. agriculture) and solutions (e.g. R&D), as well as making potential links to other sustainability issues.

International harmonization and standardization also play a role in this context. The PACTA tool is an open-source tool and made freely available to the market through the platform TransitionMonitor. Over 1,000 organizations have used the framework to date. Following this exercise, the tool will continue to be updated and made freely available to Swiss investors next year. The tool has also been designed to articulate and inform other international initiatives. PACTA can be used to set science-based climate targets[102] and is currently used by a number of investors and banks in the context of the Net Zero Asset Owner Alliance (AOA) and the Principles for Responsible Banking Collective

[102] While PACTA can be used to set science-based targets in terms of taking the climate science as a basis, it is not formally recognized by some NGO initiatives, notably the Science-based Targets Initiative.

Commitment on Climate Action (CCLA). It also informs the CA100+ Initiative as a data input and – as outlined above – is applied by a number of governments and financial supervisory authorities around the world. By using the PACTA tool, financial institutions are also fully aligned with the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD) with the requirement to conduct scenario analysis.

Progress on metrics, understanding of impact, articulation and harmonization with international initiatives, as well as further domestic actions and awareness-raising collectively can contribute to "bridging the gap" to meeting the goals of the Paris Agreement. The Swiss governments' commitment to voluntary progress tracking will ensure progress on climbing that mountain and knowing once we've reached the peak.