An analysis of extreme fossil fuel emissions financed by Credit Suisse and UBS

19 November 2018, Frankfurt

right.
based on science

A. SCOPE OF OUR ENGAGEMENT

We have been instructed by Greenpeace Switzerland, Badenerstrasse 171, 8036 Zürich, Switzerland ("**Greenpeace**") to conduct an objective and independent review of data provided by ISS Ethix, Bleicherweg 10, 8002 Zurich, Switzerland ("**ISS Ethix**") with respect to selected companies from loan portfolios of Credit Suisse Group AG ("**CS**") and UBS Group AG ("**UBS**"); (the "**Report**").

I. Scope of our Report

The Report is based on certain data provided by ISS Ethix via e-mail, dated 2nd November 2018 ("**ISS Ethix Data**") and it is subject to certain general limitations of the scope of review and assumptions (see A. III.).

II. ISS Ethix Data

We have been provided with ISS Ethix Data. The ISS Ethix Data consists of 47 data sets for 47 companies.

ISS Ethix had agreed to respond to our questions in a questions and answers process ("**Q&A Process**").

Our review covers the status of ISS Ethix Data as provided until 19th November 2018.

ISS Ethix provided data on (i) climate impact based on financed emissions and (ii) other data points relevant for this Report. Whereas data on financed emissions were sourced from the Rainforest Action Network ("**RAN**")[1] by ISS Ethix, other data points were provided directly by ISS Ethix.

[1] A detailed methodology of the calculation of financed emissions by a single bank can be found here: https://www.ran.org/bankingonclimatechange2018/#data-panel. right. assumes the correctness of the data and has not put the calculation methodology under scrutiny.

Data points	Data description	ISS Ethix Data set (Maximum data set: 47)
1	Issuer Name	47 Companies
2	ISIN	38 Companies
3	Country of Incorporation	47 Companies
4	Science Based Targets	46 Companies (2 Concrete Targets; 44 "No Commitment")
5	Scope 1 Emissions (tCO2e)	42 Companies
6	Scope 2 Emissions (tCO2e)	42 Companies
7	Scope 1 + Scope 2 Emissions (tCO2e)	42 Companies
8	Emissions Source	42 Companies (18 Approximated; 24 Reported)
9	Physical Risk: Short-Term	34 Companies (17 High; 17 Low)
10	Physical Risk: Long-Term	34 Companies (7 Low; 27 Medium)
11	Carbon Reserves Involvement	21 Companies (14 Oil and Gas; 5 Coal; 2 Coal, Oil and Gas)
12	Coal Reserves Volume (MT)	6 Companies
13	Coal Reserves Disclosure	6 Companies (3 Company Reported; 3 Modeled)
14	Oil and Gas Reserves Volume (BOE)	15 Companies
15	Oil and Gas Reserves Disclosure	16 Companies (15 Company Reported; 1 Modeled)
16	Participation in climate skeptic lobbying organizations	13 Companies (12 Yes; 1 No)
17	Oil	22 Companies (20 $ Invested; 20 (tCO2e) Financed)
18	LNG	7 Companies (7 $ Invested; 7 (tCO2e) Financed)
19	Coal Mining	11 Companies (10 $ Invested; 10 (tCO2e) Financed)
20	Coal Power	16 Companies (15 $ Invested; 15 (tCO2e) Financed)

Table 1

ISS Ethix describes the origin of the data sourced from RAN as follows: The climate impact has been calculated using data provided by RAN. RAN has provided data on CS' and UBS' contribution to bonds and loans to companies involved in the extraction and production of fossil fuels. The exact nature of the purpose of the funds has not been specified. For the purpose of this exercise it has been assumed that all funds have been directed towards extracting fossil fuels.

The formula applied to calculate the greenhouse gas ("**GHG**") emissions is:

$$(sum\ invested\ \div cost\ of\ fossil\ fuel\ produced) \times GHG\ fuel\ emissions\ factor = GHG\ emissions$$

The figure for the sum invested has been provided by RAN.

Cost of fossil fuels produced can differ significantly depending on geography and extraction methods. The costs have been chosen with a conservative approach. Meaning that the costs generating a lower amount of fuels and thus lower overall emissions have been chosen.

Costs per barrel of oil used	**$**	**Source**
Tar sands	76	Canadian Energy Research Institute
Arctic drilling	75	Rystad Energy
Ultradeep drilling	60	McKinsey Energy Insights

Production cost per $/mmbtu used	**$**	**Source**
LNG	13	Canadian Energy Research Institute

Mining and processing cost $/tonne used	**$**	**Source**
Coal	37	IEA

Generating cost $/MWh	**$**	**Source**
Coal power electricity	102	Lazard

GHG fuel emission factors have been taken from the 2006 International Panel on Climate Change ("**IPCC**") Guidelines for National Greenhouse Gas Inventories. For coal power generation the average emissions factor per generated electricity has been sourced from the International Energy Agency ("**IEA**").

III. General limitations of the scope of our Report

The scope of our work as well as the extent of liability we assume are contained in the Agreement concluded between Greenpeace and right. dated November 4, 2018.

Our review is based on ISS Ethix Data.

We are under no obligation to update the Report or advise you of any development or circumstance of any kind including any regulatory change or fact that occurs after the date hereof, even if such developments or circumstances may affect conclusions or any matter set forth in or relating to this Report.

This Report contains information of a general and high-level nature. It does not intend to provide, nor should it be relied upon as, investment advice, financial advice or legal advice in respect of any jurisdiction.

In translating German terms into English, we have used expressions which, in our opinion, most closely reflect the original term. We are not official translators and do not accept responsibility for any differences in meaning or inferences that can be made of such terms in English.

IV. Assumptions

In connection with this Report, please note the following:

- The accuracy of this Report is necessarily dependent on disclosed ISS Ethix Data, and the replies to further information requests, being true, complete, accurate and not misleading.
- We have not carried out a review of other publicly available sources and have not verified the accuracy or authenticity of ISS Ethix Data and information provided or independently researched the facts and/or circumstances. We assume the provided ISS Ethix Data to be accurate and up to date.

B. PERMITTED RECIPIENTS AND OTHER THIRD PARTIES

Generally, this Report has been prepared for the use of Greenpeace only. However, the Report and its derived results shall be published and disclosed objectively. In the event of queries about the methodology and its use on behalf of third parties we request the Report be made available upon request.

C. LIMITATION OF LIABILITY

In accordance with the Agreement between Greenpeace and right., right.'s total liability shall be limited to the fees paid by Greenpeace.

Any requests regarding this Report shall exclusively be addressed to

Hannah Helmke

right. based on science UG (haftungsbeschränkt)

Intzestraße 1, 60314 Frankfurt am Main (Germany)

Phone: +49 (0) 221 29105326

Frankfurt am Main, 19th November 2018

Foreword

right. based on science ("**right.**") is a data provider, which combines insights from climate science with economic data to create science-based climate metrics. These metrics enable stakeholders of e.g. a certain company to understand the impact this company has on climate change and the exposure of this company to climate-related risks.

right.'s mission is to increase transparency on climate-related risks and opportunities within the market to better steer capital into futureproof activities. right.'s work consists of generating objective and integer facts about the impact and the exposure of an economic entity towards climate change. It shall serve as a solid base for the full variety of stakeholders to express and probe their strategies to tackle the broad challenges that lie within the climate change phenomenon. right. will not judge about the effectiveness and the appropriateness of different strategies and believes that a solid and transparent data base of any strategy supports the strength, with which workable solutions for climate-related issues can be found.

Hannah Helmke
Founder and CEO

Authors: Hannah Helmke, Dr. Hans-Peter Hafner, Roman Herzog and Fabian Gebert.

Table of Content

An analysis of extreme fossil fuel emissions financed by CS and UBS

Banks play an important role in society's adjustments to climate change. They do this through financing and investment decisions, credit risk management policies and lending practices and the development of risk-mitigation products. Thereby they can take an active role in mastering the transition to a <2°C world. While most banks communicate their willingness to support this transition, there is a lack of transparency regarding the actual strength, with which they put words into action. Ongoing financing of extreme fossil fuel activities by banks might stand in contrast to communicated commitments to financing the development of a low-carbon economy.

In order to better grasp whether the contribution of banks to reaching climate targets is significant, the concept of "financed emissions" is helpful. "Financed emissions" are those emissions, which are associated with lending and investments.

This Report provides a quantitative analysis of the emissions financed by the Swiss banks CS and UBS resulting from lending money to companies engaged in extreme fossil fuel activities. Part one of the Report provides a quantitative and descriptive overview of financed emissions relating to extreme fossil fuels by the two banks. Part two introduces science-based climate metrics as complementary sources of information to better put quantitative results, such as those generated in part one, into context..

Part 1: Analysis of financed activities

A. Executive Summary

Both banks in sum have provided slightly less finance to extreme fossil fuel activities in 2017 than in 2015. Whereas UBS decreased financing such activities between 2015 and 2017 in absolute terms, CS increased absolute financing between 2015 and 2017. The decline at UBS is the consequence of constantly reduced financing of oil, coal power and coal mining. The increase at CS mainly results from a steep increase of financing coal mining from 2016 to 2017.

Especially striking is a sharp decrease in financing LNG by CS between 2015 and 2017 and a sharp increase in finance provide by CS to coal mining activities between 2016 and 2017.

Financed emissions by both banks in sum steeply increased between 2015 and 2017. Whereas UBS is financing fewer absolute emissions in 2017 than in 2015, emissions financed by CS more than tripled between 2015 and 2017. This increase of financed emissions is the result of a steep increase of financing coal mining from 2016 to 2017.

The analysis of ISS Ethix Data did not find any correlation between the amount of reserves a company has and the amount of financed emissions resulting from financing activities by CS and UBS.

The biggest share of finance by CS and UBS was provided to companies, of which there is no data on whether they engage in climate sceptic lobbying.

2.88% of finance provided within the period of 2015 until 2017 went to companies that had set themselves a Science Based Target ("**SBT**").

The analysis of ISS Ethix Data revealed a strong increase in the share of finance provided to companies between 2015 and 2017 with a high exposure to short-term physical risk. The share of finance provided to companies with medium exposure to long-term physical risk slightly declined for the same period of time.

B. Analysis

Both CS and UBS are lending money to companies engaged in exploring and producing fossil fuels. This part describes these financing activities and quantifies the emissions corresponding to such projects. The following results were determined by summing up investments and financed emissions across each category assessed for each bank separately and for both banks together.

I. Investments for each financed activity between 2015 and 2017

CS and UBS both financed activities in the areas of oil (tar sands, arctic drilling and deep drilling), Liquified Natural Gas (LNG), coal mining and coal power. Investments in each fossil fuel and corresponding emissions developed between 2015 and 2017 are shown in US $.

Total

	2015	2016	2017	2015-2017
UBS	1,776,022,509	1,624,332,052	1,076,943,865	4,477,298,427
CS	2,770,945,105	1,996,930,057	3,057,022,371	7,824,897,534
Total	4,546,967,614	3,621,262,109	4,133,966,237	12,302,195,961

Table 2

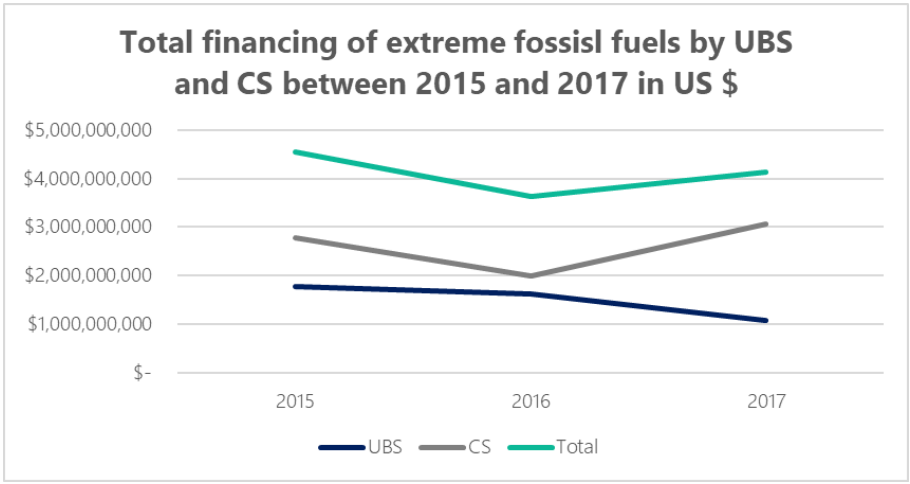

Figure 1

Whereas UBS constantly decreased financing of extreme fossil fuels between 2015 and 2017, CS decreased financing in 2016 but increased financing again in 2017. In sum CS and UBS provided 12.3 bn US $ to companies engaged in extreme fossil fuel activities between 2015 and 2017.

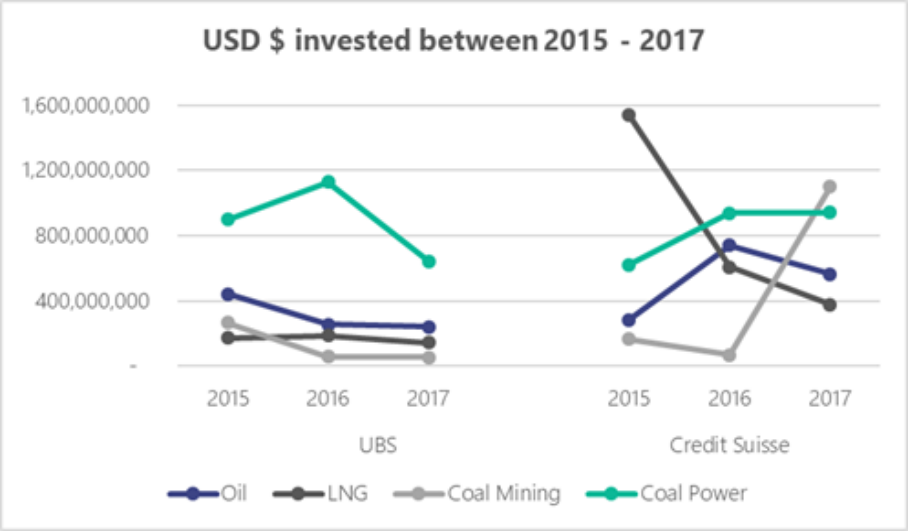

Figure 2

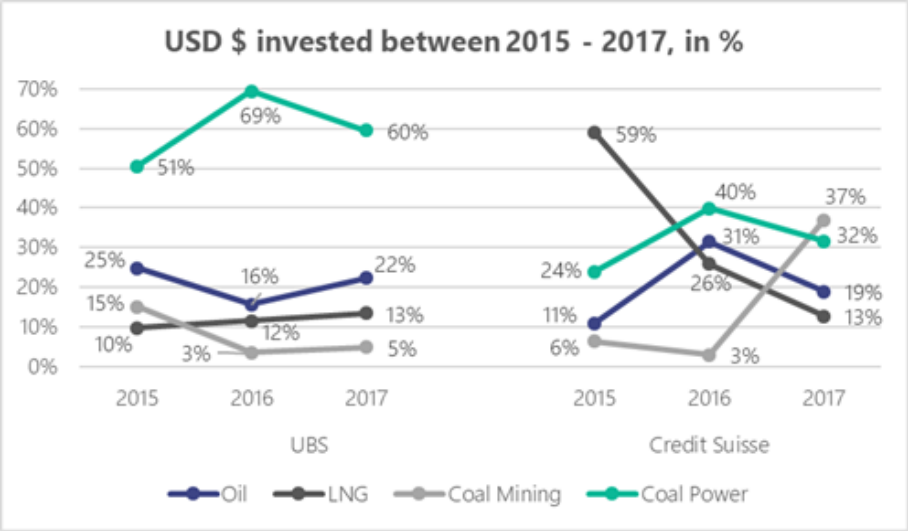

Figure 3

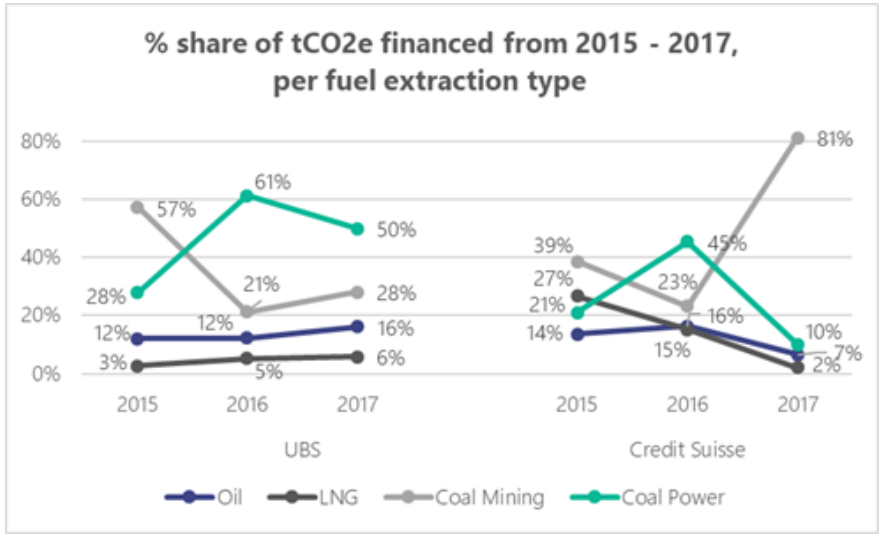

Figure 4

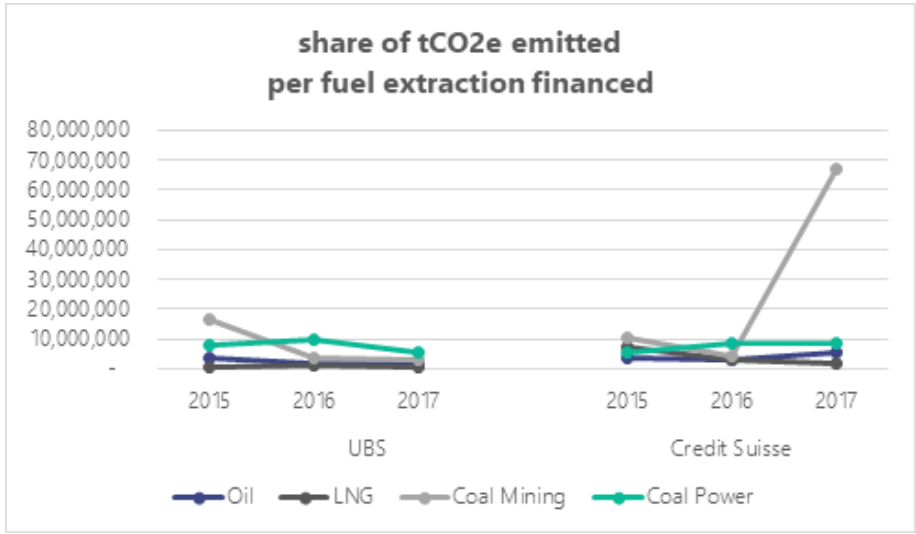

Figure 5

Oil

	2015	2016	2017	2015-2017
	Tar Sands			
UBS	102,189,544	76,344,466	43,010,937	221,544,948
CS	205,176,563	106,323,459	542,882,972	854,382,995
Total	307,366,108	182,667,925	585,893,909	1,075,927,944
	Arctic Drilling			
UBS	3,603,869	11,000,091	3,716,215	18,320,176
CS	21,748,671	10,075,906	3,716,215	35,540,792
Total	25,352,540	21,075,998	7,432,430	53,860,968
	Deep Drilling			
UBS	335,382,436	165,568,295	192,596,059	693,546,791
CS	216,628,321	265,495,935	93,967,871	576,092,128
Total	552,010,758	431,064,230	286,563,930	1,269,638,920
	Oil Total			
UBS	441,175,850	252,912,853	239,323,212	933,411,916
CS	443,553,556	381,895,301	640,567,058	1,466,015,916
Total	884,729,407	634,808,154	879,890,270	2,399,427,833

Table 3

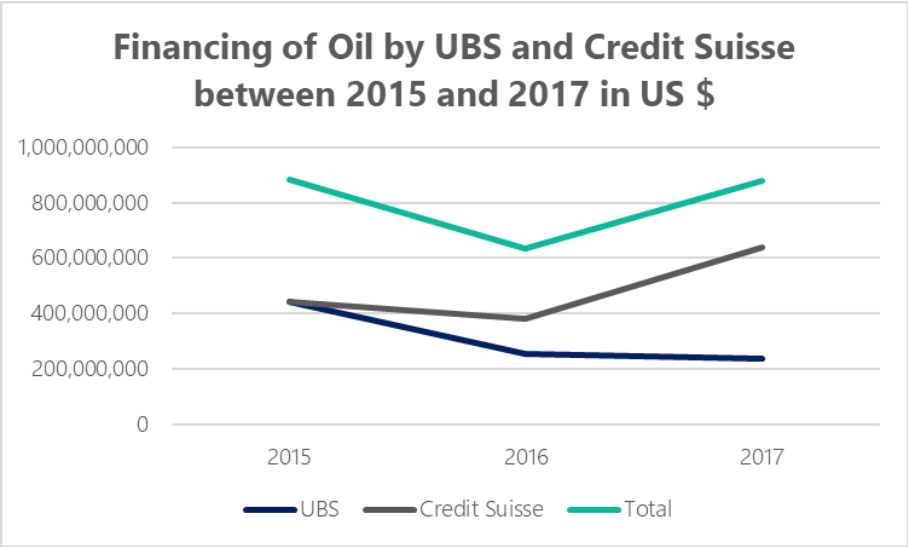

Figure 6

LNG

	2015	2016	2017	2015-2017
UBS	171,037,940	186,839,720	144,536,655	502,414,316
CS	1,539,277,218	608,286,521	377,285,190	2,524,848,930
Total	1,710,315,158	795,126,241	521,821,846	3,027,263,247

Table 4

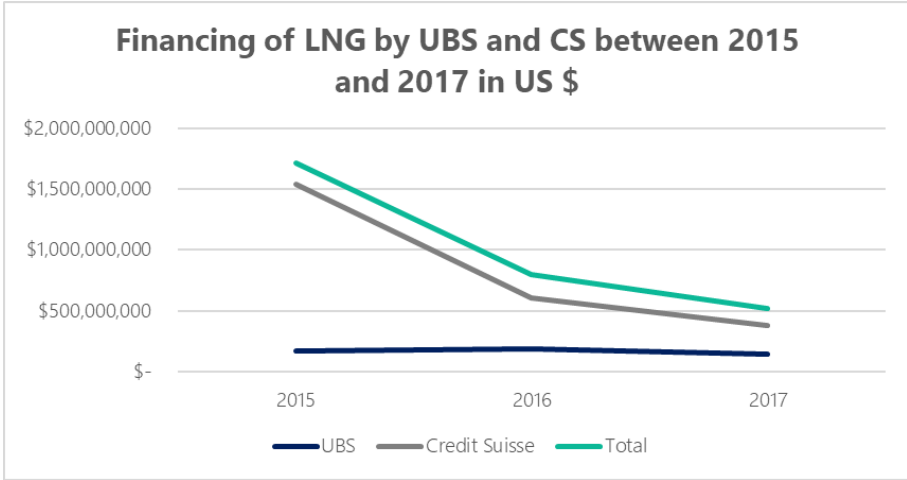

Figure 7

UBS slightly increased financing of LNG from 2015 and 2016 and slightly decreased financing from 2016 and 2017. CS sharply decreased financing of LNG between 2015 and 2017. In sum UBS and CS provided 3.0 bn US $ to companies engaged in LNG activities between 2015 and 2017.

Coal Mining

	2015	2016	2017	2015-2017
UBS	266,660,657	56,232,279	51,995,041	374,887,979
CS	165,510,324	68,910,375	1,099,670,736	1,334,091,436
Total	432,170,981	125,142,655	1,151,665,778	1,708,979,415

Table 5

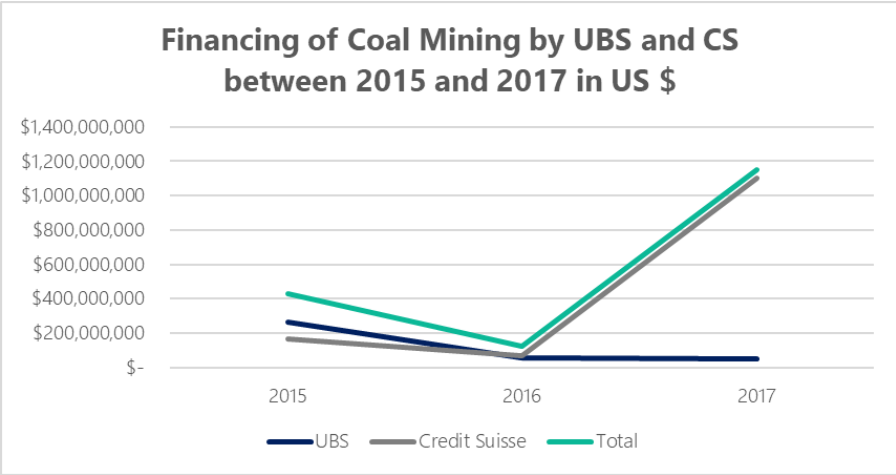

Figure 8

Whereas financing of coal mining activities by UBS dropped between 2015 and 2017, financing provided by CS for such activities decreased between 2015 and 2016 but sharply increased between 2016 and 2017. In sum, 1.7 bn US $ were given by UBS and CS to companies engaged in coal mining activities.

Coal Power

	2015	2016	2017	2015-2017
UBS	897,148,060	1,128,347,198	641,088,955	2,666,584,215
CS	622,604,006	937,837,858	939,499,385	2,499,941,250
Total	1,519,752,066	2,066,185,057	1,580,588,341	5,166,525,465

Table 6

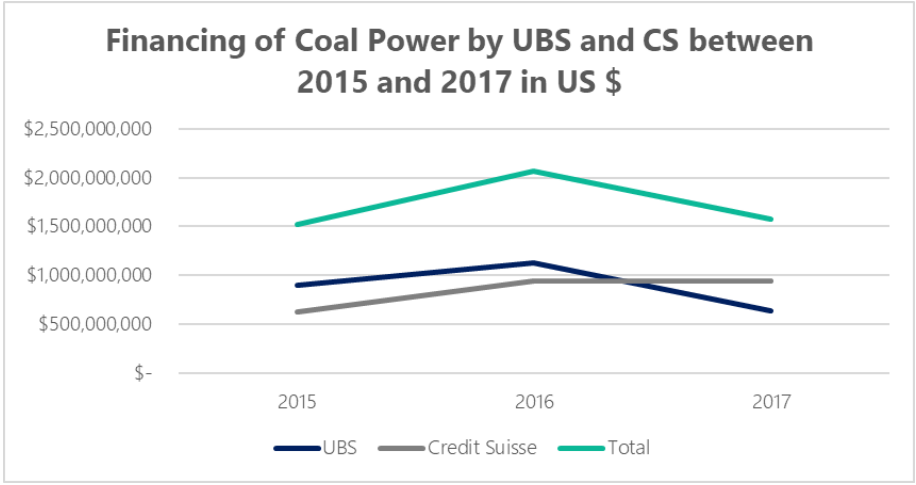

Figure 9

Both CS and UBS increased financing given to coal power activities between 2015 and 2016. Between 2016 and 2017, UBS decreased the amount of financing given to such activities whereas CS increased financing of coal power. In sum, 5.2 bn US $ financing was provided by the two banks to coal power activities between 2015 and 2017.

II. Total emissions financed for each financed activity between 2015 and 2017

The emissions resulting from financing such activities are depicted in the following section in t CO2e.

Total

	2015	2016	2017	2015-2017
UBS	28,408,305	16,210,013	11,329,433	55,947,752
CS	26,129,652	18,220,964	82,628,263	126,978,880
Total	54,537,957	34,430,978	93,957,697	182,926,633

Table 7

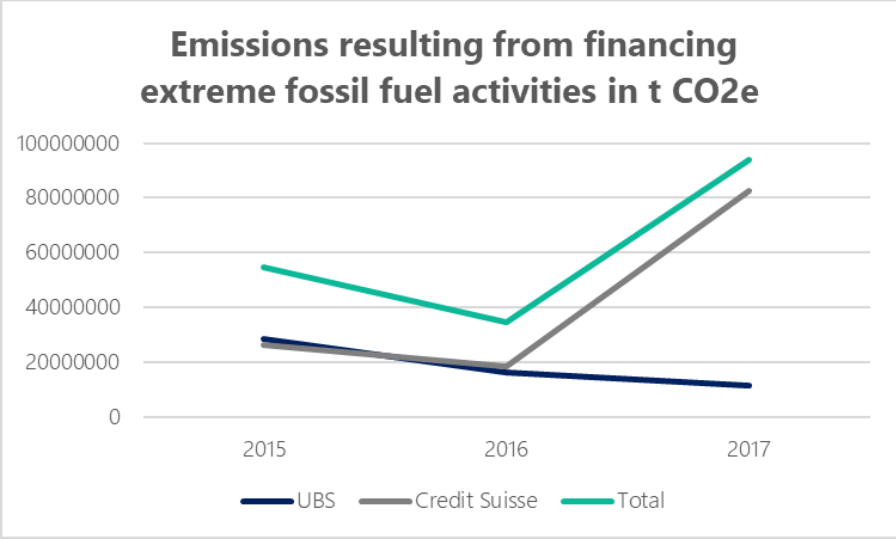

Figure 10

Whereas financed emissions resulting from financing fossil fuel activities between 2015 and 2017 constantly decreased for UBS, financed emissions by CS decreased between 2015 and 2016 but sharply increased between 2016 and 2017. UBS and CS in sum financed 182,9 Mio t CO2 between 2015 and 2017.

Oil

	2015	2016	2017	2015-2017
	Tar Sands			
UBS	886,842	662,548	373,266	1,922,657
CS	1,780,606	922,718.43	4,711,360	7,414,684
Total	2,667,448	1,585,266	5,084,626	9,337,342
	Arctic Drilling			
UBS	21,619	65,989	22,293	109,903
CS	130,470	60,445	22,293	213,210
Total	152,090	126,435	44,587	323,113
	Deep Drilling			
UBS	2,514,959	1,241,560	1,444,235	5,200,756
CS	1,624,448	1,990,896	704,644	4,319,989
Total	4,139,408	3,232,456	2,148,880	9,520,746
	Oil Total			
UBS	3,423,422	1,970,098	1,839,796	7,233,317
CS	3,535,525	2,974,060	5,438,298	11,947,884
Total	6,958,947	4,944,159	7,278,094	19,181,201

Table 8

LNG

	2015	2016	2017	2015-2017
UBS	776,505	848,244	656,190	2,280,939
CS	6,988,253	2,761,595	1,712,858	11,462,708
Total	7,764,759	3,609,839	2,369,049	13,743,648

Table 9

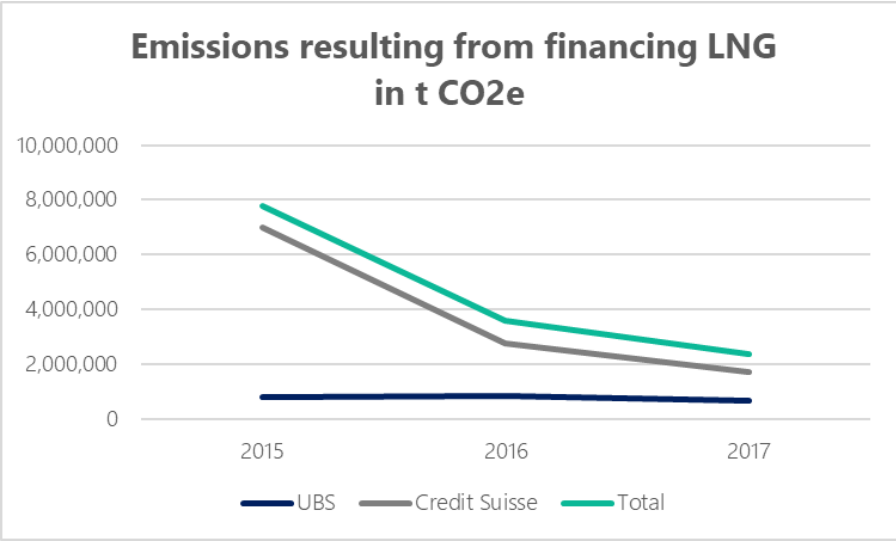

Figure 11

Emissions resulting from financing LNG for UBS slightly increased between 2015 and 2016 and slightly decreased between 2016 and 2017. Financed emissions by CS regarding LNG decreased between 2015 and 2017. UBS and CS in sum financed 13,7 Mio t CO2e emissions resulting from LNG activities.

Coal Mining

	2015	2016	2017	2015-2017
UBS	16,292,365	3,435,665	3,176,779	22,904,811
CS	10,112,308	4,210,268	67,187,405	81,509,982
Total	26,404,673	7,645,934	70,364,185	104,414,793

Table 10

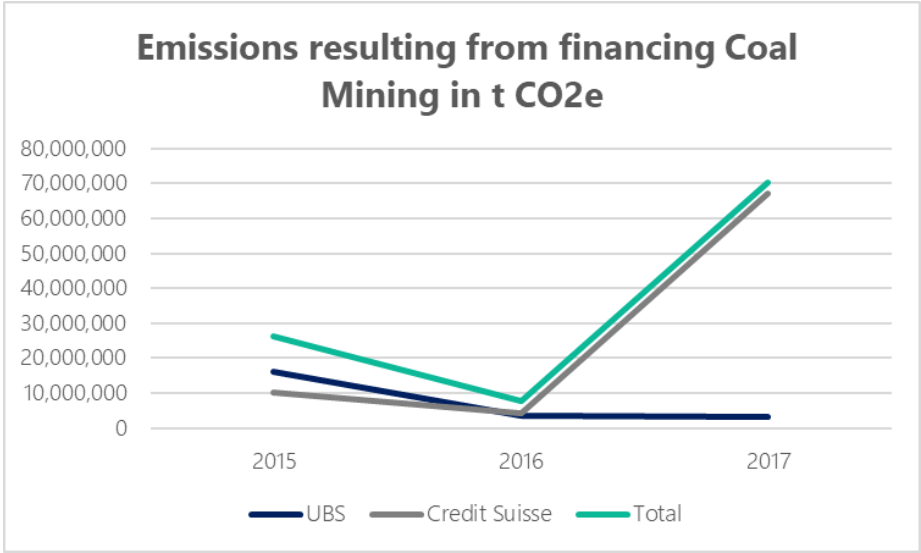

Figure 12

Emissions resulting from financing Coal Mining for UBS constantly decreased between 2015 and 2017. Financed emissions by CS regarding Coal Mining decreased from 2015 to 2016, but steeply increased again in 2017. UBS and CS in sum financed 104,4 Mio t CO2e emissions resulting from Coal Mining activities.

Coal Power

	2015	2016	2017	2015-2017
UBS	7,916,012	9,956,004	5,656,667	23,528,684
CS	5,493,564	8,275,039	8,289,700	22,058,305
Total	13,409,577	18,231,044	13,946,367	45,586,989

Table 11

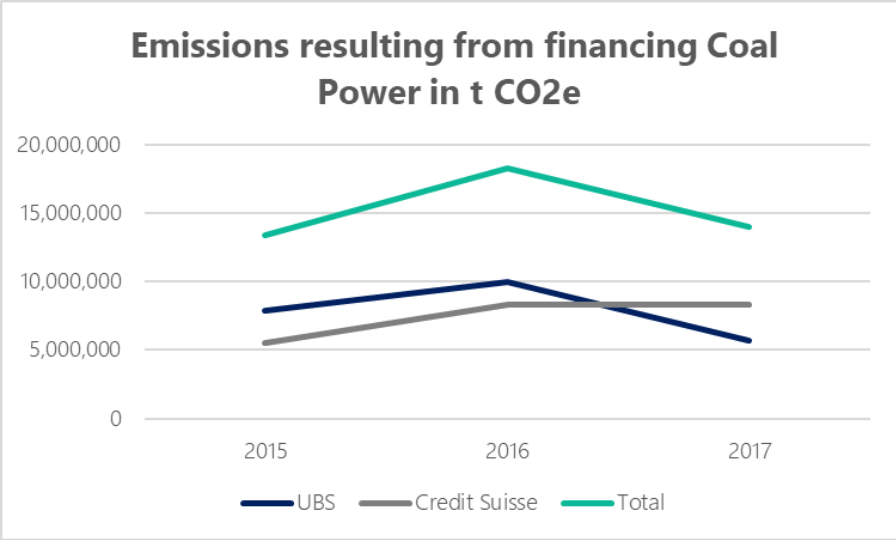

Figure 13

Emissions resulting from financing Coal Power for UBS increased between 2015 and 2016 and decreased again in 2017. Financed emissions by CS regarding Coal Power increased from 2015 to 2017. UBS and CS in sum financed 45,6 Mio t CO2e emissions resulting from Coal Mining activities

III. Emissions financed in relation to company-specific reserves

ISS Ethix Data showed fossil fuel reserves for 19 companies. Those reserves account for emissions of 144,468,668,519 t CO2e. The financed emissions for those 19 companies by UBS correspond to 30,648,745 t CO2e. The financed emissions for those 19 companies by CS correspond to 86,434,929 t CO2e.

Company Name	Total Reserves in t CO2e	Financed Emissions UBS in t CO2e	Financed Emissions CS in t CO2e	Financed Emissions Total in t CO2e
Anglo American plc	5,319,277,750	783,345	783,345	1,566,691
Arch Coal, Inc	4,346,582,229	0	2,618,475	2,618,475
Athabasca Oil Corp.	149,408,880	0	955,751	955,751
BHP Billiton Ltd.	11,935,673,723	7,411,398	0	7,411,398
BP plc	7,826,382,694	2,045,838	1,887,738	3,933,576
Cenovus Energy, Inc.	1,707,390,165	0	3,122,821	3,122,821
China Petrochemical Corp.	1,190,535,716	1,154,351	0	1,154,351
Equinor ASA	2,127,523,261	0	410,344	410,344
Exxon Mobil Corp.	9,006,218,055	0	1,361,987	1,361,987
Gazprom PJSC	55,333,429,624	55,397	0	55,397
Glencore Plc	9,363,548,712	11,563,720	9,113,936	20,677,656
Kinder Morgan, Inc.	21,766,552	87,530	116,302	203,832
Peabody Energy Corp.	10,999,857,201	0	59,946,218	59,946,218
Petroleos Mexicanos SA	3,209,987,093	68,597	235,699	304,296
Repsol SA	999,464,847	242,377	0	242,377
Royal Dutch Shell plc	5,622,467,216	0	1,066,136	1,066,136
RWE AG	9,980,882,500	4,185,813	1,680,228	5,866,041
Total SA	4,870,003,873	327,063	1,196,860	1,523,924
Woodside Petroleum Ltd.	458,268,425	2,723,316	1,939,087	4,662,402

Table 12

	Correlations
Reserves with financed emissions UBS	0.0494
Reserves with financed emissions CS	0.0559
Reserves with financed emissions Total	0.0658

Table 13

Based on ISS Ethix Data, a correlation analysis revealed that there is no correlation between the amount of reserves a company holds and the total financing it had been provided with by UBS, CS or in total.

IV. Emissions financed in relation to involvement in climate-sceptic lobbying

The climate sceptic lobbying indicator has been defined by ISS Ethix as follows: If the company publicly has advocated against or obstructed climate change mitigating policies and activities or is a member of organizations that have done so, it would be classified as participating in "Lobbying activities". If a company has communicated support for some mitigating policies but is still a member of organizations actively opposing them, it would also be classified as participating in "Lobbying activities". The indicator was sourced from Influence Map[2].

According to the ISS Ethix Data, only one of the 46 assessed companies has been found to not engage in climate sceptic lobbying, this company is Enel. Enel received loans by CS in 2017 for generating power from coal-fired power plants. The finance given to Enel between 2015 and 2017 accounts for 2.42% of all finance provided to the companies within the ISS Ethix Data by CS in 2017.

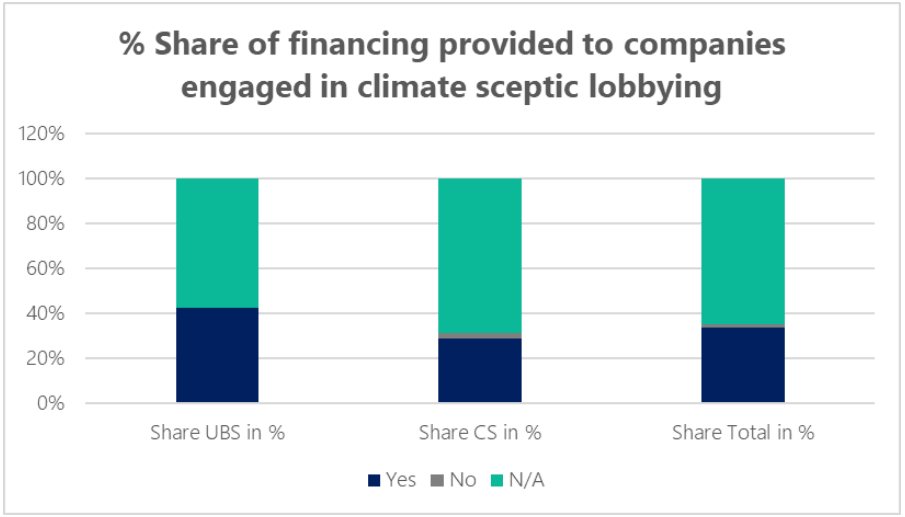

Figure 14

Most of each bank's extreme fossil fuel financing was provided to companies for which there is no information on whether they engage in climate sceptic lobbying or not. 42.2% of extreme fossil fuel financing by UBS and 28.7% by CS respectively was provided to companies which are known to engage in climate sceptic lobbying.

For 34 of the 46 companies provided, the lobbying indicator is unknown. For 11 companies of the ISS Ethix Data it is known that they engage in climate sceptic lobbying.

[2] https://influencemap.org/climate-lobbying

Company	Engagement in climate sceptic lobbying	Share of financing provided by UBS in %	Share of financing provided by CS in %	Share of total financing provided in %
American Electric Power	Yes	2.86	1.62	2.07
Anglo American	Yes	0.29	0.16	0.21
BHP Billiton	Yes	5.64	0.00	2.05
BP	Yes	5.98	3.16	4.18
Duke Energy	Yes	17.53	14.86	15.83
Electricite de France	Yes	0.00	0.49	0.31
Exxon Mobil	Yes	0.00	3.83	2.44
Royal Dutch Shell	Yes	0.00	1.91	1.21
RWE	Yes	2.67	0.71	1.42
The Southern	Yes	6.33	0.00	2.30
Total	Yes	0.93	1.95	1.58
Enel	No	0.00	2.42	1.54
Total				
	Yes	42.22	28.68	33.61
	No	0	2.42	1.54
	N/A	57.78	68.9	64.85

Table 14

V. Emissions financed in relation to companies having set a Science Based Target

According to the dataset provided by ISS Ethix, two of the financed companies have set themselves a Science Based Target[3]. Those two companies are Enel and NRG Energy. Both companies received loans by CS only.

Enel received loans by CS in 2017 for generating power from coal-fired power plants. The finance given to Enel accounts for 2.42% of all finance provided to the companies within the ISS Ethix Data by CS between 2015 and 2017.

NRG Energy received loans by CS in 2016 and 2017 for generating power from coal-fired power plants. The finance given to NRG Energy accounts for 2.11 % of all finance provided to the companies within the ISS Ethix Data by CS between 2015 and 2017.

Company	SBT	Share UBS in %	Share CS in %	Share Total in %
Enel	Concrete Target	0.00	2.42	1.54
NRG Energy	Concrete Target	0.00	2.11	1.34

Table 15

SBT	Share UBS in %	Share CS in %	Share Total in %
Concrete Target	0.00	4.53	2.88
No Commitment	100.00	95.47	97.12

Table 16

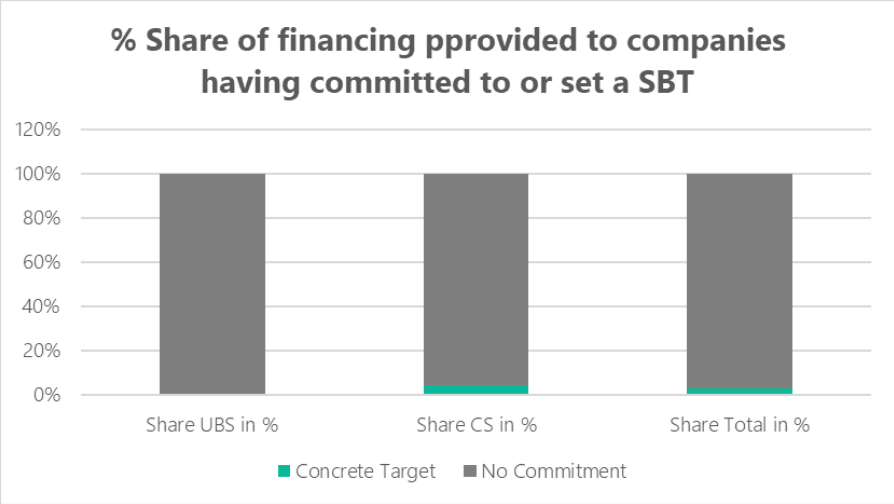

Figure 15

Only a fraction of the overall financing provided to the companies within the ISS Ethix Dataset was given to companies having set themselves an emission reduction target which is in line with the Paris Agreement.

[3] A SBT is an emission reduction target set in line with the requirements of the Paris Climate Agreement. Further information and all companies having either committed to or having already set a SBT can be found here: https://sciencebasedtargets.org/

VI. Emissions financed in relation to the companies' exposure to physical risks

ISS Ethix describes the origin of the submitted data on the physical risk indicator as follows:

The indicator shows the companies´ risk exposure to short-term and long-term physical risk.

Each sector and each region have characteristic physical risk levels relating to their exposure to long term climate change and catastrophic events. Based on a regional and sectoral analysis of the portfolio, a general level of exposure to physical risks (long term climate change and catastrophic events) can be attributed to the portfolio.

The sector of each holding's main field of activity is determined, and the company is then attributed the corresponding risk level. This is done using ISS Ethix's proprietary sector classification which determines a company's main field of operations. The same is done for the company's main region of activity. This is based on the company´s headquarter location.

The calculations are based on research by Moody's[4], the Sustainable Accounting Standard Board ("**SASB**")[5] and CICERO[6].

The following description of the different classifications of *low*, *medium* and *high* has been provided by ISS Ethix upon request by right.:

Low classified physical risk is described as: No or potentially emerging risks in the medium to long term (5 years and beyond) with uncertainty as to which extent they might material.

Medium classified physical risk is described as: Emerging risks that in aggregate have the potential to have material impacts in the medium term.

High classified physical risk is described as: More immediate risks that can have a material impact.

1. Short Term Risk: Investments in US $

Short-term refers to a time horizon of three years. From 34 companies with data on physical risks, 17 show an exposure to medium physical risks and 17 show exposure to high physical risk.

The amount of financing provided by UBS to companies exposed to medium physical risk in the short term decreased steadily between 2015 and 2017. The amount given to companies exposed to high physical risk decreased from 2015 to 2016 but increased again from 2016 to 2017. UBS has provided significantly less finance to companies exposed to high risk than to companies exposed to medium risk. The amount of financing

[4] Environmental Risks: Heat Map Shows Wide Variations in Credit Impact Across Sectors, Moody's Investors Service, Nov. 2015

[5] Climate Risk: Technical Bulletin TB001 – 10182016, Sustainability Accounting Standards Board, Oct. 2016

[6] Shades of Climate Risk: Categorizing Climate Risk for Investors, CICERO: Climate Finance, Feb. 2017

provided by CS to companies exposed to medium physical risk in the short term increased between 2015 and 2016 and slightly decreased again from 2016 to 2017. The amount of financing given to companies exposed to high physical risk decreased from 2015 to 2016 but strongly increased again from 2016 to 2017. CS has provided significantly less finance to companies exposed to medium risk than to companies exposed to high risk. The total amount of finance given by both banks in sum to companies exposed to high physical risk exceeded the amount of finance given to companies exposed to medium physical risk in 2017.

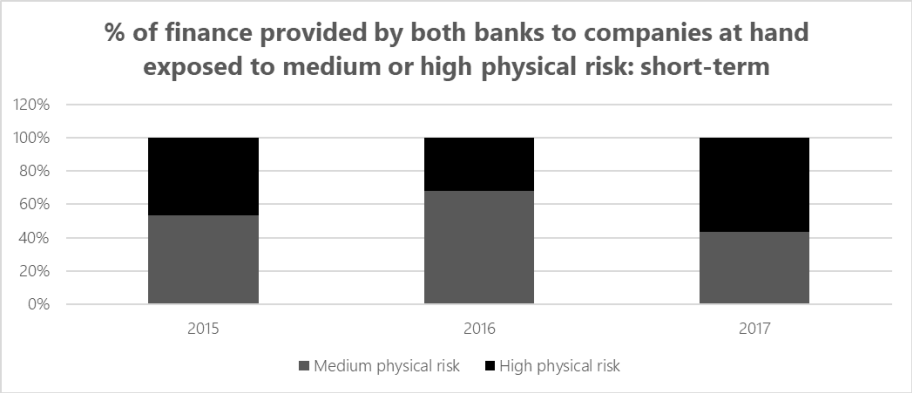

Figure 16

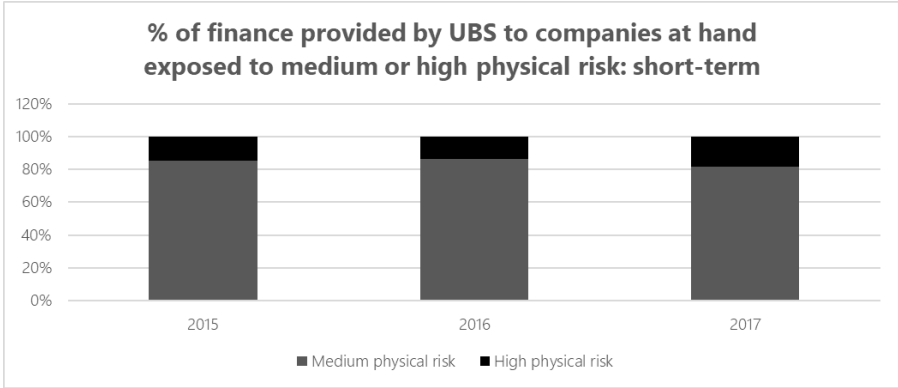

Figure 17

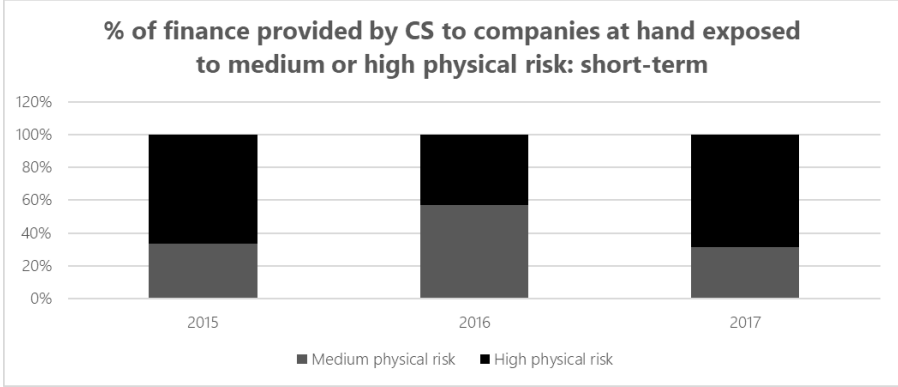

Figure 18

Table 17 shows the amount of $ invested in companies exposed to medium and high physical risk for each bank separately and for both banks together between 2015 and 2017.

	2015	2016	2017	2015-2017
Total				
Medium	2172975335	1826099242	1656537674	5655612251
High	1882157811	845855162	2154623625	4882636598
UBS				
Medium	1339614484	889659348	741398830	2970672663
High	233683505	138844788	167596047	540124341
CS				
Medium	833360850	936439892	915138844	2684939588
High	1648474306	707010374	1987027577	4342512257

Table 17

2. Short Term Risk: Emissions Financed in t CO2e

Table 18 shows the financed emissions in t CO2e corresponding to the investments in companies with short-term medium and high exposure to physical risks.

	2015	2016	2017	2015-2017
Total				
Medium	27106750	14302147	13962481	55371379
High	23742072	11221424	71286465	106249962
UBS				
Medium	19307357	6916532	5887727	32111617
High	7239883	3935177	3764013	14939075
CS				
Medium	7799392	7385614	8074754	23259762
High	16502188	7286246	67522451	91310886

Table 18

3. Long Term Risk: Investments in US $

Long-term refers to a time horizon of more than five years. From 34 companies with data on physical risks, 7 show an exposure to low physical risks and 27 show exposure to medium physical risk.

The amount of financing provided by UBS to companies exposed to low physical risk in the long term increased slightly between 2015 and 2016 and decreased in 2017. The amount given to companies exposed to medium physical risk decreased from 2015 to 2016 but increased again from 2016 to 2017. UBS has provided significantly less finance to companies exposed to low risk in the long-term than to companies exposed to medium risk in the long-term.

The amount of financing provided by CS to companies exposed to low physical risk in the long term increased between 2015 and 2017. The amount given to companies exposed to medium physical risk decreased from 2015 to 2016 but increased again from 2016 to 2017. CS has

provided significantly less finance to companies exposed to low risk than to companies exposed to medium risk.

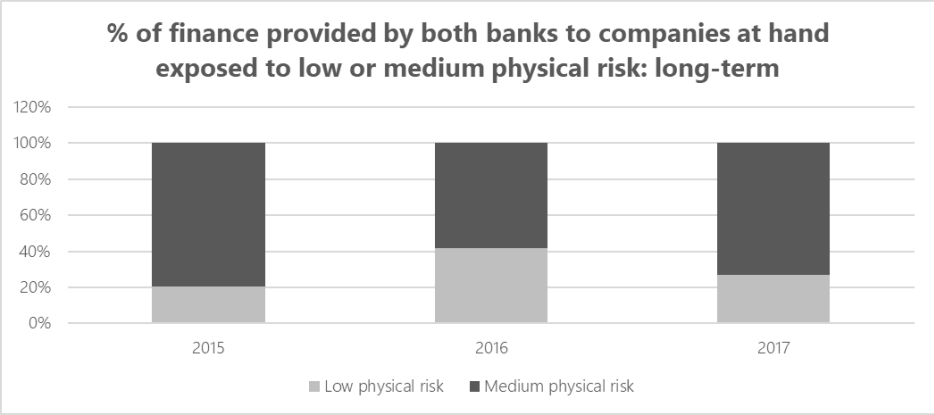

Figure 19

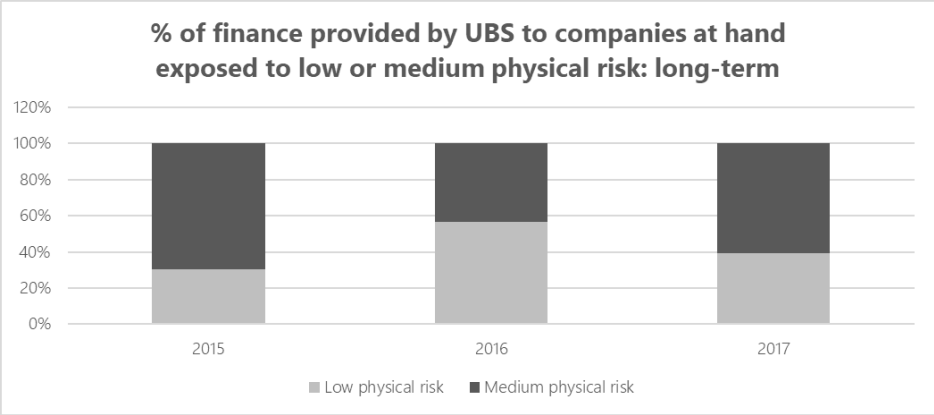

Figure 20

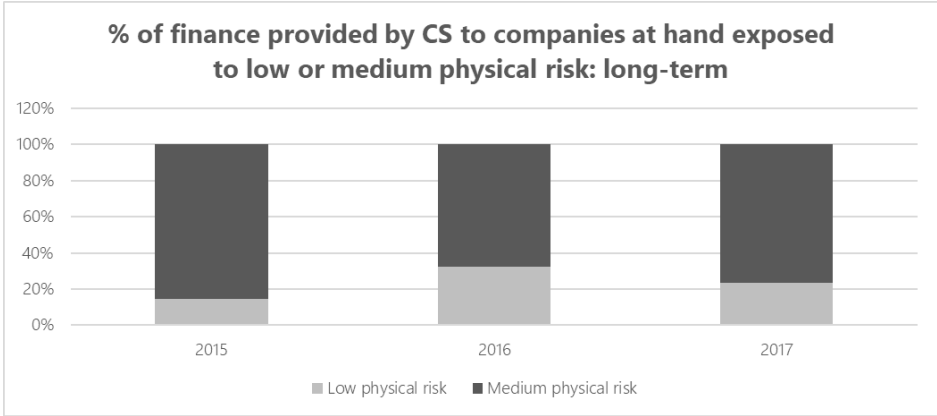

Figure 21

Table 19 shows the amount of $ invested in companies exposed to low and high physical risk for each bank separately and for both banks together between 2015 and 2017.

	2015	2016	2017	2015-2017
Total				
Low	836379087	1113821053	1030881185	2981081325
Medium	3218754059	1558133351	2780280114	7557167524
UBS				
Low	480881540	583447695	356342996	1420672232
Medium	1092416449	445056441	552651882	2090124773
CS				
Low	355497547	530373357	674538188	1560409093
Medium	2126337609	1113076910	2227628232	5467042752

Table 19

4. Long Term Risk: Emissions Financed in t CO2e

Table 20 shows the financed emissions corresponding to the investments in companies with short-term medium and high exposure to physical risks.

	2015	2016	2017	2015-2017
Total				
Low	7379815.476	9827832.819	9096010.454	26303658.75
Medium	43469007.07	15695739.38	76152936.6	135317683
UBS				
Low	4243072.414	5148067.903	3144202.906	12535343.22
Medium	22304168.8	5703642.688	6507538.238	34515349.73
CS				
Low	3136743.062	4679764.916	5951807.548	13768315.53
Medium	21164838.26	9992096.693	69645398.36	100802333.3

Table 20

Part 2: Climate Performance

This section is to be understood as an explorative outlook providing a glimpse into how science-based metrics can add valuable information to quantitative analyses as carried out in part 1, once methodologies are fully developed. The methodology used for determining the science-based metrics provided in this part is the X-Degree Compatibility ("**XDC**") Model, which is proprietary to right. and currently in ß-development phase. The XDC Model computes science-based climate metrics for the purposes of corporate climate strategy development, risk management, reporting and communication based on various scenarios.

A. Executive Summary

The total amount of financed emissions between 2015 and 2017 would lead to an increase of global temperatures by 0.0001293345 °C.

The total amount of emissions resulting from burning the total reserves of those 19 companies of which data on reserves was available would lead to an increase of global temperatures by 0.100253 °C.

The Standard XDC could be calculated for 33 companies and ranges from 1.2°C to well above 6°C. Two of the companies covered by the analysis have a Standard XDC below 2°C and two companies have a Standard XDC below their Target XDC as of IEA 2DS.

B. The XDC Model

The XDC is a science-based climate metric, which illustrates for a single company, how many degrees the world would warm up to by 2050 if all entities behaved as emission intensively as the company at hand. If a company has an XDC of e.g. 2.3°C, this means that the world would warm by 2.3°C, if everyone else would operate in the same manner. The XDC is computed via the XDC Model, which can additionally calculate several other metrics, such as an emission target.

I. The XDC Metric

The calculation underlying the metric is:

XDC = ($Emissions$ / $Gross\ Value\ Added$) x Climate Performance

The model computes the XDC of a company following two major questions:

Step 1: What amount of emissions would reach the atmosphere if every company would be as emission intensive as the company at hand, given the same economic output?

In the first step, the XDC Model computes an emission budget that would be generated by the global economy if every company's ratio between emissions and gross value added were the same as the company being evaluated.

Step 2: What temperature increase would result from the release of that specific amount of emissions?

In the second step, the XDC Model computes how much global warming would result from this amount of emissions reaching the atmosphere. right. uses emission-driven climate models to compute step 2. This means that the input data are the anthropogenic emissions of GHG and the output is a value for global warming expressed in degrees Celsius.

Our model captures the effect of further GHG emissions resulting in an increase of the atmospheric concentration of these gases in the atmosphere. The increase of the atmospheric concentration causes an increase of the radiative forcing and therefore on global warming.

II. Output of the XDC Model

The output of the XDC Model can be divided into two main categories:

- **Standard XDC**: The Standard XDC assumes standard assumptions for economic growth and emissions. The underlying scenario is a Business As Usual Scenario assuming the ratio between emissions and gross value added remains the same until 2050. Due to using the same assumptions for every XDC computed, the Standard XDC serves the purpose of comparing one company to another or to another peer group, such as a sector.
- **Scenario Based XDC**: The scenario based XDC allows individual assumptions for economic growth and emissions for each year until 2050 to be assessed. By doing this, XDCs based on different scenarios can be computed. Furthermore, the Scenario Based XDC allows for variation in scope 1-3 coverage. A user can decide what percentage of scope 1-3 emissions should be considered into the resulting XDC. Determining scenarios allows a user to consider emissions targets, strong business growth expectations, expansion plans or the effect of modern technology on decarbonizing e.g. the supply chain.

III. Validation of the XDC Model

right. has validated the calculations up to the moment, in the following way:

Radiative Forcing: The primary source for radiative forcing are GHG. Our values for radiative forcing generated by GHG for the base year 2016 are in line with the National Oceanic and Atmospheric Administration ("**NOAA**") results. Total radiative forcing for the base year is in line with IPCC results.

Carbon Budgets: Current climate science describes remaining cumulative budgets for GHG emissions to stay below 2 / 3 / 4 degrees Celsius global warming. Remaining cumulative budgets for GHG emissions as calculated by the XDC Model are within the 90% confidence interval of those scientific results until almost 4°C.

IV. Input data for this Report

In order calculate science-based climate metrics via the XDC Model for a company via data provided by third parties, the company has to be publicly listed. Out of the 47 companies provided by ISS Ethix, 13 are held privately or by governments. Since ISS Ethix did not provide climate data for the company Connacher Oil & Gas Ltd., it has also been deducted from the sample. Consequently, the final number of companies, for which calculations have been done using the XDC Model, amounts to 33. For the calculation of the Standard XDC for Enbridge, Inc. data from 2017 was used, considering the fact, that this company underwent a large merger in 2017.

The following sources of input data apply to analyses carried out in part 2 of this Report:

Emissions: Carbon footprint (scope 1 and scope 2) were sourced by ISS Ethix. ISS Ethix describes the methodology as follows:

(1) ISS Ethix collects self-reported GHG data from all available sources, including CSR reports, the CDP, investor relation communication, websites etc. This self-reported data is validated by analysts. Usually, 20-25% of this data is dismissed as not trustworthy.
(2) For all non-reporting or poorly reporting companies, ISS Ethix developed a sophisticated approach for modeling such data.

ISS Ethix's methodology for estimating the carbon emissions of non-reporting companies was developed over three years with researchers from the Swiss Federal Institute of Technology. ISS Ethix's approach relies on about 800 subsector specific models, applied on a proprietary, carbon-focused subsector classification system.

Gross Value Added: Gross Value Added can be calculated by adding EBITDA (Earnings before Interest, Taxes, Depreciation and Amortization) and personnel costs. EBITDA for the 33 companies covered by the analysis in part 2 was sourced from Factset Research Systems. In case of negative values for EBITDA, only personnel costs were used as GVA. Personnel costs were also sourced from Factset Research Systems. In case personnel costs could not be provided by Factest Research Systems, this information was derived from sector-specific estimations.

C. Analysis

I. Climate Performance of financed emissions

The climate performance of the total sum of emissions financed by CS and UBS was determined by entering the total amount of financed emissions into the climate performance calculation part of the XDC Model.

Results show that the total amount of financed emissions between 2015 and 2017 would lead to an increase of global temperatures by 0.0001293345°C.

Also small numbers can play a huge role. In November 2015, Saúl Luciano Lliuya, a Peruvian farmer filed claims for declaratory judgment and damages in a German court against RWE, Germany's largest electricity producer. Lliuya's suit alleged that RWE, having knowingly contributed to climate change by emitting "substantial volumes" – namely 0.47% of worldwide GHGs. The case will move forward into the evidentiary phase.

The case indicates that there is a need to establish what is the specific result in temperature increase that past and future emissions will amount to. As climate attribution science becomes more precise, the specific impacts and effects of contributions will be easier to associate with specific consequences.

II. Climate Performance of the company's fossil fuel reserves

ISS Ethix Data show values for coal reserves for six companies and oil and gas reserves for 15 companies. In order to determine the additional climate performance of these reserves, reserves had to be turned into emissions according to the following process for each fossil fuel:

1. Coal

Coal reserves given in Metric Tonnes where converted into Short Tonnes in order to apply factors given by the IEA to calculate the emissions resulting from burning the coal reserves. The factor applied for turning MT into ST was 1.10231. No distinction could be made between different sorts of coal, which is why the general factor for coal was used.

2. Oil and Gas

Oil and gas reserves given in Barrel Oil Equivalent where converted into British Thermal Units ("**BTU**") in order to apply factors given by the IEA to calculate the emissions resulting from burning the oil and gas reserves of the 16 companies. 1 BOE corresponds to 5.800.641 BTU. BTU was then converted into tonnes of CO2e according to the factors for "Home Heating and Diesel Fuel (Distillate)" given by the IEA.

The climate performance of the total sum of reserves held by the 19 companies (two companies have coal and oil and gas reserves) having received credit by CS and UBS was determined by entering the total amount of emissions resulting from burning those reserves into the climate performance calculation part of the XDC Model.

Results show that the total amount of emissions resulting from burning the total reserves of the 19 companies would lead to an increase of global temperatures by 0.100253 degrees Celsius.

It should be stressed that around 70% of coal reserves are located in Asia[7] and that reserves of the companies financed by UBS and CS located in China and South Korea could not be incorporated into this calculation due to missing data on the amount of reserves which those companies hold.

III. Standard XDC and Sector Target XDC

The Standard XDC for the base year 2016 was calculated according to the following assumptions: 3.2%[8] growth of global GVA p.a. until 2050, 3.2% growth of company-specific GVA p.a. until 2050 and zero decoupling of emissions and GVA until 2050. Scope 1 emissions were covered by 100% of the analysis whereby Scope 2 emissions were covered by 50% of the analysis, taking into account the shared GVA from Scope 2 emissions between the company at hand and its energy providers.

The Target XDC is a Scenario Based XDC and has been determined for OECD countries based on the emission-reduction assumptions of the IEA 2DS using the following data bases:

[7] InfluenceMap, Who Owns the World's Coal, 2017.

[8] IEA ETP 2016.

1. Emissions according to the International Energy Agency's 2 degrees scenario ("**2DS**")

For sectors covered by the IEA ETP 2016, GHG emissions permitted to achieve the 2°C target are reported in 5-year intervals. For the intermediate years, the data was interpolated linearly by right. This way the cumulative emissions for the years 2016-2050 had been determined.

The assignment of the companies in the sample to the sectors of the IEA had been done as follows:

- Oil Production and Mining was assigned to Industry [ISIC rev4 divisions 5-9 and 10-33]
- Power Generation and Gas Distribution was assigned to Power [ISIC rev4 division 35]
- Transport in Pipelines was assigned to Transport [ISIC rev4 divisions 49-53]

2. GVA by sector for OECD countries for the year 2016 was sourced from the OECD databank.

The data was calculated and summed up using the annual 1.8% growth forecast given by the IEA for OECD countries until 2050.

Resulting sums for GHG emissions and GVA were used to determine the Target XDC of the sectors Industry, Power and Transport.

Taking into account existing and well-founded criticism against the rationale of the IEA 2DS, it should be noted that a Target XDC under the 2°C-mitigation scenarios provided by the scenario framework of the Shared Socioeconomic Pathways ("**SSPs**")[9] might be a better indicator for 2°C-compatible emission reduction requirements of the companies covered by the analysis.

[9] https://tntcat.iiasa.ac.at/SspDb/dsd?Action=htmlpage&page=about

Table 21 shows results for each of the companies within the ISS Ethix Data, for which sufficient data was available:

	Standard XDC 2016				Target XDC
Company Name	**Total**	**Scope 1**	**Scope 2**	**Scope 3**	**Scope 1**
NRG Energy, Inc.	>6°C	>6°C	1.2°C	n/a	2.2
RWE AG	>6°C	>6°C	3.2°C	n/a	2.2
Plains All American Pipeline LP	>6°C	>6°C	3.0°C	n/a	2.7
American Electric Power Co., Inc.	>6°C	>6°C	2.8°C	n/a	2.2
Cheniere Energy, Inc.	>6°C	>6°C	2.5°C	n/a	2.2
Vistra Energy Corp.	>6°C	>6°C	2.2°C	n/a	2.2
The Southern Co.	>6°C	>6°C	2.2°C	n/a	2.2
Enbridge, Inc.	>6°C	>6°C	2.2°C	n/a	2.7
Athabasca Oil Corp.	>6°C	>6°C	1.8°C	n/a	1.3
Energy Transfer LP	>6°C	>6°C	1.1°C	n/a	2.2
Duke Energy Corp.	>6°C	>6°C	2.1°C	n/a	2.2
Cenovus Energy, Inc.	>6°C	>6°C	2.5°C	n/a	1.3
Gazprom PJSC	>6°C	>6°C	1.8°C	n/a	n/a
ENEL SpA	>6°C	>6°C	1.1°C	n/a	2.2
PPL Corp.	>6°C	>6°C	1.8°C	n/a	2.2
Kinder Morgan, Inc.	>4°C	>4°C	1.7°C	n/a	2.2
Exxon Mobil Corp.	>4°C	>4°C	1.4°C	n/a	1.3
Repsol SA	>4°C	>4°C	1.2°C	n/a	1.3
TransCanada Corp.	>4°C	>4°C	1.2°C	n/a	2.2
Glencore Plc	>4°C	>4°C	2.4°C	n/a	1.3
Total SA	>4°C	>4°C	1.3°C	n/a	1.3
BP plc	>4°C	3.9°C	1.4°C	n/a	1.3
Electricite de France SA	4.0°C	3.9°C	1.3°C	n/a	2.2
Peabody Energy Corp.	3.9°C	3.5°C	2.0°C	n/a	1.3

Royal Dutch Shell plc	3.8°C	3.7°C	1.4°C	n/a	1.3
Arch Coal, Inc	3.8°C	3.4°C	1.9°C	n/a	1.3
Sempra Energy	3.2°C	3.2°C	1.1°C	n/a	2.2
Woodside Petroleum Ltd.	3.2°C	3.2°C	1.1°C	n/a	1.3
Anglo American plc	3.1°C	3.0°C	1.2°C	n/a	1.3
BHP Billiton Ltd.	3.0°C	2.7°C	1.6°C	n/a	1.3
Equinor ASA	3.0°C	3.0°C	1.1°C	n/a	1.3
Korea Gas Corp.	1.7°C	1.5°C	1.3°C	n/a	2.2
Korea Electric Power Corp.	1.2°C	1.2°C	1.1°C	n/a	2.2

Table 21

IV. Financed Emissions in relation to Standard XDC

Table 22 shows the absolute and relative amount of financed emissions to each company's Standard XDC. Analysing the correlation between Standard XDC and % share of financed emissions total revealed that companies with high XDC values are not receiving significantly more loans for fossil fuel activities by the two banks.

Company Name	**Standard XDC (Scope 1&2)**	**% share of financed emissions total**	**UBS % share of financed emissions**	**CS % share of financed emissions**
NRG Energy, Inc.	>6°C	0.8%		100%
RWE AG	>6°C	3.2%	71%	29%
Plains All American Pipeline L	>6°C	0.1%	100%	
American Electric Power Co., Inc.	>6°C	1.2%	50%	50%
Cheniere Energy, Inc.	>6°C	3.8%		100%
Vistra Energy Corp.	>6°C	4.5%	50%	50%
The Southern Co.	>6°C	1.4%	100%	
Enbridge Inc	>6°C	0.4%		100%
Athabasca Oil Corp	>6°C	0.5%		100%
Energy Transfer LP	>6°C	0.2%	10%	90%

Duke Energy Corp.	>6°C	9.4%	40%	60%
Cenovus Energy Inc	>6°C	1.7%		100%
Gazprom PJSC	>6°C	0.0%	100%	
ENEL SpA	>6°C	0.9%		100%
PPL Corp.	>6°C	0.6%	64%	36%
Kinder Morgan Inc/DE	>4°C	0.1%	43%	57%
Exxon Mobil Corp	>4°C	0.7%		100%
Repsol SA	>4°C	0.1%	100%	
TransCanada Corp	>4°C	0.4%		100%
Glencore Plc	>4°C	11.3%	56%	44%
TOTAL SA	>4°C	0.8%	21%	79%
BP PLC	>4°C	2.2%	52%	48%
Electricite de France SA	4.0°C	0.2%		100%
Peabody Energy Corp.	3.9°C	32.8%		100%
Royal Dutch Shell PLC	3.8°C	0.6%		100%
Arch Coal, Inc	3.8°C	1.4%		100%
Sempra Energy	3.2°C	0.0%	100%	
Woodside Petroleum Ltd	3.2°C	2.5%	58%	42%
Anglo American plc	3.1°C	0.9%	50%	50%
BHP Billiton Ltd	3.0°C	4.1%	100%	
Equinor ASA	3.0°C	0.2%		100%
Korea Gas Corp	1.7°C	0.6%	75%	25%
Korea Electric Power Corp.	1.2°C	0.7%	100%	

Table 22