

Appendix 1

List of Carbon Bombs

Name (* new project) Fuel GtCO2

Algeria
 *Tannezuft Shale Oil&Gas 2.3
 Hassi R'Mel (Domestic) Oil&Gas 2.3
 Hassi Messaoud Oil&Gas 1.2

Argentina
 Vaca Muerta Shale Oil&Gas 5.2

Australia
 *Red Hill Coal Project Coal 4.6
 *Goldwyer Shale Oil&Gas 4.5
 Loy Yang Coal Mine Coal 3.1
 *Wards Well Coal Mine Coal 2.7
 *Alpha North Coal Mine Coal 2.5
 Peak Downs Coal Mine Coal 2.3
 Goonyella-Riverside Coal Mine Coal 2.2
 *Carmichael Coal Project Coal 2.1
 *Valeria Coal Mine Coal 2.0
 *Wilton and Fairhill Coal Projects Coal 1.9
 Gorgon LNG T1-T3 Oil&Gas 1.9
 Byerwen Coal Mine Coal 1.8
 *Galilee Coal Mine Coal 1.8
 Hunter Valley North Coal Mine Coal 1.7
 *Hutton Coal Mine Coal 1.7
 *Olive Downs Coal Mine Coal 1.4
 *Saraji East Coal Mine Coal 1.3
 Ensham Coal Mine Coal 1.3
 Hunter Valley South Coal Mine Coal 1.2
 *Velkerri Shale Oil&Gas 1.1
 Yallourn Coal 1.1
 Mount Pleasant Coal Mine Coal 1.1
 Blackwater Coal Mine Coal 1.0

Azerbaijan
 ACG (Azeri-Chirag-Guneshli Deep Water) Oil&Gas 1.7

Bahrain
 *Central Arabian Offshore Oil&Gas 1.4

Bangladesh
 *Phulbari Coal Mine Coal 1.4

Botswana
 *Project Motheo Coal 2.2

Brazil
 *Santos Offshore Oil&Gas 4.3
 *Llandovery Shale Oil&Gas 4.3
 Buzios (x-Franco) Oil&Gas 3.6
 *Irati Shale Oil&Gas 2.7
 Lula (X-Tupi) Oil&Gas 2.5
 *Parnaiba Onshore Oil&Gas 2.0
 *Libra Oil&Gas 1.9
 *Candeias Shale Oil&Gas 1.6
 *Campos Offshore Oil&Gas 1.6
 Mero (Libra NW) Oil&Gas 1.3

Bulgaria
 Maritsa Coal Mines Coal 2.5

Canada
 Montney Play Oil&Gas 13.7
 Murray River Coal Mine Coal 8.5
 Spirit River (Notikewin, Falher, Wilrich) Oil&Gas 3.0
 Gething Coal Mine Coal 2.1
 Horizon Oil Sands Project Oil&Gas 2.0
 Kearl Oil&Gas 1.9
 Duvernay Oil&Gas 1.9
 Athabasca Oil Sands Project Oil&Gas 1.4
 Christina Lake Oil&Gas 1.2
 Liard Shale Oil&Gas 1.2
 Syncrude Mildred Lake/Aurora Oil&Gas 1.2
 Fording River Coal 1.0

China
 Tashan Coal Mine Coal 9.0
 Hongshaquan No.1 Coal Mine Coal 9.0
 *Dahaize Coal Mine Coal 8.0
 *Jiangjun Gebi No.2 Coal Mine Coal 7.8
 Dananhu No.1 Coal Mine Coal 7.2
 *Balasu Coal Mine Coal 6.4
 Hongqinghe Coal Mine Coal 5.7
 Longmaxi Shale Oil&Gas 5.7
 *Baijia Haizi Coal Mine Coal 5.0
 Changqing Oil&Gas 4.9
 Xiaojihan Coal Mine Coal 4.6
 Shengli East No.2 Coal Mine Coal 4.6
 Buertai Coal Mine Coal 4.5
 *Xinwen Ii No.1 Coal Mine Coal 4.5
 Chahasu Coal Mine Coal 4.2
 Ningtiaota Coal Mine Coal 4.0
 Hulusu Coal Mine Coal 4.0

*Shilawusu Coal Mine Coal 3.9
 Jinjie Coal Mine Coal 3.9
 Xiaobaodang No.1 Coal Mine Coal 3.8
 *Yingpanhao Coal Mine Coal 3.8
 Menkeqing Coal Mine Coal 3.7
 *Dananhu No. 7 Coal Mine Coal 3.6
 *Zhundong Surface Mine Coal 3.5
 Meihuajing Coal Mine Coal 3.5
 *Qinghua No.7 Coal Mine Coal 3.4
 *Shaanxi Caojiatan Coal Mine Coal 3.3
 *Wucaiwan No.1 Coal Mine Coal 3.3
 Majialiang Coal Mine Coal 3.2
 Hongliulin Coal Mine Coal 3.1
 *Hetaoyu Coal Mine Coal 3.0
 *Taran Gaole Coal Mine Coal 2.9
 Ningxia Hongliu Coal Mine Coal 2.9
 *Dalaihushuo Coal Mine Coal 2.9
 Yushuwan Coal Mine Coal 2.8
 *Dananhu West No.2 Coal Mine Coal 2.7
 Wangjialing Coal Mine Coal 2.7
 Shenhua Heidaigou Surface Coal Mine Coal 2.7
 Pingshuo East Coal Mine Coal 2.6
 Yili No.4 Coal Mine Coal 2.6
 Daqing Oil&Gas 2.6
 *Shitoumei No.1 Coal Mine Coal 2.4
 *Cambrian/Silurian Marine Shale Oil&Gas 2.4
 *Xinzhuan Coal Mine Coal 2.3
 Sandaogou Coal Mine Coal 2.3
 Huangyuchuan Coal Mine Coal 2.3
 *Inner Mongolia Erlintu Coal Mine Coal 2.2
 Shenhua Bulianta Coal Mine Coal 2.2
 Zhangji Coal Mine Coal 2.2
 *Jinjitai Coal Mine Coal 2.2
 *Pangpangta Coal Mine Coal 2.2
 *Guojiatan Coal Mine Coal 2.2
 Dongzhouyao Coal Mine Coal 2.2
 Longmaxi Shale (Sichuan/Changyu) Oil&Gas 2.2
 Haerwusu Surface Mine Coal 2.1
 Suancangou Coal Mine Coal 2.1
 Yimin Surface Coal Mine Coal 2.0
 Guqiao Coal Mine Coal 2.0
 *Boli Coal Mine Coal 2.0
 Gaojialiang No.1 Coal Mine Coal 2.0
 Hongqingliang Coal Mine Coal 2.0
 Tarim (CNPC) Oil&Gas 2.0
 *Xiaobaodang No.2 Coal Mine Coal 1.9
 *Zhaoshipan Coal Mine Coal 1.9
 Longwanggou Coal Mine Coal 1.9
 Guojiawan Coal Mine Coal 1.9
 Gaotouyao Coal Mine Coal 1.9
 *Madaotou Coal Mine Coal 1.8
 Qingshuiying Coal Mine Coal 1.8
 Buliangou Coal Mine Coal 1.8
 Shanxi Lu'an Gucheng Coal Mine Coal 1.8
 Shangwan Coal Mine Coal 1.8

Hanglaiwan Coal Mine Coal 1.8
 Xiaojiawa Coal Mine Coal 1.8
 *Southeast Uplift Onshore Heilongjiang Province Oil&Gas 1.8
 *Chagannur No.1 Coal Mine Coal 1.7
 *Muduchaideng Coal Mine Coal 1.7
 *Qiyuan Coal Mine Coal 1.7
 Weijiamao Open Pit Mine Coal 1.7
 *Nalin River No.2 Coal Mine Coal 1.7
 Dingji Coal Mine Coal 1.7
 Baode Coal Mine Coal 1.7
 Wangjiata Coal Mine Coal 1.6
 Wudong Coal Mine Coal 1.6
 *Shengli No.1 Open-Pit Coal Mine Coal 1.6
 Baiyinhu No.3 Surface Mine Coal 1.6
 Tongxin Coal Mine Coal 1.6
 Shenhua Baorixile Surface Coal Mine Coal 1.6
 Sijiazhuang Coal Mine Coal 1.6
 Gaohe Coal Mine Coal 1.5
 Xiwan Surface Coal Mine Coal 1.5
 Liuzhuang Coal Mine Coal 1.5
 *Yadian Coal Mine Coal 1.5
 Lijiahao Coal Mine Coal 1.5
 Shicaocun Coal Mine Coal 1.5
 Shengli Oil&Gas 1.5
 Shangyuquan Coal Mine Coal 1.4
 Qingchunta Coal Mine Coal 1.4
 *Taohe Coal Mine Coal 1.4
 Xiaozhuang Coal Mine Coal 1.4
 Wucaiwan No.1 Surface Mine Coal 1.4
 Shaqu No.1 Coal Mine Coal 1.4
 *Sanjiao No.1 Coal Mine Coal 1.4
 *Zhong Yu Coal Mine Coal 1.4
 *Mengcun Coal Mine Coal 1.4
 Huangling No.2 Coal Mine Coal 1.4
 Dafosi Coal Mine Coal 1.4
 Oil shale China Oil&Gas 1.4
 Xinjiang (CNPC) Oil&Gas 1.4
 Zhangjiamao Coal Mine Coal 1.3
 Talahao Coal Mine Coal 1.3
 Baishihu Surface Mine Coal 1.3
 Halagou Coal Mine Coal 1.3
 *Wenjiazhuang Coal Mine Coal 1.3
 *Yuwang No.1 Coal Mine Coal 1.3
 *Baiyanghe Coal Mine Coal 1.2
 Yangquan No.1 Coal Mine Coal 1.2
 Daliuta Coal Mine Coal 1.2
 *Xinjiang Hongshan Coal Mine Coal 1.2
 Antaibao Surface Mine Coal 1.2
 Shahaiji No.1 Coal Mine Coal 1.2
 Shigetai Coal Mine Coal 1.2
 Fengjiata Coal Mine Coal 1.2
 Gaojiabao Coal Mine Coal 1.1
 Shajihai No.2 Coal Mine Coal 1.1
 *Taliike District No. 2 Coal Mine Coal 1.1

Huojiutu Well Of Daliuta Coal Mine	Coal	1.1
*Changcheng No.3 Coal Mine	Coal	1.1
Yangjiacun Coal Mine	Coal	1.1
Yangchangwan No.1 Well Coal Mine	Coal	1.1
*Wangwa Coal Mine	Coal	1.1
*Ba Leng Coal Mine	Coal	1.1
Zaoquan Coal Mine	Coal	1.1
Anjialing Open-Pit Mine	Coal	1.0
*Longwan Coal Mine	Coal	1.0
*Shanxi Dongda Coal Mine	Coal	1.0
Kouzi East Coal Mine	Coal	1.0
*Hongshuliang Coal Mine	Coal	1.0
*West Well of Faer Second Coal Mine	Coal	1.0
Sihe Coal Mine	Coal	1.0
*Central Uplift Onshore Xinjiang Uygur Autonomous Region	Oil&Gas	1.0

Colombia		
El Descanso Coal Mine	Coal	4.1
Cerrejón Coal Mine	Coal	2.4
*La Luna Shale	Oil&Gas	1.6
*San Juan Coal Mine	Coal	1.6
Pribbenow Coal Mine	Coal	1.4

Denmark		
*Kronprins Christian Offshore	Oil&Gas	2.2

Germany		
Hambach Coal Mine	Coal	1.7
Garzweiler Coal Mine	Coal	1.3

Greece		
West Macedonia Lignite Centre (WMLC)	Coal	2.2

Guyana		
*Greater Turbot (Stabroek)	Oil&Gas	1.1
Greater Liza (Liza)	Oil&Gas	1.0

India		
Rajmahal Coal Mine	Coal	5.8
Gevra Coal Mine	Coal	2.4
*Barail Shale	Oil&Gas	2.1
*Siarmal Coal Mine	Coal	1.9
*Kerandari BC	Coal	1.8
Talaipalli Coal Mine	Coal	1.5
Lakhanpur Coal Mine	Coal	1.5
*Integrated Belpahar, Lakhanpur, Lilari Coal Mine	Coal	1.5
*Bankui	Coal	1.6
*Balaram Coal Mine	Coal	1.4
*Gare Pelma Sector II	Coal	1.3
*Mandakini B	Coal	1.3
Kaniha Coal Mine	Coal	1.2
Dipka Coal Mine	Coal	1.2
Kusmunda Coal Mine	Coal	1.2

*Banhardih	Coal	1.1
*Saharpur Jamarpani	Coal	1.0
Moher Amlohri Coal Mine	Coal	1.0

Indonesia		
PTBA Coal Mines	Coal	8.9
KPC Operation Coal Mine	Coal	3.1
*East Natuna (x-Natuna D-Alpha)	Oil&Gas	2.2
*GAM Coal Mine	Coal	1.3
Indexim Coalindo Coal Mine	Coal	1.1
*Pakar North Coal Mine	Coal	1.1
Tutupan Coal Mine	Coal	1.1
MHU Coal Mine	Coal	1.1
BIB Coal Mine	Coal	1.1
Pasir Coal Mine	Coal	1.0

Israel		
*Leviathan	Oil&Gas	1.1

Iraq		
Rumaila North & South	Oil&Gas	7.8
Qurna West	Oil&Gas	4.0
Baghdad East	Oil&Gas	2.7
*Central Arabian Onshore	Oil&Gas	2.6
Majnoon	Oil&Gas	2.5
Zubair	Oil&Gas	1.7
Qurna West-2	Oil&Gas	1.6
Halfayah	Oil&Gas	1.4
Nahr bin Umar	Oil&Gas	1.3
Ratawi	Oil&Gas	1.1
Basrah Gas project	Oil&Gas	1.0

Iran		
Marun	Oil&Gas	2.4
Azadegan	Oil&Gas	2.3
Ahwaz Asmari	Oil&Gas	2.2
*Central Arabian Offshore	Oil&Gas	2.1
Gachsaran	Oil&Gas	1.7
Agha Jari	Oil&Gas	1.6
Ahwaz Bangestan	Oil&Gas	1.4
Pazanan	Oil&Gas	1.4
South Pars (Phases 9-10) dry gas	Oil&Gas	1.3
*Kish Gas Project	Oil&Gas	1.2
*Pars Southwest	Oil&Gas	1.1
South Pars (Phases 4-5) dry gas	Oil&Gas	1.1
Mansouri Bangestan	Oil&Gas	1.0
South Pars (Phases 22-24)	Oil&Gas	1.0
South Pars (Phases 20-21)	Oil&Gas	1.0
South Pars (Phases 2-3) dry gas	Oil&Gas	1.0

Kazakhstan		
Bogatyr Coal Mine	Coal	7.3
Kashagan	Oil&Gas	5.1
Tengiz	Oil&Gas	3.4
*Carboniferous Shale	Oil&Gas	1.3

Karachaganak	Oil&Gas	1.2
Borly Coal Mines	Coal	1.0
Shubarkol Coal Mine	Coal	1.0

Kuwait		
Greater Burgan	Oil&Gas	8.3
Project Kuwait	Oil&Gas	4.4
*Central Arabian Onshore	Oil&Gas	3.6
*Khafji	Oil&Gas	1.4 ¹

Libya		
*Sirte Shale	Oil&Gas	1.7
El Sharara	Oil&Gas	1.0

Mexico		
*Eagle Ford Shale	Oil&Gas	5.1
*Gulf Deepwater Offshore	Oil&Gas	2.2
Ku-Maloob-Zaap Project	Oil&Gas	2.0
*Yucatan Platform Offshore	Oil&Gas	1.0

Mongolia		
*Tavan Tolgoi Coal Mine	Coal	16.0

Mozambique		
*Zambezi Coal Mine	Coal	4.1
*Chirodzi Coal Mine	Coal	2.9
*Revuboe Coal Mine	Coal	1.4
*MZLNG Joint Development (T1-T2)	Oil&Gas	1.3
*Area-1 Future Phases	Oil&Gas	1.0
*Area 1 LNG (T1&T2)	Oil&Gas	1.0

Nigeria		
NLNG Base Project	Oil&Gas	1.0

North Korea		
Saebyoil Coal Mining Complex	Coal	3.2

Norway		
Troll	Oil&Gas	1.8
Johan Sverdrup	Oil&Gas	1.1

Pakistan		
*Sembar Shale	Oil&Gas	2.8
Thar Coal Mine	Coal	1.9

Poland		
*Lublin Basin Silurian Shale	Oil&Gas	5.6

Qatar		
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¹ This project is located in the Neutral Zone between Saudi-Arabia & Kuwait and is included in both country lists.

*North Field	Oil&Gas	11.6
*North Field C LNG	Oil&Gas	7.8
*North Field E	Oil&Gas	4.6
*QatarGas LNG T8-T11 (NFE-East)	Oil&Gas	3.4
*Barzan	Oil&Gas	3.1
*Central Arabian Onshore	Oil&Gas	2.2
Qatargas 2 LNG T4-T5	Oil&Gas	1.8
*QatarGas LNG T12-T13(NFE-South)	Oil&Gas	1.8
Dolphin	Oil&Gas	1.6
Rasgas 2 LNG T3-T5	Oil&Gas	1.5
Rasgas 3 LNG T6-T7	Oil&Gas	1.5
QatarGas 1 LNG T1-T3	Oil&Gas	1.3
Al Khaleej Gas project	Oil&Gas	1.1

Russia		
Bovanenkovo Zone (Yamal Megaproject)		
	Oil&Gas	11.2
Gazprom dobycha Yamburg	Oil&Gas	8.9
*Tunguska Basin CBM	Oil&Gas	8.8
*Shtokman	Oil&Gas	6.1
Urengoyskoye	Oil&Gas	5.2
*Kuznetsk Depression (Kuzbass) CBM	Oil&Gas	4.9
*Elga Coal Mine	Coal	4.5
Yuganskneftegaz	Oil&Gas	4.3
Eastern Gas Program	Oil&Gas	4.3
Stepnoy Coal Mine	Coal	3.6
*West Siberia Offshore	Oil&Gas	2.9
*Lensky Basin CBM	Oil&Gas	2.7
*Timan - Pechora Basin Offshore	Oil&Gas	2.5
*Tambey Zone (Yamal Megaproject)	Oil&Gas	2.5
*Timan - Pechora Basin Onshore	Oil&Gas	2.4
*Beisky-Zapadny Coal Mine	Coal	2.4
Raspadskaya Coal Mine	Coal	2.4
Listvianskaya Coal Mine	Coal	2.4
Elegest Coal Mine	Coal	2.3
Taldinsky Coal Mine	Coal	2.2
*Ulug-Khem Project	Coal	2.2
Samotlorneftegaz (TNK-BP)	Oil&Gas	1.9
*Sugodinsk-Ogodzhinsky Coal Mine	Coal	1.8
*Leningradskoye (Kara Sea)	Oil&Gas	1.8
Arshanovsky Coal Mine	Coal	1.7
*Usinsk-1 Coal Mine	Coal	1.7
Pereyaslovskiy Coal Mine	Coal	1.6
Gazprom dobycha Orenburg	Oil&Gas	1.6
*Arctic LNG 2 T1-3	Oil&Gas	1.5
*Pervomaisky Coal Mine	Coal	1.5
*Volga - Urals Onshore	Oil&Gas	1.4
Romashkino	Oil&Gas	1.3
*Rusanovskoye (Kara Sea)	Oil&Gas	1.3
Gazprom dobycha Nadym	Oil&Gas	1.3
*Inaglinskaya-2 Mine	Coal	1.3
*Taymyr Basin CBM	Oil&Gas	1.2
*North Kara Sea Offshore	Oil&Gas	1.2
*West Siberia Onshore	Oil&Gas	1.2

SeverEnergia Project	Oil&Gas	1.1
Erkovetskiy Coal Mine	Coal	1.0
*Shurapskaya Coal Mine	Coal	1.0

Saudi Arabia

Ghawar Uthmaniyah	Oil&Gas	19.2
Safaniya	Oil&Gas	11.9
Khurais project	Oil&Gas	7.6
Ghawar Haradh	Oil&Gas	7.0
*Central Arabian Offshore	Oil&Gas	6.9
Ghawar Shedgum	Oil&Gas	5.7
Qatif project	Oil&Gas	5.1
Manifa (redevelop)	Oil&Gas	5.0
Ghawar Hawiyah	Oil&Gas	4.6
*Central Arabian Onshore	Oil&Gas	4.4
Shaybah	Oil&Gas	4.3
Berri	Oil&Gas	3.6
*Zuluf (CR in field)	Oil&Gas	3.5
Zuluf	Oil&Gas	2.4
Khursaniyah	Oil&Gas	2.4
Ghawar Ain Dar N	Oil&Gas	2.1
Marjan	Oil&Gas	1.9
*Safaniya YTF Concession	Oil&Gas	1.8
*Zuluf (expansion)	Oil&Gas	1.8
Abqaiq	Oil&Gas	1.6
Ghawar Ain Dar S	Oil&Gas	1.4
*Khafji	Oil&Gas	1.4 ²
*Sudair Shale	Oil&Gas	1.0
Harmaliyah	Oil&Gas	1.0

Serbia

Kolubara	Coal	2.5
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South Africa

Grootegeluk Mine	Coal	6.9
*Greater Soutpansberg Coal Project	Coal	2.8
*Boikarabelo Coal Mine	Coal	2.4
*Collingham Shale	Oil&Gas	1.8
*Paardekop Coal Mine	Coal	1.7
*New Largo Coal Mine	Coal	1.4
*Bernice-Cygnus Coal Mine	Coal	1.1

Syria

*Tanf Shale	Oil&Gas	1.4
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Turkey

Afşin-Elbistan Coal Mine	Coal	4.1
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Turkmenistan

Yolotan (Iolotan) South	Oil&Gas	9.5
*Yashlar Vostochnyy (East)	Oil&Gas	2.1
Dovletabad-Donmez	Oil&Gas	1.6

Tanzania

*Tanzanian Coastal Offshore	Oil&Gas	1.0
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Ukraine

*Menilite Shale	Oil&Gas	1.7
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United Arab Emirates

Upper Zakum	Oil&Gas	6.4
Bu Hasa	Oil&Gas	4.9
Bab	Oil&Gas	4.2
Lower Zakum	Oil&Gas	2.4
Umm Shaif/Nasr	Oil&Gas	1.9
Bab (Gasco)	Oil&Gas	1.7
Asab	Oil&Gas	1.4

United Kingdom

*Bowland Shale	Oil&Gas	1.5
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United States

Permian Delaware Tight	Oil&Gas	27.8
Marcellus Shale	Oil&Gas	26.7
Permian Midland Tight	Oil&Gas	16.6
Haynesville/Bossier Shale	Oil&Gas	13.2
Utica Shale	Oil&Gas	7.7
Bakken Shale	Oil&Gas	5.9
Eagle Ford Shale	Oil&Gas	5.9
DJ Basin Tight Oil	Oil&Gas	5.9
Western Gulf Province_Texas	Oil&Gas	5.1
Woodford Shale	Oil&Gas	3.4
North Antelope Rochelle Coal Mine	Coal	2.9
MC #1 Coal Mine	Coal	2.9
PRB Tight Oil	Oil&Gas	2.8
*Chukchi Sea Offshore	Oil&Gas	2.5
Meramec Shale	Oil&Gas	2.4
Permian Conventional_Texas	Oil&Gas	2.1
*North Slope Onshore	Oil&Gas	2.0
Cumberland Coal Mine	Coal	1.9
Anadarko Shelf_Oklahoma	Oil&Gas	1.8
*Baltimore Canyon Offshore	Oil&Gas	1.6
Austin Chalk Tight	Oil&Gas	1.4
Barnett Shale	Oil&Gas	1.4
Black Thunder Coal Mine	Coal	1.4
*Beaufort Sea Offshore	Oil&Gas	1.3
Hamilton County No. 1 Mine	Coal	1.2
*Gulf Coast Centre Offshore	Oil&Gas	1.1
*West Florida Offshore	Oil&Gas	1.1
*Youngs Creek Coal Mine	Coal	1.1

Uzbekistan

*Angren Coal Mine	Coal	2.4
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Venezuela

Orinoco Joint Ventures	Oil&Gas	6.7
*La Luna Shale	Oil&Gas	1.1

Zimbabwe

Sengwe Colliery	Coal	1.0
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Source: Kühne et al. 2022

² See footnote 1.