Profundo
Research & advice

Identification of Fossil & Nuclear Free Financial Institutions in Japan

Description of the methodology

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16 December 2021

Introduction

The objective of this research project was to identify Japanese financial institutions with no record of financing provided to companies engaged in fossil fuels, or nuclear power generation. Additionally, it also identified which financial institutions have provided financing to companies engaged in renewable energy. This note describes the methodology which was used for this case study.

1 Research questions

The following research questions were answered in this case study:

1. **Which financial institutions have provided credit (loans and underwriting services) to the selected companies?**

   Disaggregated by the four categories: coal, oil & gas, companies engaged in nuclear energy and renewable energy companies.

2. **Which financial institutions hold bonds and/or shares of the selected companies?**

   Disaggregated by the four categories: coal, oil & gas, companies engaged in nuclear energy and renewable energy companies.

3. **What proportion of the selected companies' activities are related to the four categories: coal, oil & gas, nuclear energy and renewable energy?**

2 Scope of the research

2.1 Financial institutions

The research focused on Japanese financial institutions, including life insurance companies and banks.

The largest life insurance companies in Japan on basis of total assets were selected:

- Japan Post Life Insurance
- Nippon Life
- Dai-ichi Holdings
- Meiji Yasuda Life
- Sumitomo Life

The banks were chosen to create a representative spread of banks. In addition to the large banks, smaller banks were chosen based on their branch numbers in underrepresented areas of Japan, as listed in Table 1.

Table 1 Banks and insurers selected for the research

Parent company	Subsidiary
77 Bank	77 Bank
Aeon Bank	Aeon Bank
Aichi Bank	Aichi Bank
Akita Bank	Akita Bank
Akita Shinkin Bank	Akita Shinkin Bank
Amagasaki Shinkin Bank	Amagasaki Shinkin Bank
Aoi Mori Shinkin Bank	Aoi Mori Shinkin Bank
Aomori Bank	Aomori Bank
Aozora Bank	Aozora Bank
Asahikawa Shinkin Bank	Asahikawa Shinkin Bank
Ashikaga Bank	Ashikaga Bank
Au Jibun Bank	Au Jibun Bank
Awa Bank	Awa Bank
Bank of Iwate	Bank of Iwate
Bank of Kochi	Bank of Kochi
Bank of Kyoto	Bank of Kyoto
Bank of Nagoya	Bank of Nagoya
Bank of Okinawa	Bank of Okinawa
Bank of Saga	Bank of Saga
Bank of The Ryukyus	Bank of The Ryukyus
Bank of Yokohama	Bank of Yokohama
Chiba Bank	Chiba Bank
Chikuho Bank	Chikuho Bank
Chugoku Bank	Chugin Securities
	Chugoku Bank
Chugoku Labour Bank	Chugoku Labour Bank
Chukyo Bank	Chukyo Bank
Chuo Labour Bank	Chuo Labour Bank
Daishi Hokuetsu Financial Group	Daishi Hokuetsu Bank
	Daishi Hokuetsu Securities
Daito Bank	Daito Bank
Daiwa Securities	Daiwa Asset Management
	Daiwa Capital Markets
	Daiwa Next Bank
	Daiwa Securities
Ehime Bank	Ehime Bank
FIDEA Holdings	Hokuto Bank
	Shonai Bank

Parent company	Subsidiary
First Bank of Toyama	First Bank of Toyama
Fukoku Mutual Life Insurance	Fukoku Mutual Life Insurance
Fukuho Bank	Fukuho Bank
Fukui Bank	Fukui Bank
Fukuoka Chuo Bank	Fukuoka Chuo Bank
Fukuoka Financial Group	Bank of Fukuoka
	FFG Securities
	Kumamoto Bank
	Juhachi-Shinwa Bank
Fukushima Bank	Fukushima Bank
Gunma Bank	Gunma Bank
Hachijuni Bank	Hachijuni Bank
Higashi Nippon Bank	Higashi Nippon Bank
Hirogin Holdings	Hiroshima Bank
Hokkaido Labour Bank	Hokkaido Labour Bank
Hokkoku Bank	Hokkoku Bank
Hokuhoku Financial Group	Hokkaido Bank
	Hokuriku Bank
Hokuriku Labour Bank	Hokuriku Labour Bank
Howa Bank	Howa Bank
Hyakugo Bank	Hyakugo Bank
Hyakujushi Bank	Hyakujushi Bank
Iyo Bank	Iyo Bank
Japan Post Bank	Japan Post Bank
	Japan Post Life Insurance
Jimoto Holdings	Kirayaka Bank
	Sendai Bank
Johnan Shinkin Bank	Johnan Shinkin Bank
Joyo Bank	Joyo Bank
Juroku Bank	Juroku Bank
Kanagawa Bank	Kanagawa Bank
Keiyo Bank	Keiyo Bank
Kinki Labour Bank	Kinki Labour Bank
Kiraboshi Bank	Kiraboshi Bank
Kita-Nippon Bank	Kita-Nippon Bank
Kiyo Financial Group	Kiyo Bank
Koza Shinkin Bank	Koza Shinkin Bank
Kyoto Chuo Shinkin Bank	Kyoto Chuo Shinkin Bank
Kyoto Shinkin Bank	Kyoto Shinkin Bank

Parent company	Subsidiary
Kyushu Financial Group	Higo Bank
	Kagoshima Bank
Kyushu Labour Bank	Kyushu Labour Bank
Meiji Yasuda Life Insurance	Meiji Yasuda Life Insurance
Michinoku Bank	Michinoku Bank
Minami Nippon Bank	Minami Nippon Bank
Minato Bank	Minato Bank
Mitsubishi UFJ Financial	Bank of Tokyo Mitsubishi UFJ
	Mitsubishi Trust & Banking
	Mitsubishi UFJ Asset Management
	Mitsubishi UFJ Morgan Stanley
	MU Investments
	MUFG Union Bank
	Nippon Yusen
Miyazaki Bank	Miyazaki Bank
Miyazaki Taiyo Bank	Miyazaki Taiyo Bank
Mizuho Financial	Asset Management One
	Chiba Kogyo Bank
	Mizuho Bank
	Mizuho Financial
	Mizuho International
	Mizuho Securities
MS&AD Insurance Group	Mitsui Sumitomo Insurance
	Mitsui Sumitomo Marine Management
	MS&AD Insurance Group
Musashino Bank	Musashino Bank
Nagano Labour Bank	Nagano Labour Bank
Naganobank	Naganobank
Nanto Bank	Nanto Bank
Niigata Labour Bank	Niigata Labour Bank
Nippon Life Insurance	Nippon Life Insurance
	Nissay Asset Management
Nishi-Nippon Financial Holdings	Bank of Nagasaki
	Nishi-Nippon City Bank
Nomura	Nomura Asset Management
	Nomura International
	Nomura Securities
	Nomura Trust & Banking
Norinchukin Bank	Norinchukin Bank

Parent company	Subsidiary
	Norinchukin Zenkyoren Asset Management
North Pacific Bank	North Pacific Bank
Ogaki Kyoritsu Bank	Ogaki Kyoritsu Bank
Oita Bank	Oita Bank
Okayama Shinkin Bank	Okayama Shinkin Bank
Okinawa Kaiho Bank	Okinawa Kaiho Bank
Okinawa Labour Bank	Okinawa Labour Bank
Orix Corporation	Boston Partners
	Orix Corporation
	Robeco
Osaka City Shinkin Bank	Osaka City Shinkin Bank
Osaka Shinkin Bank	Osaka Shinkin Bank
PayPay Bank Corporation	PayPay Bank Corporation
Rakuten	Rakuten Bank
Resona Holdings	Resona Bank
	Resona Holdings
	Saitama Resona Bank
Saga Kyoei Bank	Saga Kyoei Bank
Saikyo Bank	Saikyo Bank
San-in Godo Bank	San-in Godo Bank
Sapporo Shinkin Bank	Sapporo Shinkin Bank
San Ju San Financial Group	San Ju San Bank
SBI Holdings	SBI Holdings
	SBI Sumishin Net Bank
Seibu Shinkin Bank	Seibu Shinkin Bank
Senshu Ikeda Holdings	Senshu Ikeda Bank
Seven & I Holdings	Seven Bank
Shiga Bank	Shiga Bank
Shikoku Bank	Shikoku Bank
Shikoku Labour Bank	Shikoku Labour Bank
Shimane Bank	Shimane Bank
Shimane Chuo Shinkin Bank	Shimane Chuo Shinkin Bank
Shimizu Bank	Shimizu Bank
Shinkin Central Bank	Shinkin Asset Management
	Shinkin Central Bank
	Shinkin International
	Shinkin Securities
Shinsei Bank	Shinsei Bank
Shizuoka Bank	Shizuoka Bank

Parent company	Subsidiary
Shizuoka Chuo Bank	Shizuoka Chuo Bank
Shizuoka Labour Bank	Shizuoka Labour Bank
Sompo Holdings	Sompo Asset Management
	Sompo Holdings
	Sompo Japan Insurance
Sony Financial Group	Sony Bank
Sumitomo Life	Sumitomo Life
Sumitomo Mitsui Financial	Kansai Urban Banking
	Mitsui Sumitomo Bank
	SMBC Friend Securities
	SMBC Nikko Capital Markets
	SMBC Nikko Securities
	SMBC Trust Bank
	Sumitomo Mitsui Asset Management
	Sumitomo Mitsui Banking Corporation
	Sumitomo Mitsui DS Asset Management
Sumitomo Mitsui Trust Holdings	Nikko Asset Management
	Sumitomo Mitsui Trust Asset Management
	Sumitomo Mitsui Trust Bank
Suruga Bank	Suruga Bank
T&D Holdings	T&D Asset Management
	T&D Holdings
	Taiyo Life
Taiko Bank	Taiko Bank
Tajima Bank	Tajima Bank
Tama Shinkin Bank	Tama Shinkin Bank
The Dai-Ichi Life Holdings	The Dai-Ichi Life Insurance Company
Tochigi Bank	Tochigi Bank
Toho Bank	Toho Bank
Tohoku Bank	Tohoku Bank
Tohoku Labour Bank	Tohoku Labour Bank
Tokai Labour Bank	Tokai Labour Bank
Tokio Marine Holdings	Tokio Marine Holdings
Tokyo Star Bank	Tokyo Star Bank
Tomato Bank	Tomato Bank
Tomony Holdings	Kagawa Bank
	Taisho Bank
	Tokushima Bank
	Tomony Holdings

Parent company	Subsidiary
Tottori Bank	Tottori Bank
Tottori Shinkin Bank	Tottori Shinkin Bank
Towa Bank	Towa Bank
Toyokawa Shinkin Bank	Toyokawa Shinkin Bank
Tsukuba Bank	Tsukuba Bank
Yamagata Bank	Yamagata Bank
Yamaguchi Financial Group	Kitakyushu Bank
	Momiji Bank
	Yamaguchi Bank
Yamanashi Chuo Bank	Yamanashi Chuo Bank
Yonago Shinkin Bank	Yonago Shinkin Bank

2.2 Companies

Financing to companies on the Global Coal Exit List (GCEL) representing 75% of global production were researched, as well as oil & gas companies accounting for 75% of global production, the largest oil field service companies, pipeline companies, and companies engaged in renewable energy equipment production (e.g. wind turbines, solar PVs). Additionally, the study researched all financing to Japanese electric utility companies. The selected companies are listed in Table 2.

Table 2 Companies selected for the research

Sector	Company	Country
Geothermal energy utilization equipment	Atlas Copco	Sweden
Geothermal energy utilization equipment	Exergy	Italy
Geothermal energy utilization equipment	Fuji Electric	Japan
Geothermal energy utilization equipment	GE/Alstom	
Geothermal energy utilization equipment	Mitsubishi	Japan
Geothermal energy utilization equipment	Ormat	United States
Geothermal energy utilization equipment	Toshiba	Japan
Geothermal energy utilization equipment	Turboden (subsidiary of Mitsubishi)	Italy
Hydrogen	Ballard Power Systems	Canada
Hydrogen	Bloom Energy	United States
Hydrogen	Ceres Power	United Kingdom
Hydrogen	ITM Power	United Kingdom
Hydrogen	Nel	Norway
Hydrogen	Plug Power	United States
Coal mining	ABM Investama	Indonesia
Coal mining	Adani Group	India
Coal mining	Adaro Energy	Indonesia
Coal mining	Africa Coal Partners Ltd	South Africa
Coal mining	AGL Energy Ltd	Australia
Coal mining	Alliance Resource Partners LP	USA

Sector	Company	Country
Coal mining	ALLTECH Group	Russia
Coal mining	Altraso Ventures Ltd	Russia
Coal mining	Aluminum Corporation of China Ltd	China
Coal mining	Anglo American PLC	United Kingdom
Coal mining	Anglo Pacific Group PLC	United Kingdom
Coal mining	Anhui Wanbei Coal - Electricity Group Co Ltd	China
Coal mining	Arch Resources Inc	USA
Coal mining	ARM Coal Pty Ltd	South Africa
Coal mining	Banpu Public Company Ltd	Thailand
Coal mining	Baramulti Suksessarana	Indonesia
Coal mining	Batchfire Resources Pty Ltd	Australia
Coal mining	Bayan Resources	Indonesia
Coal mining	Beijing Energy Holding Co Ltd	China
Coal mining	BHP Group Ltd	Australia
Coal mining	Bin County Coal Co Ltd	China
Coal mining	Blackhawk Mining LLC	USA
Coal mining	Bukit Asam	Indonesia
Coal mining	Bulgarian Energy Holding (BEH)	Bulgaria
Coal mining	Bumi Resources	Indonesia
Coal mining	CC Kolmar LLC	Russia
Coal mining	Celikler Holding	Turkey
Coal mining	CEZ AS	Czech Republic
Coal mining	China Energy Investment Corporation (China Energy/ CHN Energy)	China
Coal mining	China Huadian Co Ltd	China
Coal mining	China Huaneng Group Co Ltd	China
Coal mining	China National Coal Group Corp (ChinaCoal)	China
Coal mining	China Petrochemical Group (Sinopec Group)	China
Coal mining	China Pingmei Shenma Group	China
Coal mining	China Qinfa Group Ltd	China
Coal mining	Coal India Ltd	India
Coal mining	Complexul Energetic Oltenia SA	Romania
Coal mining	CONSOL Energy Inc	USA
Coal mining	Contura Energy Inc	USA
Coal mining	Datong Coal Mine Group Co Ltd	China
Coal mining	DMCI Holdings Inc	Philippines
Coal mining	Drummond Company Inc	USA
Coal mining	DTEK BV Group	Ukraine

Sector	Company	Country
Coal mining	Electricity Generating Authority of Thailand (EGAT)	Thailand
Coal mining	Elektrik Uretim A.S. Genel Mudurlugu (EUAS)	Turkey
Coal mining	Elektroprivreda Srbije (EPS)	Serbia
Coal mining	EN+ Group IPJSC	Russia
Coal mining	Enea SA	Poland
Coal mining	Energeticky a prumyslovy holding a.s. (EPH)	Czech Republic
Coal mining	Enerjisa Uretim Santralleri A.S.	Turkey
Coal mining	EP Investment II S.à.r.l.	Luxembourg
Coal mining	EP Investment S.à.r.l.	Luxembourg
Coal mining	Erdenes Mongol LLC	Mongolia
Coal mining	Essel Mining & Industries Ltd (EMIL)	India
Coal mining	Eurasian Resources Group S.à.r.l (ERG)	Luxembourg
Coal mining	Exxaro Resources Ltd	South Africa
Coal mining	Famur SA	Poland
Coal mining	FM Coal LLC	USA
Coal mining	Foresight Energy LP	USA
Coal mining	Geo Energy Resources Ltd	Singapore
Coal mining	Glencore PLC	Switzerland
Coal mining	Global Mining Holding Company LLC	USA
Coal mining	GMR Infrastructure Ltd	India
Coal mining	Guangdong Energy Group Co Ltd	China
Coal mining	Guanghui Energy Co Ltd	China
Coal mining	Guizhou Panjiang Coal And Electricity Group Co Ltd	China
Coal mining	Guizhou Panjiang Investment Holding (Group) Co Ltd	China
Coal mining	Guizhou Panjiang Refined Coal Co Ltd	China
Coal mining	Gujarat Mineral Development Corp Ltd	India
Coal mining	Hallador Energy Co	USA
Coal mining	Heilongjiang Longmay Mining Holding Group Co Ltd	China
Coal mining	Henan Energy and Chemical Industry Group Co Ltd	China
Coal mining	Henan Shenhuo Group Co Ltd	China
Coal mining	Hindalco Industries Ltd	India
Coal mining	Huaibei Mining Group Company	China
Coal mining	Huaihe Energy Holding Group Co Ltd	China
Coal mining	Hubei Yihua Group Co Ltd	China

Sector	Company	Country
Coal mining	Idemitsu Kosan Co Ltd	Japan
Coal mining	Indika Energy	Indonesia
Coal mining	Indonesia Asahan Aluminium LLP	Indonesia
Coal mining	Inner Mongolia Energy Generation & Investment Group	China
Coal mining	Inner Mongolia Huineng Coal and Electricity Group Co Ltd	China
Coal mining	Inner Mongolia Manshi Investment Group Co Ltd	China
Coal mining	Inner Mongolia Yitai Group Co Ltd	China
Coal mining	Jiangsu Yueda Group Co Ltd	China
Coal mining	Jindal Steel & Power Ltd (JSPL)	India
Coal mining	Jingyuan Coal Industry Group	China
Coal mining	Jinneng Group Co Ltd	China
Coal mining	Jizhong Energy Group Co Ltd	China
Coal mining	JSC HC SDS	Russia
Coal mining	JSC SUEK Group (Siberian Coal Energy Company)	Russia
Coal mining	Kailuan (Group) Ltd Liability Corporation	China
Coal mining	Karazhyra JSC	Kazakhstan
Coal mining	Kiewit Peter Sons' Inc	USA
Coal mining	Kosovo Energy Corporation J. S. C. (KEK)	Kosovo
Coal mining	LG International Corp	South Korea
Coal mining	Liaoning Energy Industry Holding Group Co Ltd	China
Coal mining	Menar Holding	Luxembourg
Coal mining	Minera del Norte S.A. de C.V. (MINOSA)	Mexico
Coal mining	Mongolian Mining Corporation	Mongolia
Coal mining	Murray Energy Corp	USA
Coal mining	NACCO Industries Inc	USA
Coal mining	Navajo Transitional Energy Company LLC (NTEC)	USA
Coal mining	New Hope Corporation Ltd	Australia
Coal mining	NLC India Ltd	India
Coal mining	NTPC Ltd	India
Coal mining	OAO Kuzbasskaya Toplivnaya Kompaniya (KTK)	Russia
Coal mining	Ordos Wulan Coal (Group) Co Ltd	China
Coal mining	Peabody Energy Corp	USA

Sector	Company	Country
Coal mining	PGE SA (Polska Grupa Energetyczna SA)	Poland
Coal mining	Polska Grupa Górnicza (PGG)	Poland
Coal mining	Posco	South Korea
Coal mining	PTT Global Management Co. Ltd (PTTGM)	Thailand
Coal mining	Public Power Corporation SA (PPC)	Greece
Coal mining	Rajasthan Rajya Vidyut Utpadan Nigam Ltd (RVUNL)	India
Coal mining	Reliance Power Ltd	India
Coal mining	Russian Coal Co	Russia
Coal mining	RWE AG	Germany
Coal mining	Samruk Energy JSC	Kazakhstan
Coal mining	Sasol Ltd	South Africa
Coal mining	Seriti Resources Holdings Pty Ltd	South Africa
Coal mining	Sev.en Energy Group	Czech Republic
Coal mining	Shaanxi Coal and Chemical Industry Group Co Ltd	China
Coal mining	Shaanxi Investment Group Co Ltd	China
Coal mining	Shaanxi Yulin Energy Group Co Ltd	China
Coal mining	Shandong Energy Group Co Ltd	China
Coal mining	Shanxi Coal Import & Export Group Co Ltd	China
Coal mining	Shanxi Coking Coal Group Co Ltd	China
Coal mining	Shanxi Jincheng Anthracite Mining Group Co Ltd	China
Coal mining	Shanxi Lanhua Coal Industry Group Co Ltd	China
Coal mining	Shanxi Lu'an Mining Industry (Group) Co Ltd	China
Coal mining	Shanxi Luxin Energysources Group	China
Coal mining	Shanxi Xinzhou Shenda Energy Group Co Ltd	China
Coal mining	Shenyang Coal Industry (Group) Co Ltd	China
Coal mining	Shenyang Coal Trade Group Corp Ltd	China
Coal mining	Sichuan Coal Industry Group LLC	China
Coal mining	Sinar Mas	Indonesia
Coal mining	Singareni Collieries Company Ltd (SCCL)	India
Coal mining	Sokolovská Uhelná AS	Czech Republic
Coal mining	South32 Ltd	Australia

Sector	Company	Country
Coal mining	State Power Investment Corporation (SPIC)	China
Coal mining	Tata Power Co Ltd	India
Coal mining	TerraCom Ltd	Australia
Coal mining	TransAlta Corp	Canada
Coal mining	Turkish Coal Enterprises (TKİ)	Turkey
Coal mining	United Tractors	Indonesia
Coal mining	Ural Mining Metallurgical Company (UMMC)	Russia
Coal mining	Vietnam National Coal Mineral Industries Holding Corporation Ltd (Vinacomin)	Vietnam
Coal mining	Vistra Corp	USA
Coal mining	Westmoreland Mining Holdings LLC	USA
Coal mining	Whitehaven Coal Ltd	Australia
Coal mining	Wintime Holding Group Ltd	China
Coal mining	Wolverine Fuels LLC	USA
Coal mining	Xuzhou Mining Group Co Ltd	China
Coal mining	Yangquan Coal Industry (Group) Co Ltd	China
Coal mining	Yankuang Group Co Ltd	China
Coal mining	Yunnan Coal Chemical Industry Group Co Ltd	China
Coal mining	Yunnan Xiaolongtan Mining Bureau	China
Coal mining	ZAO Stroyservis	Russia
Coal mining	ZE PAK SA Group (Zespół Elektrowni Pątnów Adamów Konin SA)	Poland
Coal mining	Zhengzhou Coal Industry Group Co Ltd	China
Ocean energy	BioTherm Energy	South Africa
Ocean energy	Blue Energy Canada	Canada
Ocean energy	Minesto	Sweden
Ocean energy	Nova Innovation	United Kingdom
Ocean energy	Ocean Renewable Power	United States
Ocean energy	Sabella	France
Ocean energy	SIMEC Atlantis (formerly Atlantis Resources Corporation)	Scotland
Ocean energy	Sowitec	Germany
Ocean energy	Tocardo	Netherlands
Oil & Gas	Abu Dhabi National Oil Company (ADNOC)	UAE
Oil & Gas	Antero Resources Corporation	USA
Oil & Gas	APA Corporation	USA

Sector	Company	Country
Oil & Gas	Ascent Resources LLC	USA
Oil & Gas	Basra Oil Company	Iraq
Oil & Gas	BP plc	UK
Oil & Gas	Cabot Oil & Gas Corporation	USA
Oil & Gas	Canadian Natural Resources Ltd (CNRL)	Canada
Oil & Gas	Cenovus Energy Inc	Canada
Oil & Gas	Chesapeake Energy Corporation	USA
Oil & Gas	Chevron Corporation	USA
Oil & Gas	China National Offshore Oil Corporation (CNOOC)	China
Oil & Gas	China National Petroleum Corporation (CNPC)	China
Oil & Gas	China Petrochemical Corporation (Sinopec Group)	China
Oil & Gas	China Petroleum & Chemical Corporation (Sinopec Corp)	China
Oil & Gas	Concho Resources Inc	USA
Oil & Gas	ConocoPhillips	USA
Oil & Gas	Continental Resources Inc	USA
Oil & Gas	Devon Energy Corporation	USA
Oil & Gas	Diamondback Energy Inc	USA
Oil & Gas	Ecopetrol SA	Colombia
Oil & Gas	Eni SpA	Italy
Oil & Gas	EOG Resources Inc	USA
Oil & Gas	EQT Corporation	USA
Oil & Gas	Equinor ASA	Norway
Oil & Gas	Exxon Mobil Corporation	USA
Oil & Gas	Gazprom	Russia
Oil & Gas	Hess Corporation	USA
Oil & Gas	Inpex Corporation	Japan
Oil & Gas	JSC Uzbekneftegaz	Uzbekistan
Oil & Gas	Kuwait Petroleum Corporation (KPC)	Kuwait
Oil & Gas	Lukoil	Russia
Oil & Gas	Mamoura Diversified Global Holding PJSC	UAE
Oil & Gas	Marathon Oil Corporation	USA
Oil & Gas	National Iranian Oil Company (NIOC)	Iran
Oil & Gas	Nigerian National Petroleum Corporation (NNPC)	Nigeria
Oil & Gas	North Oil Company (Iraq)	Iraq
Oil & Gas	Occidental Petroleum Corporation	USA

Sector	Company	Country
Oil & Gas	Oil and Natural Gas Corporation Ltd (ONGC)	India
Oil & Gas	OMV AG	Austria
Oil & Gas	OQ SAOC	Oman
Oil & Gas	Ovintiv Inc	USA
Oil & Gas	PAO NOVATEK	Russia
Oil & Gas	Pertamina (Persero)	Indonesia
Oil & Gas	Petoro AS	Norway
Oil & Gas	PetroAmazonas EP	Ecuador
Oil & Gas	PetroChina Company Ltd	China
Oil & Gas	Petroleo Brasileiro SA – Petrobras	Brazil
Oil & Gas	Petroleos de Venezuela SA (PDVSA)	Venezuela
Oil & Gas	Petroleos Mexicanos (PEMEX)	Mexico
Oil & Gas	Petroliam Nasional Berhad (Petronas)	Malaysia
Oil & Gas	Pioneer Natural Resources Company	USA
Oil & Gas	PTT Exploration and Production Public Company Ltd (PTTEP)	Thailand
Oil & Gas	Qatar Petroleum	Qatar
Oil & Gas	Range Resources Corporation	USA
Oil & Gas	Repsol SA	Spain
Oil & Gas	Rosneft Oil Company	Russia
Oil & Gas	Royal Dutch Shell plc	Netherlands
Oil & Gas	Saudi Arabian Oil Company (Saudi Aramco)	Saudi Arabia
Oil & Gas	Sonatrach SpA	Algeria
Oil & Gas	Southwestern Energy Company	USA
Oil & Gas	State Oil Company of the Azerbaijan Republic (SOCAR)	Azerbaijan
Oil & Gas	Suncor Energy Inc	Canada
Oil & Gas	Surgutneftegas PJSC	Russia
Oil & Gas	Tatneft	Russia
Oil & Gas	Total SE	France
Oil & Gas	Turkmengaz State Concern	Turkmenistan
Oil & Gas	Wintershall Dea GmbH	Germany
Oil & Gas	YPF SA	Argentinia
Oil Field Service	Baker Hughes	
Oil Field Service	Halliburton	
Oil Field Service	Helmerich & Payne	
Oil Field Service	Patterson-UTI Energy	United States
Oil Field Service	Schlumberger	
Oil Field Service	Transocean	

Sector	Company	Country
Pipelines	Bangladesh Petroleum	Bangladesh
Pipelines	Canada Development Investment Corporation	Canada
Pipelines	China National Petroleum Corporation	China
Pipelines	Eagle Spirit Energy Holdings	Canada
Pipelines	Enbridge	Canada
Pipelines	Energy Transfer	
Pipelines	Enterprise Products Partners	
Pipelines	Gazprom	Russia
Pipelines	Gaz-System	Poland
Pipelines	Gujarat State Petronet	
Pipelines	Indian Oil Corporation	India
Pipelines	Jemena	China
Pipelines	Kinder Morgan	United States
Pipelines	Magellan Midstream Partners	United States
Pipelines	Moroccan National Board of Hydrocarbons and Mines	Morocco
Pipelines	MPLX	
Pipelines	Nigerian National Petroleum Corporation	Nigeria
Pipelines	Oil and Natural Gas Corporation	India
Pipelines	ONEOK	United States
Pipelines	Pembina Pipeline	Canada
Pipelines	Petrobras	Brazil
Pipelines	Phillips 66	United States
Pipelines	PipeChina	China
Pipelines	Plains All American Pipeline	United States
Pipelines	Sinopec	China
Pipelines	Sonatrach	Algeria
Pipelines	Tallgrass Energy	United States
Pipelines	TC Energy	Canada
Pipelines	Total	France
Pipelines	Transgaz	Romania
Pipelines	Transnet	South Africa
Pipelines	Turkmengaz	Turkmenistan
Pipelines	Williams Companies	United States
Power generation	Chubu Electric Power	Japan
Power generation	Chugoku Electric Power Company	Japan
Power generation	Hokkaido Electric Power Company	Japan
Power generation	Hokuriku Electric Power Company	Japan

Sector	Company	Country
Power generation	JERA	Japan
Power generation	Kansai Electric Power Company	Japan
Power generation	Kyushu Electric Power	Japan
Power generation	Okinawa Electric Power Company	Japan
Power generation	Shikoku Electric Power	Japan
Power generation	Tohoku Electric Power	Japan
Power generation	Tokyo Electric Power Company	Japan
Solar Panel CSP	Abengoa	Spain
Solar Panel CSP	Acciona	Spain
Solar Panel CSP	Brightsource	Israel
Solar Panel CSP	China Shipbuilding New Power Company	China
Solar Panel CSP	General Electric	United States
Solar Panel CSP	Sener	Spain
Solar Panel CSP	Shanghai Electric	China
Solar Panel PV	Aiko Solar	China
Solar Panel PV	Canadian Solar	Canada/China
Solar Panel PV	First Solar	United States
Solar Panel PV	Hanwha Q-Cells	Republic of Korea
Solar Panel PV	JA Solar	China
Solar Panel PV	Jinko Solar	China
Solar Panel PV	LONGi	China
Solar Panel PV	Tongwei	China
Solar Panel PV	Trina Solar	China (or US acc to Mints))
Solar Panel PV	UREC	Taiwan
Solar Panel PV	Kyocera	Japan
Solar Panel PV	Sharp	Japan
Wind Turbines	Dongfang	China
Wind Turbines	Enercon	Germany
Wind Turbines	Envision	China
Wind Turbines	GE Renewable Energy	United States
Wind Turbines	Goldwind	China
Wind Turbines	Ming Yang	China
Wind Turbines	Nordex-Acciona	Germany
Wind Turbines	Siemens Gamesa	Spain
Wind Turbines	Vestas	Denmark
Wind Turbines	Windey	China

3 Coal, oil & gas, nuclear and renewable energy in the portfolios

The research analysed the financing and investment amounts flowing from the financial institutions to coal, oil & gas, nuclear energy and renewable energy in the past five years (January 2016 – June 2021). This analysis assessed which percentage of the energy financings and investments by banks and insurance companies is funding each type of energy.

3.1 Classification of energy sources

As a first step, this section provides an overview of the approach behind the selection of the energy sources compared in this study. Section 3.1.1 explains which energy sources are selected for this study as they are considered either as c*oal, oil & gas, nuclear* or *renewable energy*. Section 3.1.2 details which energy sources are seen as *Other energy sources*, which means that loans to, and investments in, companies active in producing or converting these energy sources are not taken into account in this research project.

3.1.1 Selected energy sources

According to the United Nations Framework Convention on Climate Change (UNFCCC), in 2016 81% of all GHG emissions (excluding land-use, land use change and forestry, LULUCF)[1] were attributable to the use of energy. Within this sector, 36% of GHG emissions originated from power generation, 26% from transport, 14% from manufacturing industries and construction, 12% from other sectors, 10% from fugitive emissions from the production of fuels and 2% from other sources not specified.[2]

As of 2016, electricity and heat generation accounted for 36% of total GHG emissions in the energy sector, and 29% of total GHG emissions (excluding LULUCF) for countries party to the UNFCCC. As such, power generation constitutes the core sector of this research. This study further focuses on sectors that can be considered as inputs for power generation and/or for energy used in transport, manufacturing industries and construction, and fugitive emissions from the production of fuels. Together these sectors are relevant for more than 60% of GHG emissions attributable to energy use and 49% of total global GHG emissions.[3]

The following paragraphs further explain which sectors and energy sources were selected as c*oal, oil & gas, nuclear* or *renewable energy*.

- **Electricity generation**

  Electricity can be generated through various sources. Not all sources of electricity generation emit GHGs. Electricity generation sources include, but are not limited to, the following:

  - Biomass
  - Coal
  - Gas
  - Geothermal energy
  - Hydro electricity
  - Nuclear energy
  - Ocean energy
  - Oil
  - Solar
  - Wind

  A growing number of electricity generation companies are diversifying the composition of their generating capacities across different energy sources. This is stimulated by various factors, such as the increasing awareness of climate change issues, the rapidly declining costs of renewable energy and other market dynamics, consumer and shareholder pressure and government incentives and regulations.

From the sourcing of materials or fuels, to construction, to operation and waste management, different electricity generation technologies emit different levels of GHG. When emissions of all these processes are taken together, they are known as the life-cycle emissions of a certain electricity generation technology. In the context of its fifth assessment report on climate change mitigation, Working Group III of the IPCC assessed different electricity generation technologies and developed an overview of the life-cycle emissions, as shown in Table 3. The GHG emissions are expressed in grams of CO_2-equivalent, comparing their climate change impact per gram to that of CO_2. The grams of CO_2-equivalent emitted per kiloWatthour produced are then calculated (gCO_2eq/kWh).

There has been some debate regarding steps in the life-cycles of some technologies not being included, and that technological advances that occurred while IPCC was conducting its study have also not been included. Alternative evaluations of life-cycle emissions also exist. However, the IPCC assessment is currently the most comprehensive. It is therefore the basis for our assessment of different sectors and energy sources in this research project.

Table 3 Life-cycle emissions of electricity generation technologies (gCO_2eq/kWh)

Current commercially available technology	Minimum	Median	Maximum
Coal - pulverized coal	740	820	910
Gas - combined cycle	410	490	650
Biomass - co-firing	620	740	890
Biomass - dedicated	130	230	420
Geothermal	6	38	79
Hydropower	1	24	2,200
Nuclear	3.7	12	110
Concentrated Solar Power (CSP)	8.8	27	63
Solar PV – rooftop	26	41	60
Solar PV – large-scale projects	18	48	180
Wind onshore	7	11	56
Wind offshore	8	12	35

Source: Intergovernmental Panel on Climate Change (2015, February), Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, New York: Cambridge University Press, p. 1,335.

Table 4 provides an overview of the electricity generation technologies that this research considers as *Renewable Energy*, because of median life-cycle emissions of below 50 grams of CO_2 equivalent per kilowatt hour, and which are considered as *Fossil Fuels*. It further provides an overview of other electricity generation technologies, which are not included in either of these two categories (explained further in section 3.1.2).

Table 4 Classification of electricity generation technologies

Coal	Oil & Gas	Nuclear	Renewable	Other
Coal - pulverized coal	Gas - combined cycle	Nuclear power	Geothermal Concentrated solar power (CSP) Solar PV - rooftop Solar PV - power generation	Biomass - co-firing Biomass - dedicated Hydropower

			Wind onshore Wind offshore Ocean and tidal energy	

- **Coal mining**

  Coal is used as an input for power generation, which accounts for 36% of all GHG emissions in the energy sector, and 29% of total GHG emissions in 2016 for countries party to the UNFCCC.[4] Coal is also used as input for other industrial processes. The most significant other uses of coal are in steel production, cement manufacturing and liquid fuel. As such its impact on GHG emissions is far greater than simply as an input in power generation.

  As Table 3 shows, coal used for electricity has a median life-cycle GHG emission of 820 grams of CO_2 equivalent per kilowatt hour. Coal mining can also have negative impact on the environment through damage to ecosystems, deforestation, and pollution. Additionally, coal mining can also have negative impacts on communities, including land grabs, loss of livelihoods, and forced displacement.

- **Oil and gas production and refining**

  Oil and gas are used in both the transport and the power generation sectors. Together, these sectors accounted for 62% of GHG emissions in the energy sector, and 51% of total GHG emissions.[5] Oil and gas are also used as energy sources in many other sectors and as inputs for other chemical processes.

  As shown in Table 3, gas as an input for electricity generation has a median life-cycle GHG emission of 490 grams of CO_2 equivalent per kilowatt hour. While this is lower than coal, it is still well above the threshold of this study of 50 grams of CO_2 equivalent per kilowatt hour. Furthermore, oil and gas extraction can have negative impacts on the environment through damage to ecosystems, deforestation, and pollution. Additionally, oil and gas extraction can also have negative impacts on communities including land grabs, loss of livelihoods, earthquakes, and forced displacement.

  A report published at the end of 2020 by the United Nations Environmental Programme (UNEP), came to the conclusion that “to follow a 1.5°C-consistent pathway, the world will need to decrease fossil fuel production by roughly 6% per year between 2020 and 2030. (…) Global coal, oil, and gas production would have to decline annually by 11%, 4%, and 3%, respectively, to be consistent with a 1.5°C pathway.”.[6]

- **Nuclear energy**

  Nuclear energy is seen by some as a sustainable source of energy because its energy generation is seen as low-carbon. It produces relatively insignificant amounts of GHGs, is comparatively cheap to run, and is a stable source of energy. However, many controversies surround nuclear power.

  Recent studies suggest that as uranium ore grades decrease, fossil fuel inputs in the nuclear fuel cycle will increase. As such, within a few decades, the GHG emissions in the nuclear fuel cycle will be similar to that of traditional coal-fired or gas-fired power plants.

  Further risks include the risks and environmental damage from uranium mining, processing and transport, the risk of nuclear weapons proliferation, the unsolved problem of nuclear waste and, although many countries have a good track record, the potential hazard of a serious accident.

As shown in Table 3, current estimations suggest that nuclear energy has a median life-cycle GHG emission of 12 grams of CO_2 equivalent per kilowatt hour. However, there are potential negative impacts, and the consensus among FFG coalition partners that nuclear power is not a viable alternative to traditional fossil fuels.

- **Solar energy**

  Solar energy is a renewable source of energy. Solar energy can be derived from solar photovoltaic panels and from concentrating solar thermal energy. Different sources of solar electricity have different levels of GHG emissions (see Table 3). Concentrated solar energy has a median life-cycle GHG emission of 27 grams of CO_2 equivalent per kilowatt hour. Large-scale solar PV has a median life-cycle GHG emission of 48 grams of CO_2 equivalent per kilowatt hour. Rooftop solar PV has a median life-cycle GHG emission of 41 grams of CO_2 equivalent per kilowatt hour.

  The mining of minerals needed to produced solar cells is regularly linked to human rights' infringements and the process of manufacturing photovoltaic cells can include the use of toxic chemicals. In addition, the production process is linked to potential issues identified generally in the production of most electronic goods. Given that the assumption that the potential impact is less than the overall benefit produced, and that solar energy equipment manufacturing has low life-cycle emissions, this sector is included in this study.

- **Wind energy**

  Wind energy is a renewable source of energy, but different sources of wind generated electricity have different levels of GHG emissions (see Table 3). Onshore wind energy has a median life-cycle GHG emission of 11 grams of CO_2 equivalent per kilowatt hour. While offshore wind energy has a median life-cycle GHG emission of 12 grams of CO_2 equivalent per kilowatt hour.

  A point of attention is that the mining of minerals needed to produced wind energy is regularly linked to human rights' infringements.

- **Geothermal energy**

  Geothermal energy is a renewable source of energy. As demonstrated in Table 3, geothermal energy has a median life-cycle GHG emission of 38 grams of CO_2 equivalent per kilowatt hour.

- **Ocean energy**

  Ocean energy is an emerging energy sector. Both tidal stream generators and barrage tidal energy are methods to capture ocean energy. Tidal stream generators function similarly to wind turbines as they capture the incoming and outgoing stream of energy from tides. Barrage tidal energy is similar to hydroelectric dams, as structures are built across bays and estuaries to force tidal energy through turbines situated in the barrage.

  As with hydro power, the impact on the environment, particularly on natural ecosystems, is potentially significant. Nevertheless, a review on studies on the life-cycle GHG emissions of ocean energy estimates that the median is around 17 grams of CO_2 equivalent per kilowatt hour (gCO_2/kWh) and could be as low as 8 gCO_2/kWh.[7] Given these results and the technical potential of this energy source as an alternative source of energy, ocean energy has been included in this study as *Renewable Energy*.

3.1.2 Other energy sectors

Apart from the *coal, oil & gas, nuclear* and *renewable* energy sources defined in section 3.1.1, two sources of energy are not taken in consideration in this research project: hydropower and bio-energy. These sources of energy are not considered viable alternatives to fossil fuels for energy used in power generation and transport as they are considered to have a high impact on the

environment or because there is limited consensus on the impact level of these energy sources. This section further discusses these two other energy sources and the rationale not to include them in this research project.

- **Hydropower**

  Hydropower is often considered a sustainable source of energy, because it is thought to emit less GHG than traditional fossil fuels. However, hydropower is often controversial. Hydropower projects, both large and small, have a significant impact on the environment, altering habitats, as well as having a potentially great impact on communities and their socioeconomic conditions. Communities are often displaced without (or with inadequate) compensation, and livelihoods are lost. It is therefore not sustainable in the social and economic sense of the word, and does not respect human rights, in all contexts.

  The GHG emissions caused by hydropower also vary widely and are sometimes even As Table 3 demonstrates, hydropower has a median life-cycle GHG emission of 24 grams of CO_2 equivalent per kilowatt hour, which is quite low. However, hydropower also has a maximum life-cycle GHG emission of 2,200 grams of CO_2 equivalent per kilowatt hour. This is more than double the maximum life-cycle GHG emission of pulverized coal. Such high levels of life-cycle GHG emission per kilowatt hour are generally reached by large-scale hydropower, caused by the methane emissions of the decaying vegetation.

  Small-scale run-of-the-river hydro power is seen as having fewer negative social and environmental impacts than large-scale hydropower. However, different countries and organizations use different minimum thresholds to differentiate between small-scale and large-scale hydropower. Table 5 provides an overview of the different definitions of small-scale hydropower.

Table 5 Country definitions of small-scale hydropower

Country	Threshold (MW)
Brazil	≤ 30
Canada	< 50
China	≤ 50
European Union	≤ 20
India	≤ 25
Norway	≤ 10
Sweden	≤ 1.5
United States	5-100
WWF	< 15

Source: Kumar, A., T. Schei, A. Ahenkorah, et al. (2011), "Hydropower", in O. Edenhofer, R. Pichs-Madruga, et al. (eds), *IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation*, Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press, p. 450; WWF (2003), *Hydropower in a Changing World*, p.3.

Many other factors influence the amounts emitted, depending on the geographical location, the age of the reservoir, external inputs of carbon and nutrients, and characteristics of the reservoir such as water flow, turnover time, area, depth, water level fluctuations and the positioning of the turbines and spillways. Dams in tropical areas for example emit more methane than do those in temperate or boreal areas.[8] Experts also suggest that the environmental impact per megawatt (MW) is dependent on the measures taken to mitigate the negative impact. It is beyond the scope of this research to investigate the impact per MW of each hydropower plant in the power generation portfolios of all selected power generation companies for the period under study. Moreover, as there is no consensus on the definition of small-scale hydropower, it was decided that hydropower would not be included in this study.

- **Bio-energy**

  Biomass energy and biofuels are derived from various sources. The term refers to biological matter that can be used as energy source for electricity generation and transport. The biological can range from wood to edible crops to algae and other sources. Biomass can be burned directly, or can be turned into fuels by gasification, pyrolysis or anaerobic digestion.

  Biomass is regarded by some as a renewable energy source because the carbon in biomass is considered as part of the natural carbon cycle. This is because trees take in carbon dioxide from the atmosphere and convert it into biomass and when they die it is released back into the atmosphere. Whether trees are burned or whether they decompose naturally, the same amount of carbon dioxide is released. The idea is that if trees harvested as biomass are replanted as fast as the wood is burned, new trees take up the carbon produced by the combustion, the carbon cycle theoretically remains in balance, and no extra carbon is added to the atmospheric balance sheet. Therefore, biomass is considered by some as “carbon neutral.” Replacing fossil fuels with biomass is thought to result in reduced carbon emissions.

  However, whether or not biomass is truly carbon neutral depends on a number of factors:

  - what type of biomass is used,
  - the combustion technology,
  - which fossil fuel is being replaced, and
  - what forest management techniques are employed where the biomass is harvested.

  Combustion of biomass and fossil fuels both produce carbon dioxide. When annual crops and other short-term biomass are burned, the carbon generated can generally be absorbed by the growing of new plants. However, when the biomass comes from wood and trees, the re-growing and thus the recapture of carbon take years or decades, and the carbon equation would need to take into consideration the carbon that the trees would have naturally stored if left untouched. This is particularly problematic as the majority of existing biomass power plants currently use wood residue.

  Furthermore, as with biofuels, described below, biomass is affected by a number of social and environmental issues. As described above, biomass can include agricultural waste, production forest wood chips, and wood pellets, among other things. Issues generally tend to arise when wood is being cultivated in order to produce wood pellets. There are numerous reports of forest destruction (also leading to CO_2 emissions) for monoculture development, as well as of land grab and loss of livelihoods related to such developments.

  Another form of bio energy is biofuels. Biofuels can come in different forms, including ethanol and biodiesel. They are derived from different feed stocks including sugar beets, sugar cane, soy, palm oil, wheat, corn, and jatropha. However, the biofuels sector is afflicted by numerous controversies. Again, there are significant concerns including issues regarding food security, deforestation, legality of operations, human rights and labour issues, community displacement and land grabs, loss of livelihoods, the impact of monoculture on ecosystems, and soil degradation.

Due to these controversial issues regarding biomass and biofuels, bio energy is not a clear-cut viable alternative to traditional fossil fuels. It is therefore not included in this study.

3.1.3 Final selection of energy sources

Table 6 presents the final categorisation of activities related to *coal, oil & gas, nuclear* and *renewable energy* selected for the purpose of this study. Based on the discussion in section 3.1.2, other sources of energy are not taken into account in this study.

Table 6 Activities related to coal, oil & gas, nuclear and renewable energy

Coal	Oil & Gas	Nuclear	Renewable Energy
Coal-fired power generation	Gas-fired power generation	Nuclear power	Geothermal energy equipment manufacturing
Coal mining	Gas production and refining		Geothermal energy generation
	Oil-fired power generation		Ocean energy engineering
	Oil production and refining		Ocean energy generation
	Oilfield services		Solar energy generation
	Pipelines		Solar panel manufacturing (PV and CSP)
			Wind power generation
			Wind turbine manufacturing

3.2 Analysing the activities of the energy companies

For each of the companies selected, we analysed which proportion of their activities can be attributed to coal, oil & gas, nuclear and renewable energy, and to other activities inside and outside the energy sector. Using these *segment adjusters* made it possible to attribute a percentage of each loan to, and each investment in, the selected companies to coal, oil & gas, nuclear and renewable energy. A general corporate loan to a power company, or an investment in the shares of that same company, can be used by the power company to finance all types of activities it is involved in. For general corporate loans and investments provided to companies active in more than one segment, the segment adjusters therefore are used to attribute the financing and investment amounts to the different activities in which the energy company is involved.

Due to a lack of data availability, segment adjusters were calculated in the same way for each company. Preferably, data on the annual capital expenditure (capex) per sector or segment in which the company is active were used. These data are also referred to as the annual addition to non-current assets per sector/segment.

For some companies, capex-data per segment are not available, or the segment classification used by the company is too broad to distinguish between the activities listed in Table 6. In these cases, the following proxies were used in order of preference:

- for electricity companies: the installed electricity generation capacity broken down by energy source;
- segment distribution of assets;
- segment distribution of costs;
- segment distribution of profits;
- an estimate based on the description of the company's activities.

The segment distribution of capex, assets, costs and/or revenues were primarily identified through annual reports, company filings and investor presentations. Segment adjusters were calculated separately for each of the last five years (January 2016-June 2021).

3.3 Researching the financing of the energy companies

In this research step, data was be gathered on the financing of, and investments in, the selected companies (see section 3.1) by the selected banks, insurers and pension funds (see Table 1). This research focused on the last five years, from January 1, 2016 until June 30, 2021.

Sources used for banks and insurers include the Bloomberg, Thomson EIKON (part of Refinitiv), Orbis, IJGlobal and TradeFinanceAnalytics databases; annual reports and stock exchange filings of companies; company registers and media sources. All amounts found were converted, where necessary, to USD against the prevailing exchange rates at the moment the financing was provided or the investment was reported.

From these data sources, the following data was retrieved for different forms of financing and investments:

- All loans (trade finance, project finance, general corporate loans, revolving credits) provided in the last five years (since 1 January 2016) were taken into account;
- All underwritings of share and bond issuances in the last five years (since 1 January 2016) were taken into account;
- For investments in shares and bonds, the outstanding values at the most recent portfolio data were considered. No distinction was made between investments for own account and asset management for third parties.

For syndicated loans and underwriting syndicates some extra estimates were needed to divide the so-called *principal amount* among all banks participating in the syndicate. The names and roles of all banks that participate in the syndicate are usually found in the data sources. When the actual amounts for which banks participated in the syndicate were also available, this break-down was obviously used and no further estimates were needed.

If there were no data available on how the principal amount was divided among the various banks participating in the syndicate, an estimate was made based on the following guidelines:

- When the fees received per bank were known, the ratio of a bank's management fee was used to estimate its financial contribution to the loan or issuance. This was calculated as follows:

$$\text{Bank's contribution: } \left(\frac{individual\,bank's\,fee}{\sum of\,all\,banks'\,fees} * principal\,amount\right)$$

- When the fees were unknown for one or more participants in a deal, we first calculated the *bookratio* to determine how the principal amount was divided between the *bookrunners* (the banks arranging the deal) and the other banks participating more passively in the syndicate. The *bookratio* was calculated as follows:

$$\textit{Bookratio}: \frac{number\,of\,banks - number\,of\,bookrunners}{number\,of\,bookrunners}$$

  Table 7 shows which share of the principal amount was then divided to the bookrunners, depending on the bookratio calculated. This table is based on experience gained by Profundo over the years with analysing thousands of loan and issuance syndicates for which the contribution of individual banks were known. Experience learns that for loan syndicates, the share of the principal amount that is divided between the bookrunners decreases when the total number of banks in the syndicate increases. For issuance syndicates this is not the case.

Table 7 Contributions assigned to the bookrunners in loan and issuance syndicates

Bookratio	Loans	Issuances
> 1/3	75%	75%

> 2/3	60%	75%
> 1.5	40%	75%
> 3.0	< 40%*	< 75%*

For loan and issuance syndicates with a bookratio of more than 3.0, we use a formula which gradually lowers the commitment assigned to the bookrunners as the bookratio increases. The formula used for this was:

$$\frac{1}{\frac{\sqrt{bookratio}}{1.443375673}}$$

The number in the denominator is used to let the formula start at 40% in case of a bookratio of 3.0. As the bookratio increases the formula will go down from 40%. For issuance syndicates the figure in the denominator is 0.769800358.

This research step resulted in an overview of the selected financial institutions, showing per bank and insurer with which companies from the selected list of companies they have financial links and for which amounts they financed, or invested in, these companies in the past five years (2016 - 2020).

3.4 Combining financings and investments with segment adjusters

The financing and investment data identified for each financial institution (see section 3.3) were then combined with the relevant segment adjusters (see section 3.2). For example, if we found that Oil Company A received a general corporate loan from Bank B for USD 100 million in 2019. During this financial year, 95% of Oil Company A's capex went to oil, 3% to wind power, and 2% to not relevant activities. USD 95 million were therefore attributed to oil & gas, USD 3 million to renewable energy, and USD 2 million would not be included in the analysis. The same calculation applies to an investment in shares or bonds of Oil Company A by Insurance company C or Bank D.

After making these calculations for all financings and investments found, the total amounts financed and invested by each bank or insurer can be added up, for *coal, oil & gas, nuclear* and renewable activities. As all financing attributable to other energy activities as well as to non-energy sectors is ignored, the total financing analysed for each financial institution is usually lower than the actual financing provided to the selected companies as found in section 3.3.

References

1 LULUCF refers to GHG emissions from land-use, land use change and forestry. More information on the definition and inclusion of LULUCF in GHG emission calculations can be found here: https://unfccc.int/land_use_and_climate_change/lulucf/items/1084.php, viewed in February 2021.

2 United Nations Framework Convention on Climate Change (n.d.), "GHG Profiles – Annex I", online: http://di.unfccc.int/ghg_profile_annex1, viewed in February 2021.

3 United Nations Framework Convention on Climate Change (n.d.), "GHG Profiles – Annex I", online: http://di.unfccc.int/ghg_profile_annex1, viewed in February 2021.

4 United Nations Framework Convention on Climate Change (n.d.), "GHG Profiles – Annex I", online: http://di.unfccc.int/ghg_profile_annex1, viewed in February 2021.

5 United Nations Framework Convention on Climate Change (n.d.), "GHG Profiles – Annex I", online: http://di.unfccc.int/ghg_profile_annex1, viewed in February 2021.

6 SEI, IISD, ODI, E3G, and UNEP (2020), "The Production Gap Report: 2020 Special Report", online: http://productiongap.org/2020report, viewed in February 2021.

7 Intergovernmental Panel on Climate Change (2015, February), "Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change", New York: Cambridge University Press, p. 539-540;

Lewis, S. Estefen, et al. (2011). "Ocean Energy," in: IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation. Prepared by Working Group III of the Intergovernmental Panel on Climate Change [O. Edenhofer, R. Pichs-Madruga, et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, p. 518.

8 Fearnside, P.M. (2016, April), "Greenhouse gas emissions from hydroelectric dams in tropical forests". in: *Alternative Energy and Shale Gas Encyclopedia,* [J. Lehr & J. Keeley (eds.)], John Wiley & Sons Publishers, New York, USA, pp. 428-438.