Data Cleaning and Visualization Coursework Report

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1 Description

This report consists of the detailed description of cleaning process for the Open Data Innovation Coursework 1 using Open Refine and Excel. The data was cleaned using both OpenRefine and Microsoft Excel.

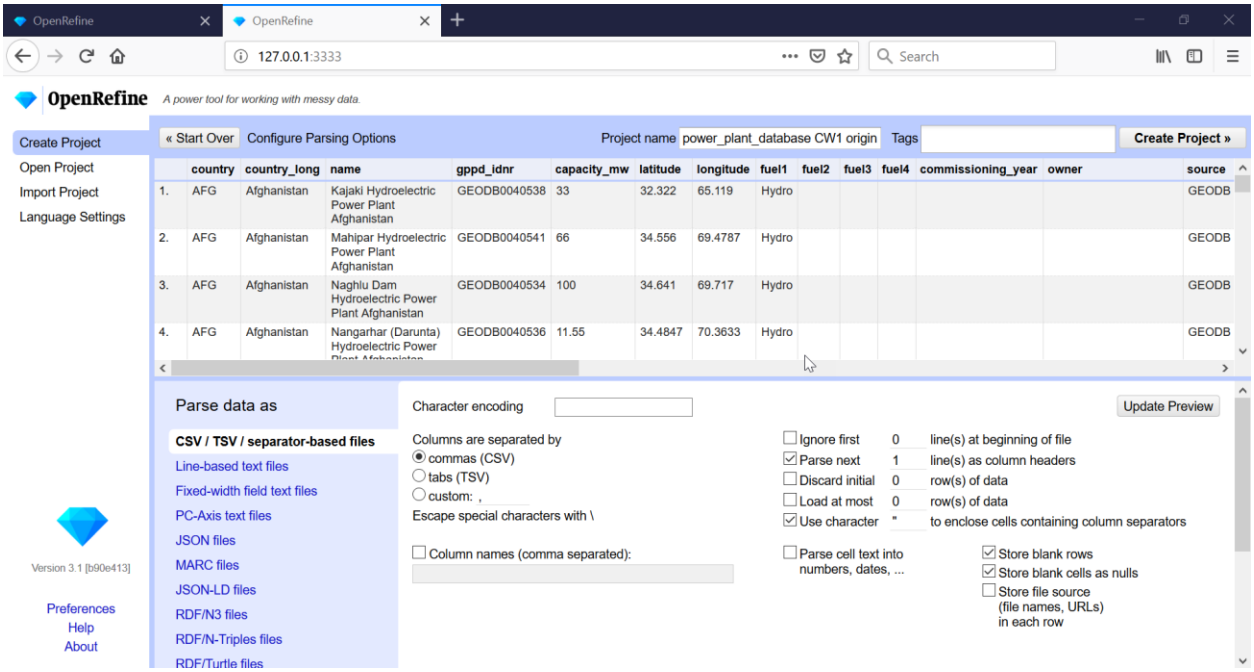


Fig 1.1 – a -Load Data into OpenRefine

2 Types of Errors

2.1 Displaced Columns

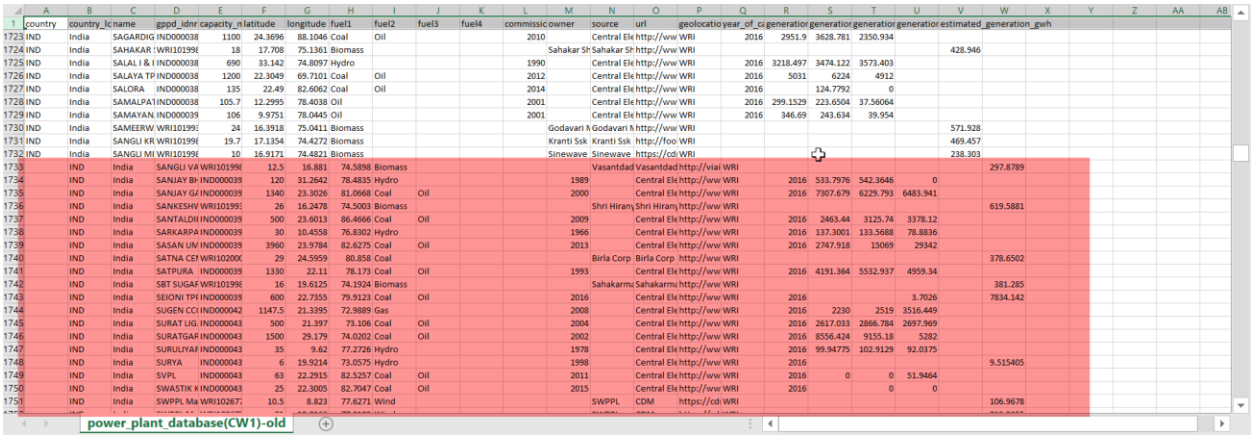
2.1.1 Description

The data in few rows are displaced from their respective columns. In few cases, first column is in right place but second column onwards they are displaced. In few cases, from first column onwards they are displaced from their respective columns as shows in figures Fig 2.1.1- a and Fig 2.1.1-b below. The highlighted range shows the cells where the data is misplaced. Microsoft Excel was used to bring the data back to their respective columns. The rows where columns were displaced were selected, then cut and placed in the right columns.

	country	country_lc	name	gppd_idnr	capacity_n	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_ca	generation	generation	generation	generation	estimated_generation_gwh
378	AUS	Australia	Quarantin	AUS000025	224	-34.7793	138.5224	Gas					Origin Ene	Australian	http://sen	Australian	2012					581.898
379	AUS	Australia	Ravenstho	AUS000032	56	-33.61	120.36	Oil					First Quan	Australian	http://sen	Australian	2012					273.063
380	AUS	Australia	Red Hill	AUS000033	3.65	-31.8317	116.0992	Waste					Landfill Ga	Australian	http://sen	Australian	2012					0
381	AUS	Australia	Redbank	AUS000028	143.8	-32.5802	151.0719	Coal					Redbank E	Australian	http://sen	Australian	2012					707.0565(gwh)
382	AUS		Australia	Reece	AUS000014	238	-41.7238	145.1359	Hydro					Hydro-Ele	Australian	http://sen	Australian	2012					539.3679
383	AUS		Australia	Remount	AUS000011	2.2	-41.395	147.1554	Waste					LMS Energ	Australian	http://sen	Australian	2012					0
384	AUS		Australia	Repulse	AUS000012	28	-42.5077	146.647	Hydro					Hydro-Ele	Australian	http://sen	Australian	2012					63.45505
385	AUS		Australia	Revesby W	AUS000031	2.5	-33.9534	151.0137	Oil					Revesby W	Australian	http://sen	Australian	2012					12.19032
386	AUS		Australia	Rochedale	AUS000007	4.2	-27.5591	153.1236	Waste					LMS Energ	Australian	http://sen	Australian	2012					0
387	AUS		Australia	Rockingha	AUS000035	2.1	-32.2863	115.8154	Waste					AGL Energ	Australian	http://sen	Australian	2012					0
388	AUS		Australia	Rocky Poir	AUS000006	30	-27.7334	153.3276	Biomass					Stanwell C	Australian	http://sen	Australian	2012					220.3556
389	AUS		Australia	Roghan Ro	AUS000007	1	-27.3388	153.0344	Waste					Energy Dev	Australian	http://sen	Australian	2012					0
390	AUS		Australia	Roma	AUS000014	80	-26.5772	148.8402	Gas					Origin Ene	Australian	http://sen	Australian	2012					207.8208
391	AUS		Australia	Ron Goodi	AUS000025	59.6	-23.7091	133.8912	Gas					NT Power	Australian	http://sen	Australian	2012					154.8265
392	AUS		Australia	Rowallan	AUS000012	10.5	-41.7295	146.2176	Hydro					Hydro-Ele	Australian	http://sen	Australian	2012					23.79564
393	AUS		Australia	Rubicon	AUS000009	9.6	-37.3272	145.8605	Hydro					AGL Energ	Australian	http://sen	Australian	2012					21.75602
394	AUS		Australia	Savannah	AUS000040	10.8	-17.3631	128.0331	Oil					Contract P	Australian	http://sen	Australian	2012					52.66217
395	AUS		Australia	Shenton P	AUS000032	1	-31.9577	115.7924	Waste					AnaeCo Lt	Australian	http://sen	Australian	2012					0
396	AUS		Australia	Shepparto	AUS000001	1.1	-36.3218	145.379	Waste					Diamond E	Australian	http://sen	Australian	2012					0
397	AUS		Australia	Smithfield	AUS000028	170.9	-33.85	150.9495	Gas					Marubeni	Australian	http://sen	Australian	2012					443.9572
398	AUS		Australia	Snowtown	AUS000000	98.7	-33.7215	138.1471	Wind					TrustPowe	Australian	http://sen	Australian	2012					237.8984
399	AUS		Australia	Snowtown	AUS000045	98.7	-33.8301	138.1184	Wind					TrustPowe	Australian	http://sen	Australian	2012					237.8984
400	AUS		Australia	Snuggery	AUS000024	63	-37.6646	140.4156	Gas					Internatio	Australian	http://sen	Australian	2012					163.6589
401	AUS		Australia	Solomon Is	AUS000045	125	-22.1581	117.9849	Gas						Australian	http://sen	Australian	Renewable Energy Mapping Infrastructure				324.72
402	AUS		Australia	Somerton	AUS000005	160	-37.6318	144.9531	Gas					AGL Energ	Australian	http://sen	Australian	2012					415.6416
403	AUS		Australia	South Carc	AUS000035	3.3	-32.2664	116.0193	Waste					Western A	Australian	http://sen	Australian	2012					0
404	AUS		Australia	South John	AUS000031	20	-17.6057	145.991	Biomass					MSF Sugar	Australian	http://sen	Australian	2012					146.9038
405	AUS		Australia	Springvale	AUS000001	4.12	-37.9733	145.1396	Waste					Energy Dev	Australian	http://sen	Australian	2012					0
406	AUS		Australia	St George	AUS000031	1.5	-33.9748	151.1294	Oil					St George	Australian	http://sen	Australian	2012					7.314191

power_plant_database(CW1)-old

Fig 2.1.1 – a – Second Column onwards displaced



	country	country_lc	name	gppd_idnr	capacity_n	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_ca	generation	generation	generation	generation	estimated_generation_gwh
1723	IND	India	SAGARDIG	IND000038	1100	24.3696	88.1046	Coal	Oil			2010		Central Ele	http://ww	WRI	2016	2951.9	3628.781	2350.934		
1724	IND	India	SAHAKAR	WRI101996	18	17.708	75.1361	Biomass					Sahakar Sh	Sahakar Sh	http://ww	WRI						428.546
1725	IND	India	SALAL I & I	IND000038	690	33.142	74.8097	Hydro				1990		Central Ele	http://ww	WRI	2016	3218.497	3474.122	3573.403		
1726	IND	India	SALAYA TP	IND000038	1200	22.3049	69.7101	Coal	Oil			2012		Central Ele	http://ww	WRI	2016	5031	6224	4912		
1727	IND	India	SALORA	IND000038	135	22.49	82.6062	Coal	Oil			2014		Central Ele	http://ww	WRI	2016		124.7792	0		
1728	IND	India	SAMALPA1	IND000038	105.7	12.2995	78.4038	Oil				2001		Central Ele	http://ww	WRI	2016	299.1529	223.6504	37.56064		
1729	IND	India	SAMAYAN	IND000039	106	9.9751	78.0445	Oil				2001		Central Ele	http://ww	WRI	2016	346.69	243.634	39.954		
1730	IND	India	SAMEERW	WRI101995	24	16.3918	75.0411	Biomass					Godavari M	Godavari M	http://ww	WRI						571.928
1731	IND	India	SANGLI KR	WRI101996	19.7	17.1354	74.4272	Biomass					Kranti Ssk	Kranti Ssk	http://foo	WRI						469.457
1732	IND	India	SANGLI MI	WRI101996	10	16.9171	74.4821	Biomass					Sinewave	Sinewave	https://cdi	WRI						238.303
1733		IND	India	SANGLI VA	WRI101996	12.5	16.881	74.5898	Biomass					Vasantdad	Vasantdad	http://viai	WRI						297.8789
1734		IND	India	SANJAY BH	IND000039	120	31.2642	78.4835	Hydro				1989		Central Ele	http://ww	WRI	2016	533.7976	542.3646	0		
1735		IND	India	SANJAY GA	IND000039	1340	23.3026	81.0668	Coal	Oil			2000		Central Ele	http://ww	WRI	2016	7307.679	6229.793	6483.941		
1736		IND	India	SANKESHV	WRI101995	26	16.2478	74.5003	Biomass					Shri Hiram	Shri Hiram	http://ww	WRI						619.5881
1737		IND	India	SANTALDIH	IND000039	500	23.6013	86.4666	Coal	Oil			2009		Central Ele	http://ww	WRI	2016	2463.44	3125.74	3378.12		
1738		IND	India	SARKARPA	IND000039	30	10.4558	76.8302	Hydro				1966		Central Ele	http://ww	WRI	2016	137.3001	133.5688	78.8836		
1739		IND	India	SASAN UM	IND000039	3960	23.9784	82.6275	Coal	Oil			2013		Central Ele	http://ww	WRI	2016	2747.918	13069	29342		
1740		IND	India	SATNA CEI	WRI102006	29	24.5959	80.858	Coal					Birla Corp	Birla Corp	http://ww	WRI						378.6502
1741		IND	India	SATPURA	IND000039	1330	22.11	78.173	Coal	Oil			1993		Central Ele	http://ww	WRI	2016	4191.364	5532.937	4959.34		
1742		IND	India	SBT SUGAF	WRI101996	16	19.6125	74.1924	Biomass					Sahakarm	Sahakarm	http://ww	WRI						381.285
1743		IND	India	SEIONI TPI	IND000039	600	22.7355	79.9123	Coal	Oil			2016		Central Ele	http://ww	WRI	2016			3.7026		7834.142
1744		IND	India	SUGEN CC	IND000042	1147.5	21.3395	72.9889	Gas				2008		Central Ele	http://ww	WRI	2016	2230	2519	3516.449		
1745		IND	India	SURAT LIG	IND000043	500	21.397	73.106	Coal	Oil			2004		Central Ele	http://ww	WRI	2016	2617.033	2866.784	2697.969		
1746		IND	India	SURATGAF	IND000043	1500	29.179	74.0202	Coal	Oil			2002		Central Ele	http://ww	WRI	2016	8556.424	9155.18	5282		
1747		IND	India	SURULIYAF	IND000043	35	9.62	77.2726	Hydro				1978		Central Ele	http://ww	WRI	2016	99.94775	102.9129	92.0375		
1748		IND	India	SURYA	IND000043	6	19.9214	73.0575	Hydro				1998		Central Ele	http://ww	WRI	2016					9.515405
1749		IND	India	SVPL	IND000043	63	22.2915	82.5257	Coal	Oil			2011		Central Ele	http://ww	WRI	2016	0	0	51.9464		
1750		IND	India	SWASTIK K	IND000043	25	22.3005	82.7047	Coal	Oil			2015		Central Ele	http://ww	WRI	2016		0	0		
1751		IND	India	SWPPL Ma	WRI102677	10.5	8.823	77.6271	Wind					SWPPL	CDM	https://cdi	WRI						106.9678

power_plant_database(CW1)-old

Fig 2.1.1 – b – First Column onwards displaced

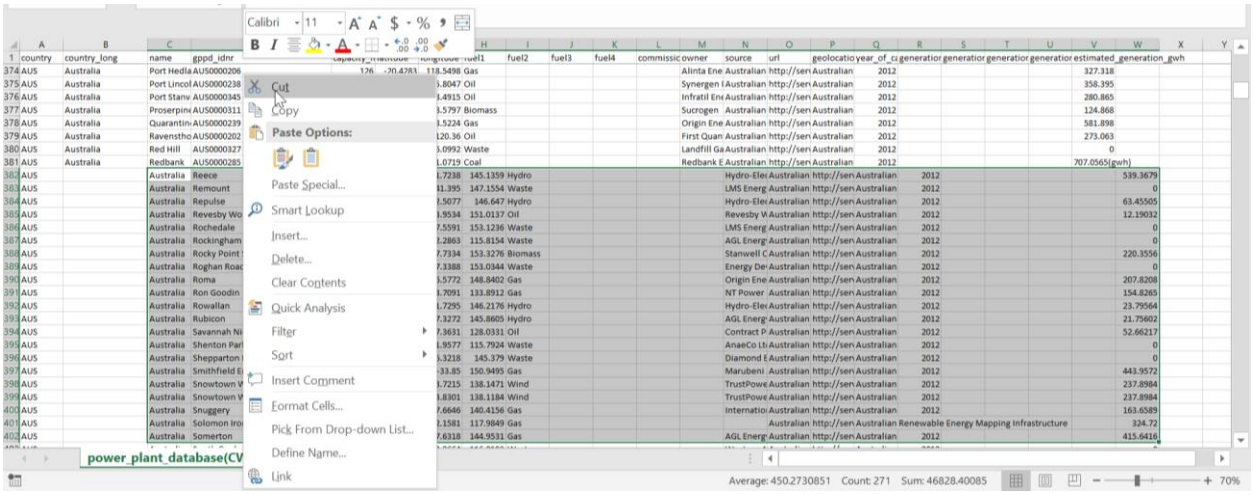


Fig 2.1.1 – c – Placing columns in right place

2.1.2 Observations

Displaced Column issue was further observed in the below mentioned rows and they were also fixed using Microsoft Excel.

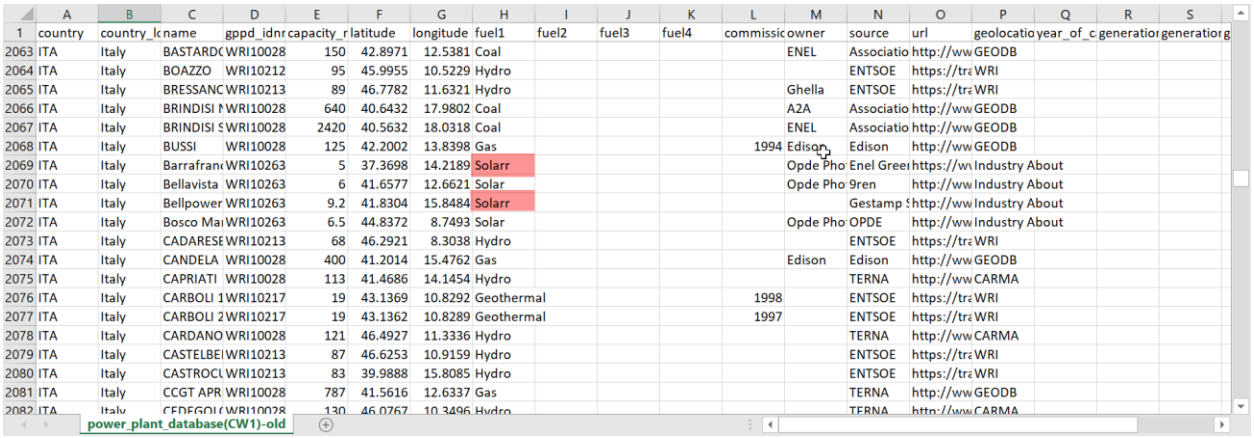
S.No:	Row Number
1	382 - 412
2	942 - 961
3	1733 - 1828
4	1837 - 1865
5	2087 - 2210
6	4403 - 4434
7	4459 - 4502

Table 2.1.2 – Displaced Rows

2.2 Wrong Spellings

2.2.1 Description

There were lot of spelling mistakes identified in the spreadsheet. Few cases, the words are mis-spelled. In few cases, in country column, instead of code, country name is displayed. The wrong spellings were fixed manually using Microsoft Excel.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	country	country_l	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissic	owner	source	url	geolocatio	year_of_c	generatior	generatior
2063	ITA	Italy	BASTARDC	WRI10028	150	42.8971	12.5381	Coal					ENEL	Associatio	http://ww	GEODB			
2064	ITA	Italy	BOAZZO	WRI10212	95	45.9955	10.5229	Hydro						ENTSOE	https://tra	WRI			
2065	ITA	Italy	BRESSANC	WRI10213	89	46.7782	11.6321	Hydro					Ghella	ENTSOE	https://tra	WRI			
2066	ITA	Italy	BRINDISI I	WRI10028	640	40.6432	17.9802	Coal					A2A	Associatio	http://ww	GEODB			
2067	ITA	Italy	BRINDISI S	WRI10028	2420	40.5632	18.0318	Coal					ENEL	Associatio	http://ww	GEODB			
2068	ITA	Italy	BUSSI	WRI10028	125	42.2002	13.8398	Gas				1994	Edison	Edison	http://ww	GEODB			
2069	ITA	Italy	Barrafranc	WRI10263	5	37.3698	14.2189	Solarr					Opde Pho	Enel Gree	https://w	Industry About			
2070	ITA	Italy	Bellavista	WRI10263	6	41.6577	12.6621	Solar					Opde Pho	9ren	http://ww	Industry About			
2071	ITA	Italy	Bellpower	WRI10263	9.2	41.8304	15.8484	Solarr						Gestamp S	http://ww	Industry About			
2072	ITA	Italy	Bosco Mai	WRI10263	6.5	44.8372	8.7493	Solar					Opde Pho	OPDE	http://ww	Industry About			
2073	ITA	Italy	CADARESE	WRI10213	68	46.2921	8.3038	Hydro						ENTSOE	https://tra	WRI			
2074	ITA	Italy	CANDELA	WRI10028	400	41.2014	15.4762	Gas					Edison	Edison	http://ww	GEODB			
2075	ITA	Italy	CAPRIATI	WRI10028	113	41.4686	14.1454	Hydro						TERNA	http://ww	CARMA			
2076	ITA	Italy	CARBOLI 1	WRI10217	19	43.1369	10.8292	Geothermal				1998		ENTSOE	https://tra	WRI			
2077	ITA	Italy	CARBOLI 2	WRI10217	19	43.1362	10.8289	Geothermal				1997		ENTSOE	https://tra	WRI			
2078	ITA	Italy	CARDANO	WRI10028	121	46.4927	11.3336	Hydro						TERNA	http://ww	CARMA			
2079	ITA	Italy	CASTELBE	WRI10213	87	46.6253	10.9159	Hydro						ENTSOE	https://tra	WRI			
2080	ITA	Italy	CASTROCI	WRI10213	83	39.9888	15.8085	Hydro						ENTSOE	https://tra	WRI			
2081	ITA	Italy	CCGT APR	WRI10028	787	41.5616	12.6337	Gas						TERNA	http://ww	GEODB			
2082	ITA	Italy	CEDEGOL	WRI10028	130	46.0767	10.3496	Hydro						TERNA	http://ww	CARMA			

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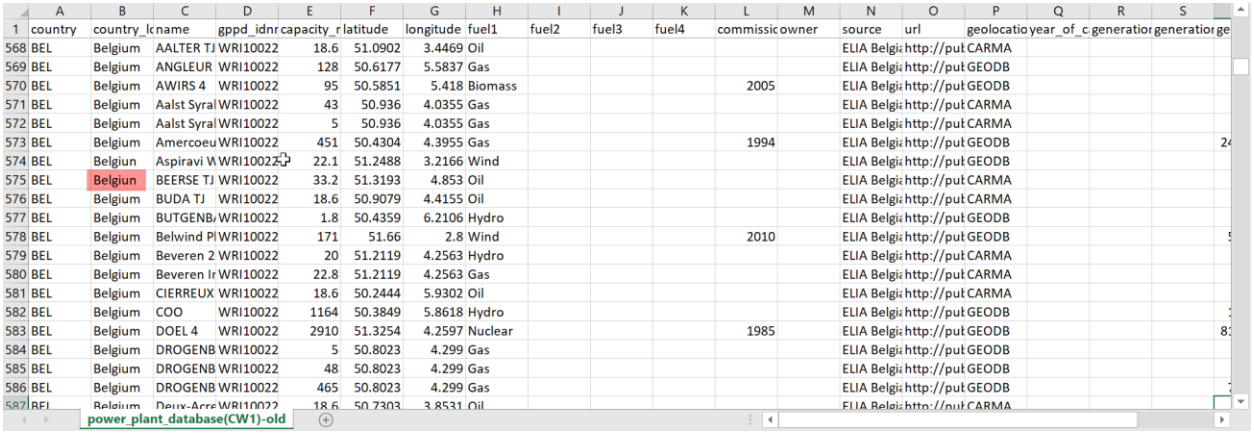
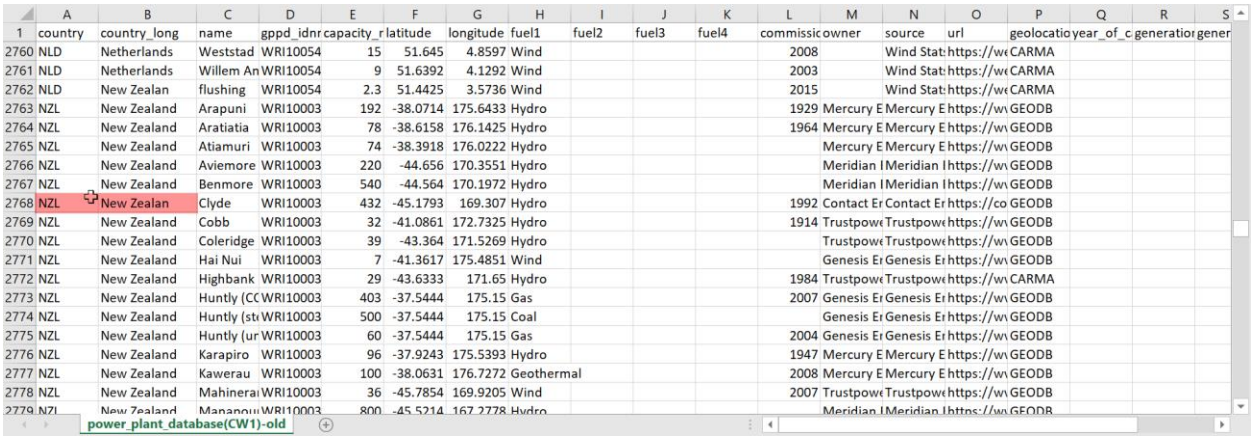
Fig 2.2.1 – a – "Solar" mis-spelled as "Solarr"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	country	country_l	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissic	owner	source	url	geolocatio	year_of_c	generatior	generatior
568	BEL	Belgium	AALTER TJ	WRI10022	18.6	51.0902	3.4469	Oil						ELIA Belgi	http://put	CARMA			
569	BEL	Belgium	ANGLEUR	WRI10022	128	50.6177	5.5837	Gas						ELIA Belgi	http://put	GEODB			
570	BEL	Belgium	AWIRS 4	WRI10022	95	50.5851	5.418	Biomass				2005		ELIA Belgi	http://put	GEODB			
571	BEL	Belgium	Aalst Syra	WRI10022	43	50.936	4.0355	Gas						ELIA Belgi	http://put	CARMA			
572	BEL	Belgium	Aalst Syra	WRI10022	5	50.936	4.0355	Gas						ELIA Belgi	http://put	CARMA			
573	BEL	Belgium	Amercoeu	WRI10022	451	50.4304	4.3955	Gas				1994		ELIA Belgi	http://put	GEODB			24
574	BEL	Belgiun	Aspiravi W	WRI10022	22.1	51.2488	3.2166	Wind						ELIA Belgi	http://put	GEODB			
575	BEL	Belgiun	BEERSE TJ	WRI10022	33.2	51.3193	4.853	Oil						ELIA Belgi	http://put	CARMA			
576	BEL	Belgium	BUDA TJ	WRI10022	18.6	50.9079	4.4155	Oil						ELIA Belgi	http://put	CARMA			
577	BEL	Belgium	BUTGENB	WRI10022	1.8	50.4359	6.2106	Hydro						ELIA Belgi	http://put	GEODB			
578	BEL	Belgium	Belwind P	WRI10022	171	51.66	2.8	Wind				2010		ELIA Belgi	http://put	GEODB			5
579	BEL	Belgium	Beveren 2	WRI10022	20	51.2119	4.2563	Hydro						ELIA Belgi	http://put	CARMA			
580	BEL	Belgium	Beveren Ir	WRI10022	22.8	51.2119	4.2563	Gas						ELIA Belgi	http://put	CARMA			
581	BEL	Belgium	CIERREUX	WRI10022	18.6	50.2444	5.9302	Oil						ELIA Belgi	http://put	CARMA			
582	BEL	Belgium	COO	WRI10022	1164	50.3849	5.8618	Hydro						ELIA Belgi	http://put	GEODB			1
583	BEL	Belgium	DOEL 4	WRI10022	2910	51.3254	4.2597	Nuclear				1985		ELIA Belgi	http://put	GEODB			81
584	BEL	Belgium	DROGENB	WRI10022	5	50.8023	4.299	Gas						ELIA Belgi	http://put	GEODB			
585	BEL	Belgium	DROGENB	WRI10022	48	50.8023	4.299	Gas						ELIA Belgi	http://put	GEODB			
586	BEL	Belgium	DROGENB	WRI10022	465	50.8023	4.299	Gas						ELIA Belgi	http://put	GEODB			1
587	BEL	Belgium	Deux-Acre	WRI10022	18.6	50.7303	3.8531	Oil						ELIA Belgi	http://put	CARMA			

power_plant_database(CW1)-old

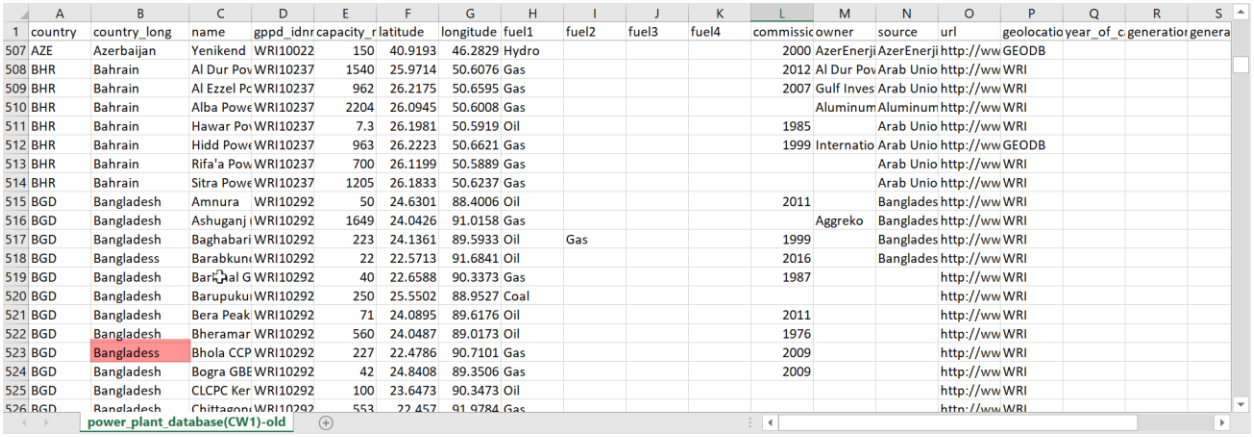
Fig 2.2.1 – b – "Belgium" mis-spelled as "Belgium"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	country	country_long	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_c	generatior	gener
2760	NLD	Netherlands	Weststad	WRI10054	15	51.645	4.8597	Wind				2008		Wind Stat	https://w	CARMA			
2761	NLD	Netherlands	Willem An	WRI10054	9	51.6392	4.1292	Wind				2003		Wind Stat	https://w	CARMA			
2762	NLD	New Zealan	flushing	WRI10054	2.3	51.4425	3.5736	Wind				2015		Wind Stat	https://w	CARMA			
2763	NZL	New Zealand	Arapuni	WRI10003	192	-38.0714	175.6433	Hydro				1929	Mercury E	Mercury E	https://w	GEODB			
2764	NZL	New Zealand	Aratiatia	WRI10003	78	-38.6158	176.1425	Hydro				1964	Mercury E	Mercury E	https://w	GEODB			
2765	NZL	New Zealand	Atiamuri	WRI10003	74	-38.3918	176.0222	Hydro					Mercury E	Mercury E	https://w	GEODB			
2766	NZL	New Zealand	Aviemore	WRI10003	220	-44.656	170.3551	Hydro					Meridian I	Meridian I	https://w	GEODB			
2767	NZL	New Zealand	Benmore	WRI10003	540	-44.564	170.1972	Hydro					Meridian I	Meridian I	https://w	GEODB			
2768	NZL	New Zealan	Clyde	WRI10003	432	-45.1793	169.307	Hydro				1992	Contact Er	Contact Er	https://co	GEODB			
2769	NZL	New Zealand	Cobb	WRI10003	32	-41.0861	172.7325	Hydro				1914	Trustpow	Trustpow	https://w	GEODB			
2770	NZL	New Zealand	Coleridge	WRI10003	39	-43.364	171.5269	Hydro					Trustpow	Trustpow	https://w	GEODB			
2771	NZL	New Zealand	Hai Nui	WRI10003	7	-41.3617	175.4851	Wind					Genesis Er	Genesis Er	https://w	GEODB			
2772	NZL	New Zealand	Highbank	WRI10003	29	-43.6333	171.65	Hydro				1984	Trustpow	Trustpow	https://w	CARMA			
2773	NZL	New Zealand	Huntly (CC	WRI10003	403	-37.5444	175.15	Gas				2007	Genesis Er	Genesis Er	https://w	GEODB			
2774	NZL	New Zealand	Huntly (st	WRI10003	500	-37.5444	175.15	Coal					Genesis Er	Genesis Er	https://w	GEODB			
2775	NZL	New Zealand	Huntly (ur	WRI10003	60	-37.5444	175.15	Gas				2004	Genesis Er	Genesis Er	https://w	GEODB			
2776	NZL	New Zealand	Karapiro	WRI10003	96	-37.9243	175.5393	Hydro				1947	Mercury E	Mercury E	https://w	GEODB			
2777	NZL	New Zealand	Kawerau	WRI10003	100	-38.0631	176.7272	Geothermal				2008	Mercury E	Mercury E	https://w	GEODB			
2778	NZL	New Zealand	Mahinerai	WRI10003	36	-45.7854	169.9205	Wind				2007	Trustpow	Trustpow	https://w	GEODB			
2779	NZL	New Zealand	Manapou	WRI10003	800	-45.5214	167.2778	Hydro					Meridian I	Meridian I	https://w	GEODB			

power_plant_database(CW1)-old

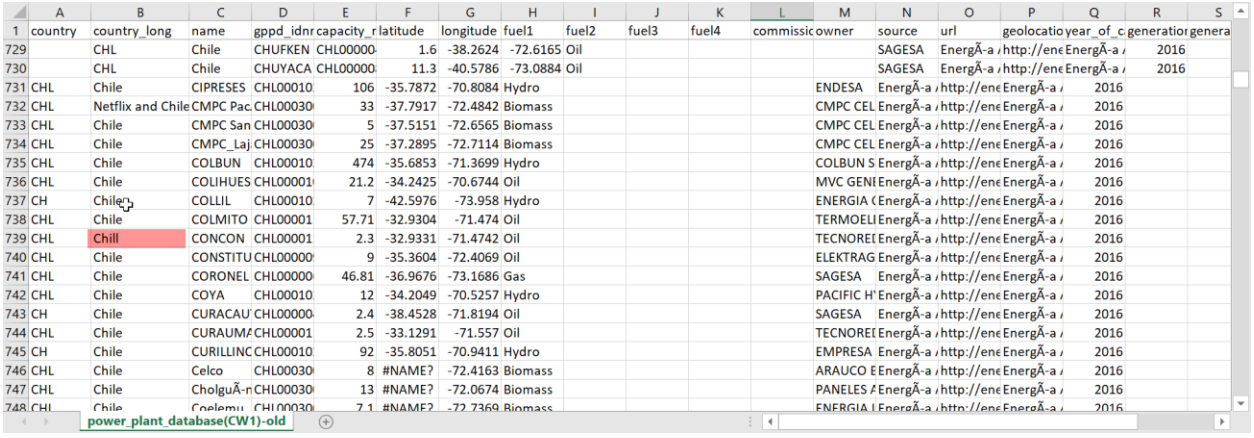
Fig 2.2.1 – c – "New Zealand" mis-spelled as "New Zealan"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	country	country_long	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_c	generatior	genera
507	AZE	Azerbaijan	Yenikend	WRI10022	150	40.9193	46.2829	Hydro				2000	AzerEnerji	AzerEnerji	http://ww	GEODB			
508	BHR	Bahrain	Al Dur Pov	WRI10237	1540	25.9714	50.6076	Gas				2012	Al Dur Pov	Arab Unio	http://ww	WRI			
509	BHR	Bahrain	Al Ezzel Pc	WRI10237	962	26.2175	50.6595	Gas				2007	Gulf Inves	Arab Unio	http://ww	WRI			
510	BHR	Bahrain	Alba Powe	WRI10237	2204	26.0945	50.6008	Gas					Aluminum	Aluminum	http://ww	WRI			
511	BHR	Bahrain	Hawar Pov	WRI10237	7.3	26.1981	50.5919	Oil				1985		Arab Unio	http://ww	WRI			
512	BHR	Bahrain	Hidd Powe	WRI10237	963	26.2223	50.6621	Gas				1999	Internatio	Arab Unio	http://ww	GEODB			
513	BHR	Bahrain	Rifa'a Pow	WRI10237	700	26.1199	50.5889	Gas						Arab Unio	http://ww	WRI			
514	BHR	Bahrain	Sitra Powe	WRI10237	1205	26.1833	50.6237	Gas						Arab Unio	http://ww	WRI			
515	BGD	Bangladesh	Amnura	WRI10292	50	24.6301	88.4006	Oil				2011		Banglades	http://ww	WRI			
516	BGD	Bangladesh	Ashuganj	WRI10292	1649	24.0426	91.0158	Gas					Aggreko	Banglades	http://ww	WRI			
517	BGD	Bangladesh	Baghabari	WRI10292	223	24.1361	89.5933	Oil	Gas			1999		Banglades	http://ww	WRI			
518	BGD	Bangladess	Barabkun	WRI10292	22	22.5713	91.6841	Oil				2016		Banglades	http://ww	WRI			
519	BGD	Bangladesh	Barkhal G	WRI10292	40	22.6588	90.3373	Gas				1987			http://ww	WRI			
520	BGD	Bangladesh	Barupukui	WRI10292	250	25.5502	88.9527	Coal							http://ww	WRI			
521	BGD	Bangladesh	Bera Peak	WRI10292	71	24.0895	89.6176	Oil				2011			http://ww	WRI			
522	BGD	Bangladesh	Bheramar	WRI10292	560	24.0487	89.0173	Oil				1976			http://ww	WRI			
523	BGD	Bangladess	Bhola CCP	WRI10292	227	22.4786	90.7101	Gas				2009			http://ww	WRI			
524	BGD	Bangladesh	Bogra GBE	WRI10292	42	24.8408	89.3506	Gas				2009			http://ww	WRI			
525	BGD	Bangladesh	CLCPC Ker	WRI10292	100	23.6473	90.3473	Oil							http://ww	WRI			
526	BGD	Bangladesh	Chittagon	WRI10292	553	22.457	91.9784	Gas							http://ww	WRI			

power_plant_database(CW1)-old

Fig 2.2.1 – d – "Bangladesh" mis-spelled as "Bangladess"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	country	country_long	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_c	generatior	genera
729		CHL	Chile	CHUFKEN	CHL00000	1.6	-38.2624	-72.6165	Oil					SAGESA	EnergÃ-a	http://ene	EnergÃ-a	2016	
730		CHL	Chile	CHUYACA	CHL00000	11.3	-40.5786	-73.0884	Oil					SAGESA	EnergÃ-a	http://ene	EnergÃ-a	2016	
731	CHL	Chile	CIPRESES	CHL00010	106	-35.7872	-70.8084	Hydro					ENDESA	EnergÃ-a	http://ene	EnergÃ-a	2016		
732	CHL	Netflix and Chile	CMPC Pac	CHL00030	33	-37.7917	-72.4842	Biomass					CMPC CEL	EnergÃ-a	http://ene	EnergÃ-a	2016		
733	CHL	Chile	CMPC San	CHL00030	5	-37.5151	-72.6565	Biomass					CMPC CEL	EnergÃ-a	http://ene	EnergÃ-a	2016		
734	CHL	Chile	CMPC_Laj	CHL00030	25	-37.2895	-72.7114	Biomass					CMPC CEL	EnergÃ-a	http://ene	EnergÃ-a	2016		
735	CHL	Chile	COLBUN	CHL00010	474	-35.6853	-71.3699	Hydro					COLBUN S	EnergÃ-a	http://ene	EnergÃ-a	2016		
736	CHL	Chile	COLIHUES	CHL00001	21.2	-34.2425	-70.6744	Oil					MVC GENI	EnergÃ-a	http://ene	EnergÃ-a	2016		
737	CH	Chile	COLLIL	CHL00010	7	-42.5976	-73.958	Hydro					ENERGIA (	EnergÃ-a	http://ene	EnergÃ-a	2016		
738	CHL	Chile	COLMITO	CHL00001	57.71	-32.9304	-71.474	Oil					TERMOELI	EnergÃ-a	http://ene	EnergÃ-a	2016		
739	CHL	Chill	CONCON	CHL00001	2.3	-32.9331	-71.4742	Oil					TECNOREI	EnergÃ-a	http://ene	EnergÃ-a	2016		
740	CHL	Chile	CONSTITU	CHL00000	9	-35.3604	-72.4069	Oil					ELEKTRAG	EnergÃ-a	http://ene	EnergÃ-a	2016		
741	CHL	Chile	CORONEL	CHL00000	46.81	-36.9676	-73.1686	Gas					SAGESA	EnergÃ-a	http://ene	EnergÃ-a	2016		
742	CHL	Chile	COYA	CHL00010	12	-34.2049	-70.5257	Hydro					PACIFIC H	EnergÃ-a	http://ene	EnergÃ-a	2016		
743	CH	Chile	CURACAU	CHL00000	2.4	-38.4528	-71.8194	Oil					SAGESA	EnergÃ-a	http://ene	EnergÃ-a	2016		
744	CHL	Chile	CURAUMA	CHL00001	2.5	-33.1291	-71.557	Oil					TECNOREI	EnergÃ-a	http://ene	EnergÃ-a	2016		
745	CH	Chile	CURILLINC	CHL00010	92	-35.8051	-70.9411	Hydro					EMPRESA	EnergÃ-a	http://ene	EnergÃ-a	2016		
746	CHL	Chile	Celco	CHL00030	8	#NAME?	-72.4163	Biomass					ARAUCO E	EnergÃ-a	http://ene	EnergÃ-a	2016		
747	CHL	Chile	CholguÃ-n	CHL00030	13	#NAME?	-72.0674	Biomass					PANELES A	EnergÃ-a	http://ene	EnergÃ-a	2016		
748	CHL	Chile	Coelemu	CHL00030	7.1	#NAME?	-72.7369	Biomass					ENERGIA I	EnergÃ-a	http://ene	EnergÃ-a	2016		

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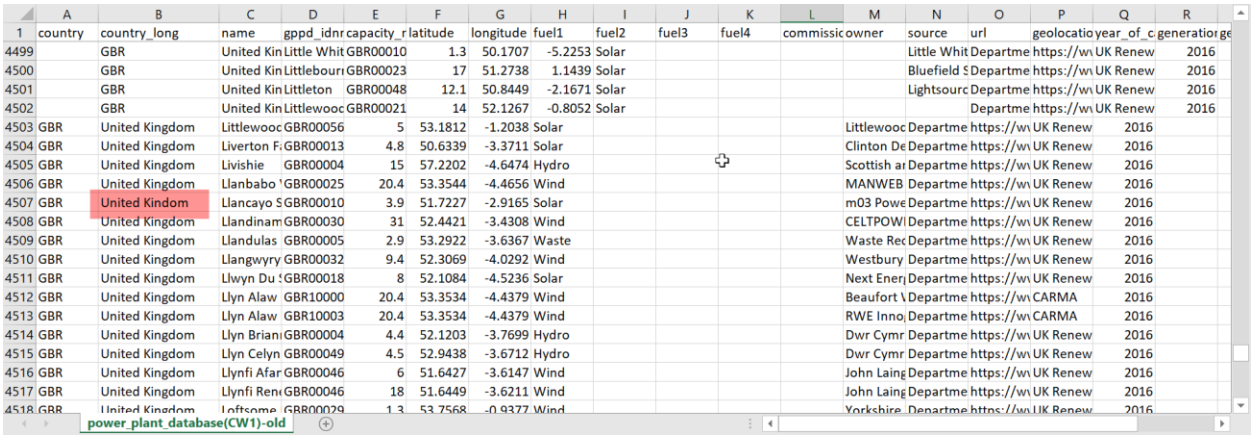
Fig 2.2.1 – e – "Chile" mis-spelled as "Chill"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	country	country_long	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_c	generatior
4499		GBR	United Kin	Little Whit	GBR00010	1.3	50.1707	-5.2253	Solar					Little Whit	Departme	https://w	UK Renew	2016
4500		GBR	United Kin	Littlebouri	GBR00023	17	51.2738	1.1439	Solar					Bluefield S	Departme	https://w	UK Renew	2016
4501		GBR	United Kin	Littleton	GBR00048	12.1	50.8449	-2.1671	Solar					Lightsourc	Departme	https://w	UK Renew	2016
4502		GBR	United Kin	Littlewooc	GBR00021	14	52.1267	-0.8052	Solar						Departme	https://w	UK Renew	2016
4503	GBR	United Kingdom	Littlewooc	GBR00056	5	53.1812	-1.2038	Solar					Littlewooc	Departme	https://w	UK Renew	2016	
4504	GBR	United Kingdom	Liverton F	GBR00013	4.8	50.6339	-3.3711	Solar					Clinton De	Departme	https://w	UK Renew	2016	
4505	GBR	United Kingdom	Livishie	GBR00004	15	57.2202	-4.6474	Hydro					Scottish ar	Departme	https://w	UK Renew	2016	
4506	GBR	United Kingdom	Llanbabo '	GBR00025	20.4	53.3544	-4.4656	Wind					MANWEB	Departme	https://w	UK Renew	2016	
4507	GBR	United Kindom	Llancayo S	GBR00010	3.9	51.7227	-2.9165	Solar					m03 Powe	Departme	https://w	UK Renew	2016	
4508	GBR	United Kingdom	Llandinam	GBR00030	31	52.4421	-3.4308	Wind					CELTPOW	Departme	https://w	UK Renew	2016	
4509	GBR	United Kingdom	Llandulas	GBR00005	2.9	53.2922	-3.6367	Waste					Waste Rec	Departme	https://w	UK Renew	2016	
4510	GBR	United Kingdom	Llangwyry	GBR00032	9.4	52.3069	-4.0292	Wind					Westbury	Departme	https://w	UK Renew	2016	
4511	GBR	United Kingdom	Llwyn Du '	GBR00018	8	52.1084	-4.5236	Solar					Next Ener	Departme	https://w	UK Renew	2016	
4512	GBR	United Kingdom	Llyn Alaw	GBR10000	20.4	53.3534	-4.4379	Wind					Beaufort \	Departme	https://w	CARMA	2016	
4513	GBR	United Kingdom	Llyn Alaw	GBR10003	20.4	53.3534	-4.4379	Wind					RWE Inno	Departme	https://w	CARMA	2016	
4514	GBR	United Kingdom	Llyn Brian	GBR00004	4.4	52.1203	-3.7699	Hydro					Dwr Cymr	Departme	https://w	UK Renew	2016	
4515	GBR	United Kingdom	Llyn Celyn	GBR00049	4.5	52.9438	-3.6712	Hydro					Dwr Cymr	Departme	https://w	UK Renew	2016	
4516	GBR	United Kingdom	Llynfi Afar	GBR00046	6	51.6427	-3.6147	Wind					John Laing	Departme	https://w	UK Renew	2016	
4517	GBR	United Kingdom	Llynfi Ren	GBR00046	18	51.6449	-3.6211	Wind					John Laing	Departme	https://w	UK Renew	2016	
4518	GBR	United Kingdom	Loftsome	GBR00029	1.3	53.7568	-0.9377	Wind					Yorkshire	Departme	https://w	UK Renew	2016	

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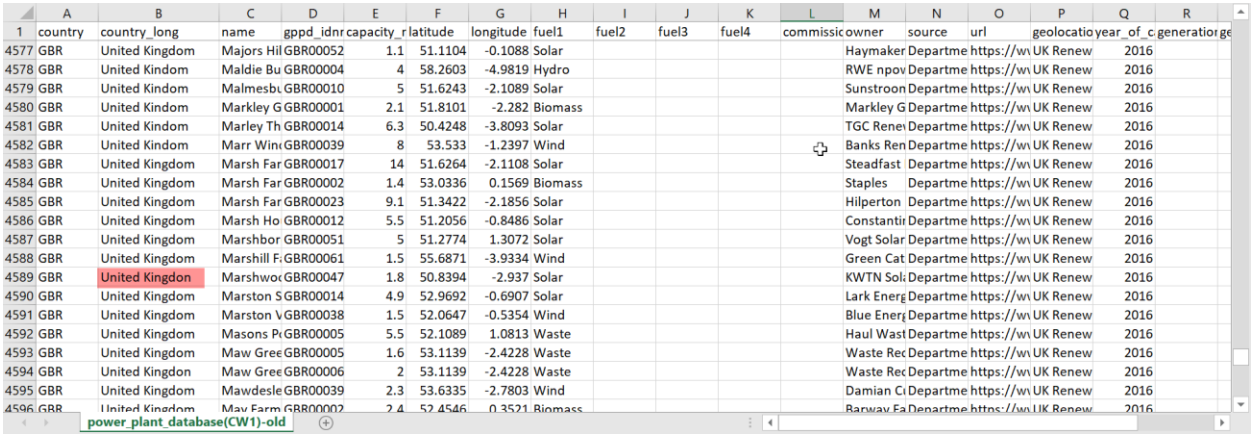
Fig 2.2.1 – f – "United Kingdom" mis-spelled as "United Kindom"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	country	country_long	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_c	generatior
4577	GBR	United Kingdom	Majors Hil	GBR00052	1.1	51.1104	-0.1088	Solar					Haymaker	Departme	https://w	UK Renew	2016	
4578	GBR	United Kindom	Maldie Bu	GBR00004	4	58.2603	-4.9819	Hydro					RWE npov	Departme	https://w	UK Renew	2016	
4579	GBR	United Kindom	Malmesbu	GBR00010	5	51.6243	-2.1089	Solar					Sunstroon	Departme	https://w	UK Renew	2016	
4580	GBR	United Kindom	Markley G	GBR00001	2.1	51.8101	-2.282	Biomass					Markley G	Departme	https://w	UK Renew	2016	
4581	GBR	United Kindom	Marley Th	GBR00014	6.3	50.4248	-3.8093	Solar					TGC Rene	Departme	https://w	UK Renew	2016	
4582	GBR	United Kindom	Marr Win	GBR00039	8	53.533	-1.2397	Wind					Banks Ren	Departme	https://w	UK Renew	2016	
4583	GBR	United Kingdom	Marsh Far	GBR00017	14	51.6264	-2.1108	Solar					Steadfast	Departme	https://w	UK Renew	2016	
4584	GBR	United Kingdom	Marsh Far	GBR00002	1.4	53.0336	0.1569	Biomass					Staples	Departme	https://w	UK Renew	2016	
4585	GBR	United Kingdom	Marsh Far	GBR00023	9.1	51.3422	-2.1856	Solar					Hilperton	Departme	https://w	UK Renew	2016	
4586	GBR	United Kingdom	Marsh Ho	GBR00012	5.5	51.2056	-0.8486	Solar					Constantir	Departme	https://w	UK Renew	2016	
4587	GBR	United Kingdom	Marshbor	GBR00051	5	51.2774	1.3072	Solar					Vogt Solar	Departme	https://w	UK Renew	2016	
4588	GBR	United Kingdom	Marshill F	GBR00061	1.5	55.6871	-3.9334	Wind					Green Cat	Departme	https://w	UK Renew	2016	
4589	GBR	United Kingdon	Marshwoo	GBR00047	1.8	50.8394	-2.937	Solar					KWTN Sol	Departme	https://w	UK Renew	2016	
4590	GBR	United Kingdom	Marston S	GBR00014	4.9	52.9692	-0.6907	Solar					Lark Energ	Departme	https://w	UK Renew	2016	
4591	GBR	United Kingdom	Marston V	GBR00038	1.5	52.0647	-0.5354	Wind					Blue Ener	Departme	https://w	UK Renew	2016	
4592	GBR	United Kingdom	Masons P	GBR00005	5.5	52.1089	1.0813	Waste					Haul Wast	Departme	https://w	UK Renew	2016	
4593	GBR	United Kingdom	Maw Gree	GBR00005	1.6	53.1139	-2.4228	Waste					Waste Rec	Departme	https://w	UK Renew	2016	
4594	GBR	United Kingdon	Maw Gree	GBR00006	2	53.1139	-2.4228	Waste					Waste Rec	Departme	https://w	UK Renew	2016	
4595	GBR	United Kingdom	Mawdesle	GBR00039	2.3	53.6335	-2.7803	Wind					Damian Cl	Departme	https://w	UK Renew	2016	
4596	GBR	United Kingdom	May Farm	GBR00002	2.4	52.4546	0.3521	Biomass					Barway Fa	Departme	https://w	UK Renew	2016	

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Fig 2.2.1 – g – "United Kingdom" mis-spelled as "United Kingdon"

2.2.2 Observation

The following type of mistakes in the below mentioned rows.

S.No	Type	Mis-Spelled Word	Correct Spelling	Row Number
1	Mis-spelled word in Fuel 1 column	Solarr	Solar	2019, 2069, 2017, 2073
2	Mis-spelled word in Fuel 2 column	Solarr	Solar	2143, 2155

3	Mis-spelled word in Country_long column	Belgiun	Belgium	574, 575, 596, 600, 614
4	Mis-spelled word in Country_long column	New Zealan	New Zealand	2768, 2780
5	Mis-spelled word in Country_long column	Bangladess	Bangladesh	518, 523, 540, 549
6	Mis-spelled word in Country_long column	Chill	Chile	739
7	Mis-spelled word in Country_long column	United Kindom	United Kingdom	4507, 4525, 4533, 4536, 4554, 4555, 4556, 4557, 4558, 4578, 4579, 4580, 4581, 4582, 4606, 4608
8	Mis-spelled word in Country_long column	United Kingdon	United Kingdom	4589, 4594, 4620, 4621, 4624, 4626, 4628, 4631, 4648, 4656, 4660, 4666, 4672, 4677

Table 2.2.2 – Rows where data is wrongly spelled

2.3 Removal of Irrelevant/Incomplete Rows

2.3.1 Description

There were two irrelevant rows in the spreadsheet. The irrelevant rows which has no useful information were removed using Microsoft Excel.

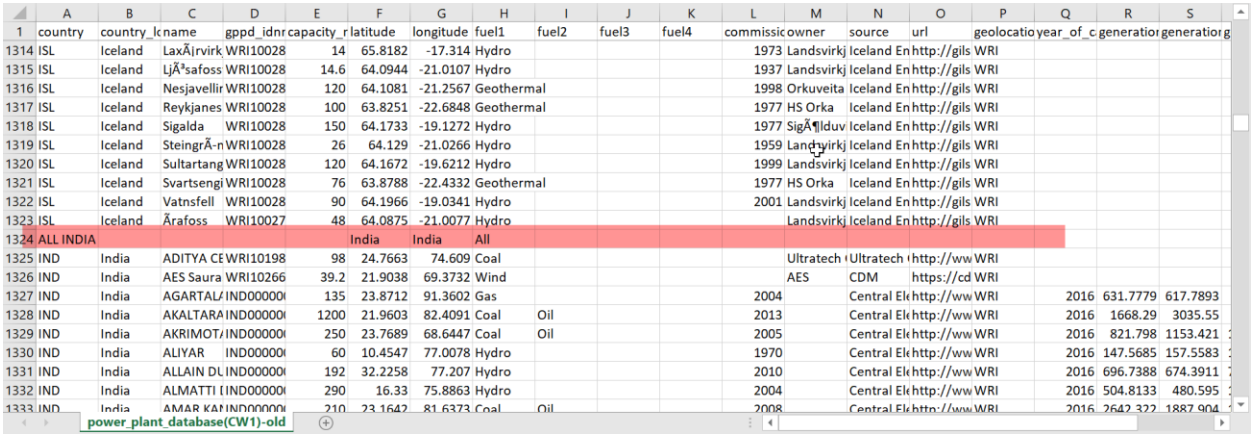


Fig 2.3.1 – a – Irrelevant Row 1

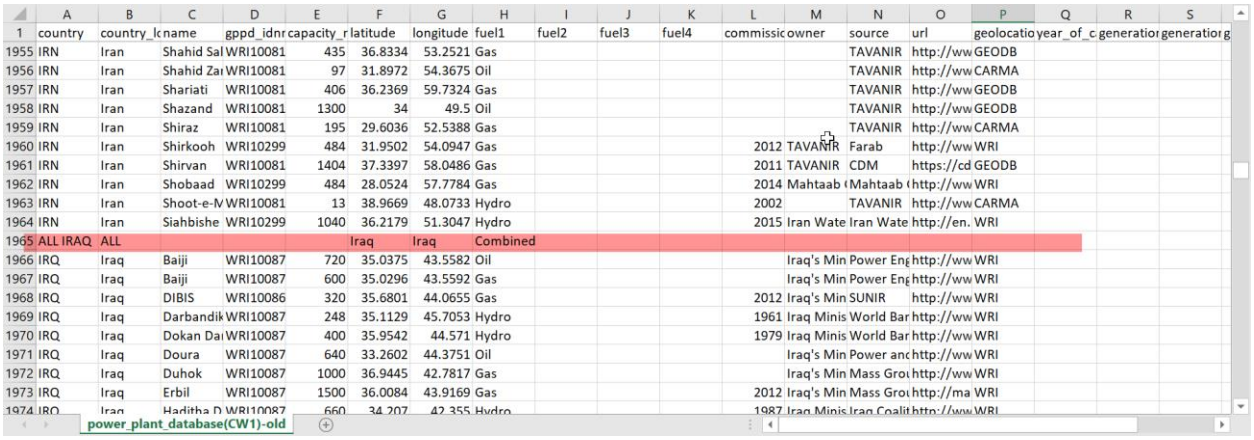


Fig 2.3.1 – b – Irrelevant Row 2

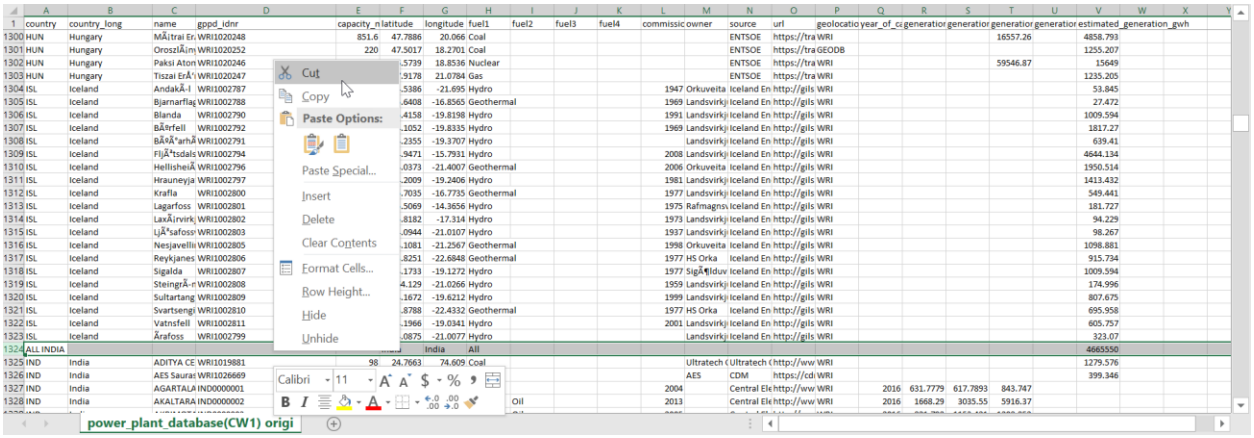


Fig 2.3.1 – c – Removal of Irrelevant Rows using Microsoft Excel

2.3.2 Observation

S.No	Row number
1	1324
2	1965

Table 2.3.2 – Irrelevant Rows

2.4 Filling Missing Values

2.4.1 Description

The latitude information was missing for few rows. They were updated by getting the information by googling the name of the power plant wherever information was available. In other rows "#NAME?", value was removed using Microsoft Excel.

2.4.2 Observation

The following power plant latitudes were updated.

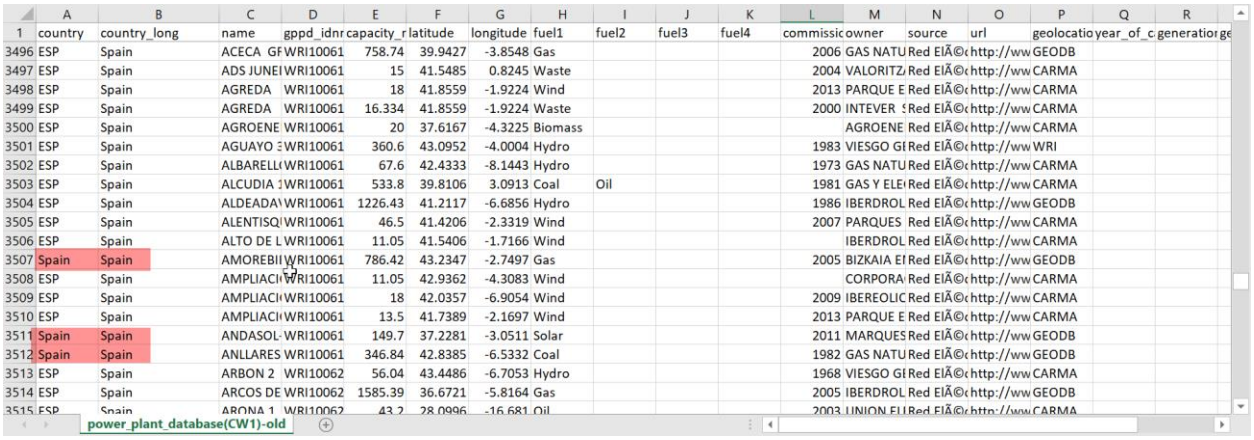
country_long	latitude
El Salvador	Ahuachapan Geothermal Power Plant El Salvador
Chile	PUNITAQUI
Chile	DON WALTERIO
Chile	DIESEL ZOFRI (ZOFRI 1-6_ZOFRI 1-5)
Chile	DIESEL TAMAYA (SUTA)
Afghanistan	Pul-e-Khumri Hydroelectric Power Plant Afghanistan
Chile	DIESEL IQUIQUE(MSIQ_TGIQ)
Chile	DIESEL ENAEX (CUMMINS-DEUTZ)
Chile	DIESEL ARICA(GMAR_M1AR)
Chile	DIEGO DE ALMAGRO (U1-U2)
Chile	DEGAN
Chile	Coelemu
Chile	CholguÃn
Chile	Celco
Angola	Luanda Diesel

Table 2.4.2 – Missing Data

2.5 Wrong Data

2.5.1 Description

There were lot of spelling mistakes identified in the spreadsheet. Few cases, the words are mis spelled. In few cases, in country column, instead of code, country name is displayed. The wrong data is replaced by correct data by manually deleting them using Microsoft Excel.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	country	country_long	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_c	generatior
3496	ESP	Spain	ACECA GF	WRI10061	758.74	39.9427	-3.8548	Gas				2006	GAS NATU	Red ElÃ©c	http://ww	GEODB		
3497	ESP	Spain	ADS JUNEI	WRI10061	15	41.5485	0.8245	Waste				2004	VALORITZ	Red ElÃ©c	http://ww	CARMA		
3498	ESP	Spain	AGREDA	WRI10061	18	41.8559	-1.9224	Wind				2013	PARQUE E	Red ElÃ©c	http://ww	CARMA		
3499	ESP	Spain	AGREDA	WRI10061	16.334	41.8559	-1.9224	Waste				2000	INTEVER S	Red ElÃ©c	http://ww	CARMA		
3500	ESP	Spain	AGROENE	WRI10061	20	37.6167	-4.3225	Biomass					AGROENE	Red ElÃ©c	http://ww	CARMA		
3501	ESP	Spain	AGUAYO 3	WRI10061	360.6	43.0952	-4.0004	Hydro				1983	VIESGO GI	Red ElÃ©c	http://ww	WRI		
3502	ESP	Spain	ALBARELL	WRI10061	67.6	42.4333	-8.1443	Hydro				1973	GAS NATU	Red ElÃ©c	http://ww	CARMA		
3503	ESP	Spain	ALCUDIA 1	WRI10061	533.8	39.8106	3.0913	Coal	Oil			1981	GAS Y ELE	Red ElÃ©c	http://ww	CARMA		
3504	ESP	Spain	ALDEADA\	WRI10061	1226.43	41.2117	-6.6856	Hydro				1986	IBERDROL	Red ElÃ©c	http://ww	GEODB		
3505	ESP	Spain	ALENTISQ	WRI10061	46.5	41.4206	-2.3319	Wind				2007	PARQUES	Red ElÃ©c	http://ww	CARMA		
3506	ESP	Spain	ALTO DE L	WRI10061	11.05	41.5406	-1.7166	Wind					IBERDROL	Red ElÃ©c	http://ww	CARMA		
3507	Spain	Spain	AMOREBII	WRI10061	786.42	43.2347	-2.7497	Gas				2005	BIZKAIA EI	Red ElÃ©c	http://ww	GEODB		
3508	ESP	Spain	AMPLIACI	WRI10061	11.05	42.9362	-4.3083	Wind					CORPORA	Red ElÃ©c	http://ww	CARMA		
3509	ESP	Spain	AMPLIACI	WRI10061	18	42.0357	-6.9054	Wind				2009	IBEREOLIC	Red ElÃ©c	http://ww	CARMA		
3510	ESP	Spain	AMPLIACI	WRI10061	13.5	41.7389	-2.1697	Wind				2013	PARQUE E	Red ElÃ©c	http://ww	CARMA		
3511	Spain	Spain	ANDASOL-	WRI10061	149.7	37.2281	-3.0511	Solar				2011	MARQUES	Red ElÃ©c	http://ww	GEODB		
3512	Spain	Spain	ANLLARES	WRI10061	346.84	42.8385	-6.5332	Coal				1982	GAS NATU	Red ElÃ©c	http://ww	CARMA		
3513	ESP	Spain	ARBON 2	WRI10062	56.04	43.4486	-6.7053	Hydro				1968	VIESGO GI	Red ElÃ©c	http://ww	CARMA		
3514	ESP	Spain	ARCOS DE	WRI10062	1585.39	36.6721	-5.8164	Gas				2005	IBERDROL	Red ElÃ©c	http://ww	GEODB		
3515	ESP	Spain	ARONA 1	WRI10062	43.2	28.0996	-16.681	Oil				2003	UNION FU	Red ElÃ©c	http://ww	CARMA		

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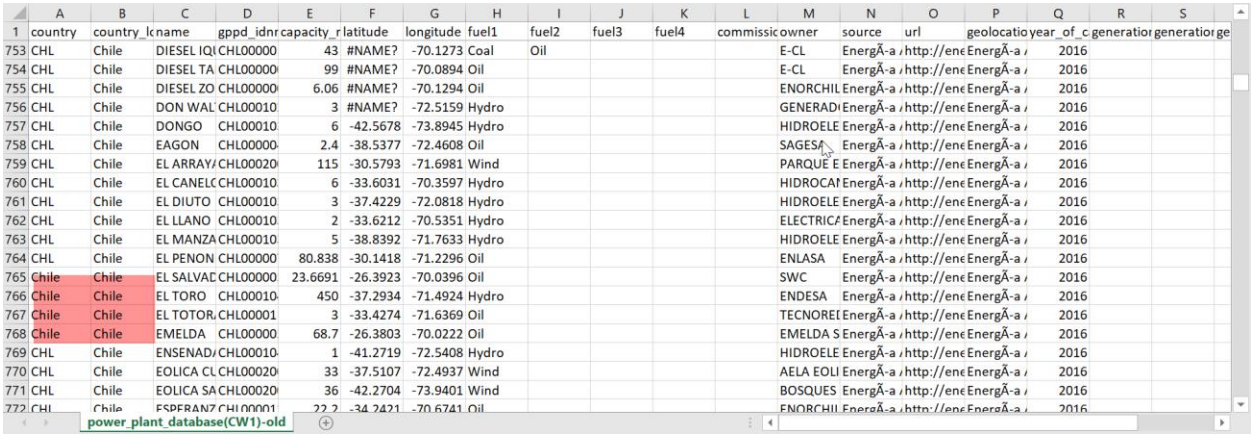
Fig 2.5.1 – a – "Spain" in place of "ESP"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	country	country_l	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_c	generatior	
753	CHL	Chile	DIESEL IQ	CHL00000	43	#NAME?	-70.1273	Coal	Oil				E-CL	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
754	CHL	Chile	DIESEL TA	CHL00000	99	#NAME?	-70.0894	Oil					E-CL	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
755	CHL	Chile	DIESEL ZO	CHL00000	6.06	#NAME?	-70.1294	Oil					ENORCHIL	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
756	CHL	Chile	DON WAL	CHL00010	3	#NAME?	-72.5159	Hydro					GENERAD	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
757	CHL	Chile	DONGO	CHL00010	6	-42.5678	-73.8945	Hydro					HIDROELE	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
758	CHL	Chile	EAGON	CHL00000	2.4	-38.5377	-72.4608	Oil					SAGESA	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
759	CHL	Chile	EL ARRAY/	CHL00020	115	-30.5793	-71.6981	Wind					PARQUE E	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
760	CHL	Chile	EL CANELC	CHL00010	6	-33.6031	-70.3597	Hydro					HIDROCAI	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
761	CHL	Chile	EL DIUTO	CHL00010	3	-37.4229	-72.0818	Hydro					HIDROELE	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
762	CHL	Chile	EL LLANO	CHL00010	2	-33.6212	-70.5351	Hydro					ELECTRIC/	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
763	CHL	Chile	EL MANZA	CHL00010	5	-38.8392	-71.7633	Hydro					HIDROELE	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
764	CHL	Chile	EL PENON	CHL00000	80.838	-30.1418	-71.2296	Oil					ENLASA	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
765	Chile	Chile	EL SALVAI	CHL00000	23.6691	-26.3923	-70.0396	Oil					SWC	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
766	Chile	Chile	EL TORO	CHL00010	450	-37.2934	-71.4924	Hydro					ENDESA	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
767	Chile	Chile	EL TOTOR	CHL00001	3	-33.4274	-71.6369	Oil					TECNOREI	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
768	Chile	Chile	EMELDA	CHL00000	68.7	-26.3803	-70.0222	Oil					EMELDA S	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
769	CHL	Chile	ENSENAD/	CHL00010	1	-41.2719	-72.5408	Hydro					HIDROELE	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
770	CHL	Chile	EOLICA CL	CHL00020	33	-37.5107	-72.4937	Wind					AELA EOLI	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
771	CHL	Chile	EOLICA SA	CHL00020	36	-42.2704	-73.9401	Wind					BOSQUES	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
772	CHL	Chile	ESPERANZ	CHL00001	22.2	-34.2421	-70.6741	Oil					ENORCHIL	EnergÃ-a /	http://ene	EnergÃ-a /	2016		

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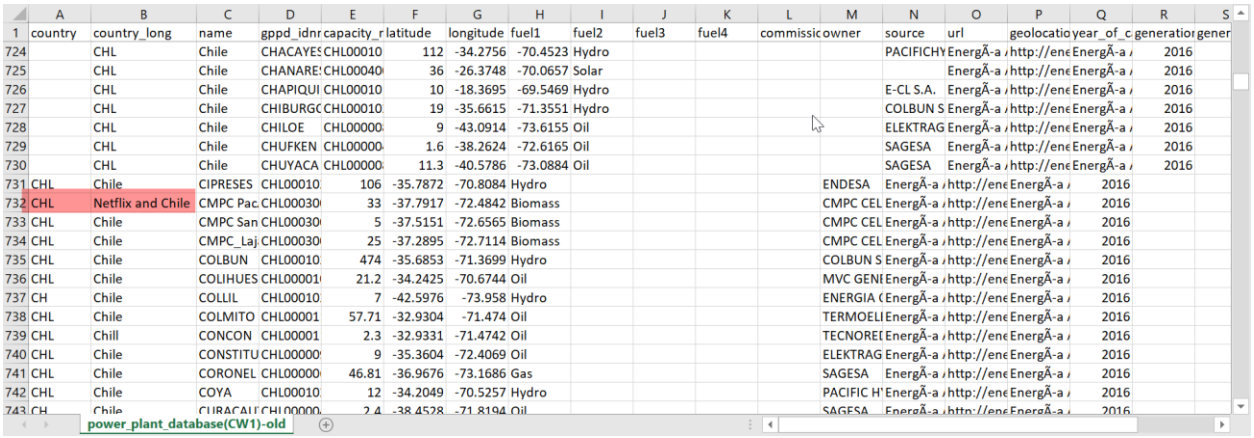
Fig 2.5.1 – b – "Chile" in place of "CHL"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	country	country_long	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissio	owner	source	url	geolocatio	year_of_c	generatior	gener
724		CHL	Chile	CHACAYES	CHL00010	112	-34.2756	-70.4523	Hydro					PACIFICHY	EnergÃ-a /	http://ene	EnergÃ-a /	2016	
725		CHL	Chile	CHANARE	CHL00040	36	-26.3748	-70.0657	Solar						EnergÃ-a /	http://ene	EnergÃ-a /	2016	
726		CHL	Chile	CHAPIQUI	CHL00010	10	-18.3695	-69.5469	Hydro					E-CL S.A.	EnergÃ-a /	http://ene	EnergÃ-a /	2016	
727		CHL	Chile	CHIBURG	CHL00010	19	-35.6615	-71.3551	Hydro					COLBUN S	EnergÃ-a /	http://ene	EnergÃ-a /	2016	
728		CHL	Chile	CHILOE	CHL00000	9	-43.0914	-73.6155	Oil					ELEKTRAG	EnergÃ-a /	http://ene	EnergÃ-a /	2016	
729		CHL	Chile	CHUFKEN	CHL00000	1.6	-38.2624	-72.6165	Oil					SAGESA	EnergÃ-a /	http://ene	EnergÃ-a /	2016	
730		CHL	Chile	CHUYACA	CHL00000	11.3	-40.5786	-73.0884	Oil					SAGESA	EnergÃ-a /	http://ene	EnergÃ-a /	2016	
731	CHL	Chile	CIPRESES	CHL00010	106	-35.7872	-70.8084	Hydro					ENDESA	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
732	CHL	Netflix and Chile	CMPC Pac	CHL00030	33	-37.7917	-72.4842	Biomass					CMPC CEL	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
733	CHL	Chile	CMPC San	CHL00030	5	-37.5151	-72.6565	Biomass					CMPC CEL	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
734	CHL	Chile	CMPC_Laj	CHL00030	25	-37.2895	-72.7114	Biomass					CMPC CEL	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
735	CHL	Chile	COLBUN	CHL00010	474	-35.6853	-71.3699	Hydro					COLBUN S	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
736	CHL	Chile	COLIHUES	CHL00001	21.2	-34.2425	-70.6744	Oil					MVC GENI	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
737	CH	Chile	COLLIL	CHL00010	7	-42.5976	-73.958	Hydro					ENERGIA (	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
738	CHL	Chile	COLMITO	CHL00001	57.71	-32.9304	-71.474	Oil					TERMOELI	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
739	CHL	Chill	CONCON	CHL00001	2.3	-32.9331	-71.4742	Oil					TECNOREI	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
740	CHL	Chile	CONSTITU	CHL00000	9	-35.3604	-72.4069	Oil					ELEKTRAG	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
741	CHL	Chile	CORONEL	CHL00000	46.81	-36.9676	-73.1686	Gas					SAGESA	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
742	CHL	Chile	COYA	CHL00010	12	-34.2049	-70.5257	Hydro					PACIFIC H	EnergÃ-a /	http://ene	EnergÃ-a /	2016		
743	CH	Chile	CURACAU	CHL00000	2.4	-38.4528	-71.8194	Oil					SAGESA	EnergÃ-a /	http://ene	EnergÃ-a /	2016		

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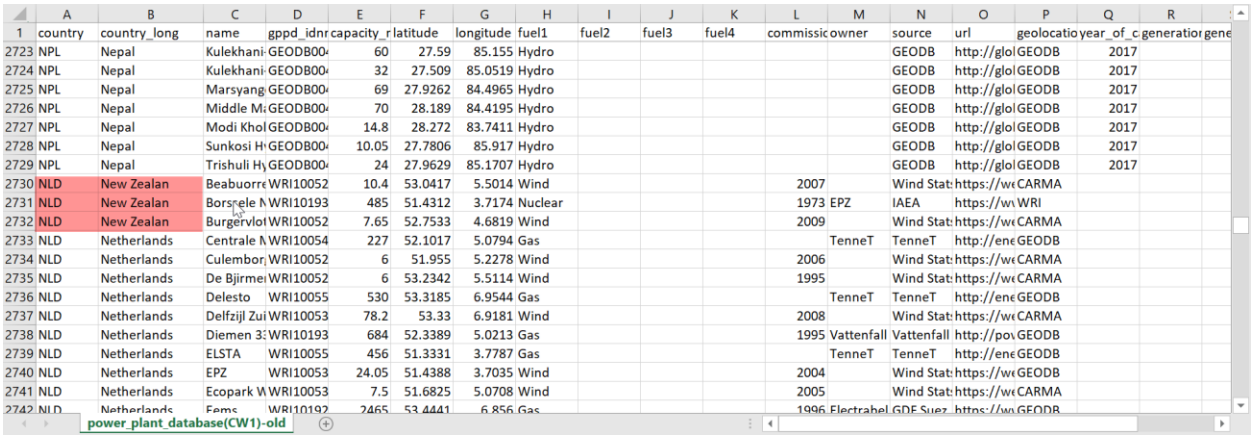
Fig 2.5.1 – c – “Netflix and Chile” in place of “Chile”



1	country	country_long	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissic	owner	source	url	geolocatio	year_of_c	generatior	gene
2723	NPL	Nepal	Kulekhani-	GEODB00	60	27.59	85.155	Hydro						GEODB	http://glo	GEODB	2017		
2724	NPL	Nepal	Kulekhani-	GEODB00	32	27.509	85.0519	Hydro						GEODB	http://glo	GEODB	2017		
2725	NPL	Nepal	Marsyang	GEODB00	69	27.9262	84.4965	Hydro						GEODB	http://glo	GEODB	2017		
2726	NPL	Nepal	Middle M	GEODB00	70	28.189	84.4195	Hydro						GEODB	http://glo	GEODB	2017		
2727	NPL	Nepal	Modi Khol	GEODB00	14.8	28.272	83.7411	Hydro						GEODB	http://glo	GEODB	2017		
2728	NPL	Nepal	Sunkosi H	GEODB00	10.05	27.7806	85.917	Hydro						GEODB	http://glo	GEODB	2017		
2729	NPL	Nepal	Trishuli H	GEODB00	24	27.9629	85.1707	Hydro						GEODB	http://glo	GEODB	2017		
2730	NLD	New Zealan	Beabuorre	WRI10052	10.4	53.0417	5.5014	Wind				2007		Wind Stat	https://we	CARMA			
2731	NLD	New Zealan	Borssele N	WRI10193	485	51.4312	3.7174	Nuclear				1973	EPZ	IAEA	https://wi	WRI			
2732	NLD	New Zealan	Burgervlot	WRI10052	7.65	52.7533	4.6819	Wind				2009		Wind Stat	https://we	CARMA			
2733	NLD	Netherlands	Centrale N	WRI10054	227	52.1017	5.0794	Gas					TenneT	TenneT	http://ene	GEODB			
2734	NLD	Netherlands	Culembor	WRI10052	6	51.955	5.2278	Wind				2006		Wind Stat	https://we	CARMA			
2735	NLD	Netherlands	De Bjirme	WRI10052	6	53.2342	5.5114	Wind				1995		Wind Stat	https://we	CARMA			
2736	NLD	Netherlands	Delesto	WRI10055	530	53.3185	6.9544	Gas					TenneT	TenneT	http://ene	GEODB			
2737	NLD	Netherlands	Delfzijl Zui	WRI10053	78.2	53.33	6.9181	Wind				2008		Wind Stat	https://we	CARMA			
2738	NLD	Netherlands	Diemen 33	WRI10193	684	52.3389	5.0213	Gas				1995	Vattenfall	Vattenfall	http://po	GEODB			
2739	NLD	Netherlands	ELSTA	WRI10055	456	51.3331	3.7787	Gas					TenneT	TenneT	http://ene	GEODB			
2740	NLD	Netherlands	EPZ	WRI10053	24.05	51.4388	3.7035	Wind				2004		Wind Stat	https://we	GEODB			
2741	NLD	Netherlands	Ecopark W	WRI10053	7.5	51.6825	5.0708	Wind				2005		Wind Stat	https://we	CARMA			
2742	NLD	Netherlands	Fems	WRI10192	2465	53.4441	6.856	Gas				1996	Electrabel	GDF Suez	https://wi	GEODB			

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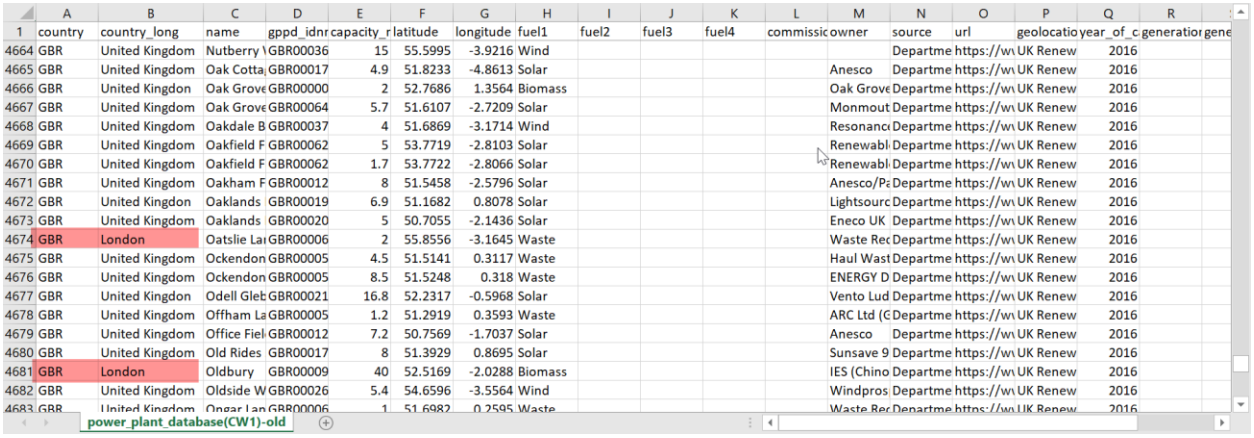
Fig 2.5.1 – d – “New Zealan” in place of “Netherlands”



1	country	country_long	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissic	owner	source	url	geolocatio	year_of_c	generatior	gene
4664	GBR	United Kingdom	Nutberry \	GBR00036	15	55.5995	-3.9216	Wind						Departme	https://wi	UK Renew	2016		
4665	GBR	United Kingdom	Oak Cotta	GBR00017	4.9	51.8233	-4.8613	Solar					Anesco	Departme	https://wi	UK Renew	2016		
4666	GBR	United Kingdon	Oak Grove	GBR00000	2	52.7686	1.3564	Biomass					Oak Grove	Departme	https://wi	UK Renew	2016		
4667	GBR	United Kingdom	Oak Grove	GBR00064	5.7	51.6107	-2.7209	Solar					Monmout	Departme	https://wi	UK Renew	2016		
4668	GBR	United Kingdom	Oakdale B	GBR00037	4	51.6869	-3.1714	Wind					Resonanc	Departme	https://wi	UK Renew	2016		
4669	GBR	United Kingdom	Oakfield F	GBR00062	5	53.7719	-2.8103	Solar					Renewabl	Departme	https://wi	UK Renew	2016		
4670	GBR	United Kingdom	Oakfield F	GBR00062	1.7	53.7722	-2.8066	Solar					Renewabl	Departme	https://wi	UK Renew	2016		
4671	GBR	United Kingdom	Oakham F	GBR00012	8	51.5458	-2.5796	Solar					Anesco/Pa	Departme	https://wi	UK Renew	2016		
4672	GBR	United Kingdon	Oaklands	GBR00019	6.9	51.1682	0.8078	Solar					Lightsourc	Departme	https://wi	UK Renew	2016		
4673	GBR	United Kingdom	Oaklands	GBR00020	5	50.7055	-2.1436	Solar					Eneco UK	Departme	https://wi	UK Renew	2016		
4674	GBR	London	Oatslie Lai	GBR00006	2	55.8556	-3.1645	Waste					Waste Rec	Departme	https://wi	UK Renew	2016		
4675	GBR	United Kingdom	Ockendon	GBR00005	4.5	51.5141	0.3117	Waste					Haul Wast	Departme	https://wi	UK Renew	2016		
4676	GBR	United Kingdom	Ockendon	GBR00005	8.5	51.5248	0.318	Waste					ENERGY D	Departme	https://wi	UK Renew	2016		
4677	GBR	United Kingdon	Odell Gleb	GBR00021	16.8	52.2317	-0.5968	Solar					Vento Lud	Departme	https://wi	UK Renew	2016		
4678	GBR	United Kingdom	Offham La	GBR00005	1.2	51.2919	0.3593	Waste					ARC Ltd (C	Departme	https://wi	UK Renew	2016		
4679	GBR	United Kingdom	Office Fiel	GBR00012	7.2	50.7569	-1.7037	Solar					Anesco	Departme	https://wi	UK Renew	2016		
4680	GBR	United Kingdom	Old Rides	GBR00017	8	51.3929	0.8695	Solar					Sunsave 9	Departme	https://wi	UK Renew	2016		
4681	GBR	London	Oldbury	GBR00009	40	52.5169	-2.0288	Biomass					IES (Chino	Departme	https://wi	UK Renew	2016		
4682	GBR	United Kingdom	Oldside W	GBR00026	5.4	54.6596	-3.5564	Wind					Windpros	Departme	https://wi	UK Renew	2016		
4683	GBR	United Kingdom	Ongar Lan	GBR00006	1	51.6982	0.2595	Waste					Waste Rec	Departme	https://wi	UK Renew	2016		

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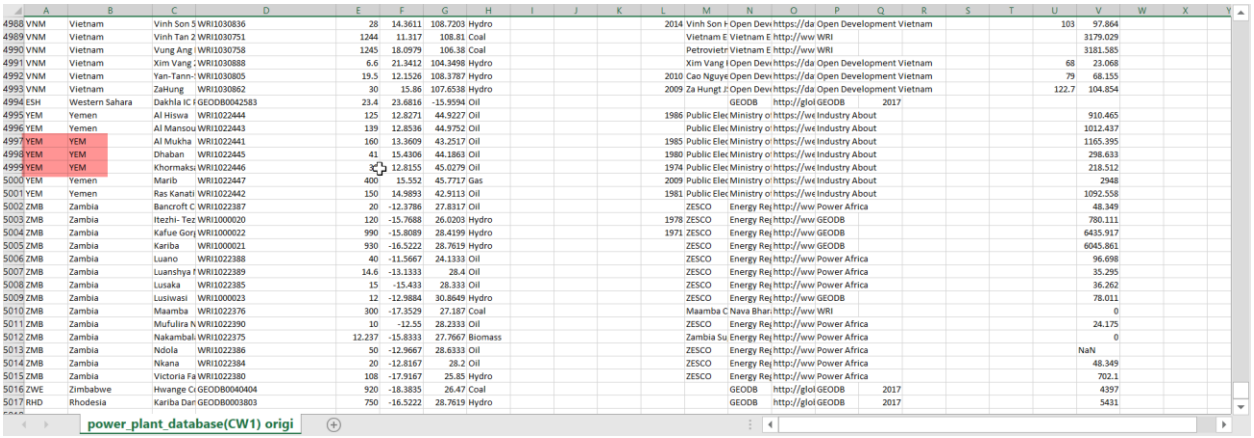
Fig 2.5.1 – e – “London” in place of “United Kingdom”



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
4988	VNM	Vietnam	Vinh Son 5	WRI1030836	28	14.3611	108.7203	Hydro				2014	Vinh Son H	Open Dev	https://da	Open Development	Vietnam				103	97.864			
4989	VNM	Vietnam	Vinh Tan 2	WRI1030751	1244	11.317	108.81	Coal					Vietnam E	Vietnam E	http://ww	WRI						3179.029			
4990	VNM	Vietnam	Vung Ang	WRI1030758	1245	18.0979	106.38	Coal					Petrovietr	Vietnam E	http://ww	WRI						3181.585			
4991	VNM	Vietnam	Xim Vang	WRI1030888	6.6	21.3412	104.3498	Hydro					Xim Vang I	Open Dev	https://da	Open Development	Vietnam				68	23.068			
4992	VNM	Vietnam	Yan-Tann-	WRI1030805	19.5	12.1526	108.3787	Hydro				2010	Cao Nguye	Open Dev	https://da	Open Development	Vietnam				79	68.155			
4993	VNM	Vietnam	ZaHung	WRI1030862	30	15.86	107.6538	Hydro				2009	Za Hung J	Open Dev	https://da	Open Development	Vietnam				122.7	104.854			
4994	ESH	Western Sahara	Dakhla IC	GEODB0042583	23.4	23.6816	-15.9594	Oil						GEODB	http://glo	GEODB	2017								
4995	YEM	Yemen	Al Hiswa	WRI1022444	125	12.8271	44.9227	Oil				1986	Public Elec	Ministry o	https://we	Industry About						910.465			
4996	YEM	Yemen	Al Mansou	WRI1022443	139	12.8536	44.9752	Oil					Public Elec	Ministry o	https://we	Industry About						1012.437			
4997	YEM	YEM	Al Mukha	WRI1022441	160	13.3609	43.2517	Oil				1985	Public Elec	Ministry o	https://we	Industry About						1165.395			
4998	YEM	YEM	Dhaban	WRI1022445	41	15.4306	44.1863	Oil				1980	Public Elec	Ministry o	https://we	Industry About						298.633			
4999	YEM	YEM	Khormaks	WRI1022446	3	12.8155	45.0279	Oil				1974	Public Elec	Ministry o	https://we	Industry About						218.512			
5000	YEM	Yemen	Marib	WRI1022447	400	15.552	45.7717	Gas				2009	Public Elec	Ministry o	https://we	Industry About						2948			
5001	YEM	Yemen	Ras Kanati	WRI1022442	150	14.9893	42.9113	Oil				1981	Public Elec	Ministry o	https://we	Industry About						1092.558			
5002	ZMB	Zambia	Bancroft C	WRI1022387	20	-12.3786	27.8317	Oil					ZESCO	Energy Re	http://ww	Power Africa						48.349			
5003	ZMB	Zambia	Itezhi- Tez	WRI1000020	120	-15.7688	26.0203	Hydro				1978	ZESCO	Energy Re	http://ww	GEODB						780.111			
5004	ZMB	Zambia	Kafue Gor	WRI1000022	990	-15.8089	28.4199	Hydro				1971	ZESCO	Energy Re	http://ww	GEODB						6435.917			
5005	ZMB	Zambia	Kariba	WRI1000021	930	-16.5222	28.7619	Hydro					ZESCO	Energy Re	http://ww	GEODB						6045.861			
5006	ZMB	Zambia	Luano	WRI1022388	40	-11.5667	24.1333	Oil					ZESCO	Energy Re	http://ww	Power Africa						96.698			
5007	ZMB	Zambia	Luanshya f	WRI1022389	14.6	-13.1333	28.4	Oil					ZESCO	Energy Re	http://ww	Power Africa						35.295			
5008	ZMB	Zambia	Lusaka	WRI1022385	15	-15.433	28.333	Oil					ZESCO	Energy Re	http://ww	Power Africa						36.262			
5009	ZMB	Zambia	Lusiwasi	WRI1000023	12	-12.9884	30.8649	Hydro					ZESCO	Energy Re	http://ww	GEODB						78.011			
5010	ZMB	Zambia	Maamba	WRI1022376	300	-17.3529	27.187	Coal					Maamba C	Nava Bhar	http://ww	WRI						0			
5011	ZMB	Zambia	Mufulira N	WRI1022390	10	-12.55	28.2333	Oil					ZESCO	Energy Re	http://ww	Power Africa						24.175			
5012	ZMB	Zambia	Nakambali	WRI1022375	12.237	-15.8333	27.7667	Biomass					Zambia Su	Energy Re	http://ww	Power Africa						0			
5013	ZMB	Zambia	Ndola	WRI1022386	50	-12.9667	28.6333	Oil					ZESCO	Energy Re	http://ww	Power Africa						NaN			
5014	ZMB	Zambia	Nkana	WRI1022384	20	-12.8167	28.2	Oil					ZESCO	Energy Re	http://ww	Power Africa						48.349			
5015	ZMB	Zambia	Victoria Fa	WRI1022380	108	-17.9167	25.85	Hydro					ZESCO	Energy Re	http://ww	Power Africa						702.1			
5016	ZWE	Zimbabwe	Hwange C	GEODB0040404	920	-18.3835	26.47	Coal						GEODB	http://glo	GEODB	2017						4397			
5017	RHD	Rhodesia	Kariba Dar	GEODB0003803	750	-16.5222	28.7619	Hydro						GEODB	http://glo	GEODB	2017						5431			

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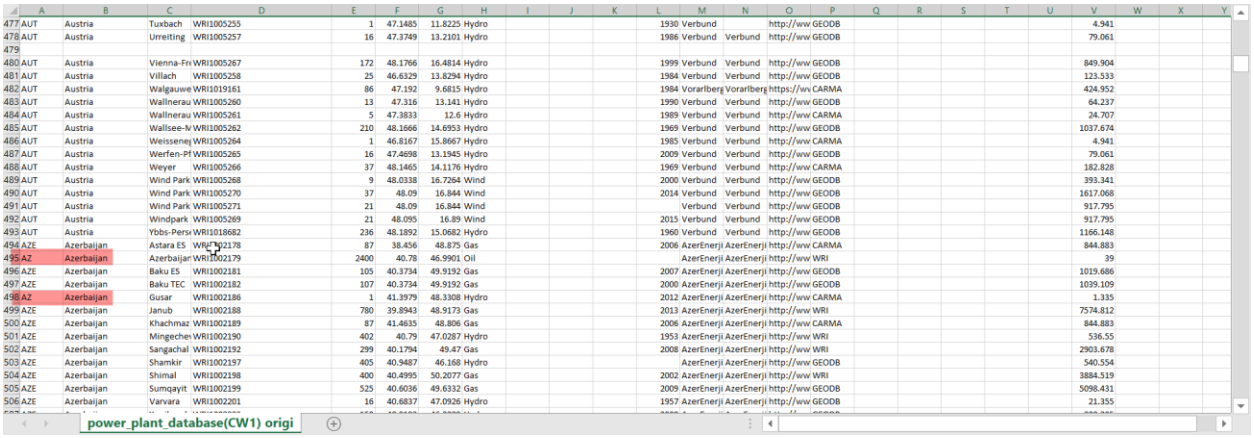
Fig 2.5.1 – f – "YEM" in place of "Yemen"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
477	AUT	Austria	Tuxbach	WRI1005255	1	47.1485	11.8225	Hydro				1930	Verbund		http://ww	GEODB						4.941			
478	AUT	Austria	Urreiting	WRI1005257	16	47.3749	13.2101	Hydro				1986	Verbund	Verbund	http://ww	GEODB						79.061			
479																									
480	AUT	Austria	Vienna-Fri	WRI1005267	172	48.1766	16.4814	Hydro				1999	Verbund	Verbund	http://ww	GEODB						849.904			
481	AUT	Austria	Villach	WRI1005258	25	46.6329	13.8294	Hydro				1984	Verbund	Verbund	http://ww	GEODB						123.533			
482	AUT	Austria	Walgauwe	WRI1019161	86	47.192	9.6815	Hydro				1984	Vorarlberg	Vorarlberg	https://ww	CARMA						424.952			
483	AUT	Austria	Wallnerau	WRI1005260	13	47.316	13.141	Hydro				1990	Verbund	Verbund	http://ww	GEODB						64.237			
484	AUT	Austria	Wallnerau	WRI1005261	5	47.3833	12.6	Hydro				1989	Verbund	Verbund	http://ww	CARMA						24.707			
485	AUT	Austria	Wallsee-M	WRI1005262	210	48.1666	14.6953	Hydro				1969	Verbund	Verbund	http://ww	GEODB						1037.674			
486	AUT	Austria	Weissenej	WRI1005264	1	46.8167	15.8667	Hydro				1985	Verbund	Verbund	http://ww	CARMA						4.941			
487	AUT	Austria	Werfen-Pf	WRI1005265	16	47.4698	13.1945	Hydro				2009	Verbund	Verbund	http://ww	GEODB						79.061			
488	AUT	Austria	Weyer	WRI1005266	37	48.1465	14.1176	Hydro				1969	Verbund	Verbund	http://ww	CARMA						182.828			
489	AUT	Austria	Wind Park	WRI1005268	9	48.0338	16.7264	Wind				2000	Verbund	Verbund	http://ww	GEODB						393.341			
490	AUT	Austria	Wind Park	WRI1005270	37	48.09	16.844	Wind				2014	Verbund	Verbund	http://ww	GEODB						1617.068			
491	AUT	Austria	Wind Park	WRI1005271	21	48.09	16.844	Wind					Verbund	Verbund	http://ww	GEODB						917.795			
492	AUT	Austria	Windpark	WRI1005269	21	48.095	16.89	Wind				2015	Verbund	Verbund	http://ww	GEODB						917.795			
493	AUT	Austria	Ybbs-Pers	WRI1018682	236	48.1892	15.0682	Hydro				1960	Verbund	Verbund	http://ww	GEODB						1166.148			
494	AZE	Azerbaijan	Astara ES	WRI1002178	87	38.456	48.875	Gas				2006	AzerEnerji	AzerEnerji	http://ww	CARMA						844.883			
495	AZ	Azerbaijan	Azerbaijan	WRI1002179	2400	40.78	46.9901	Oil					AzerEnerji	AzerEnerji	http://ww	WRI						39			
496	AZE	Azerbaijan	Baku ES	WRI1002181	105	40.3734	49.9192	Gas				2007	AzerEnerji	AzerEnerji	http://ww	GEODB						1019.686			
497	AZE	Azerbaijan	Baku TEC	WRI1002182	107	40.3734	49.9192	Gas				2000	AzerEnerji	AzerEnerji	http://ww	GEODB						1039.109			
498	AZ	Azerbaijan	Gusar	WRI1002186	1	41.3979	48.3308	Hydro				2012	AzerEnerji	AzerEnerji	http://ww	CARMA						1.335			
499	AZE	Azerbaijan	Janub	WRI1002188	780	39.8943	48.9173	Gas				2013	AzerEnerji	AzerEnerji	http://ww	WRI						7574.812			
500	AZE	Azerbaijan	Khachmaz	WRI1002189	87	41.4635	48.806	Gas				2006	AzerEnerji	AzerEnerji	http://ww	CARMA						844.883			
501	AZE	Azerbaijan	Mingechev	WRI1002190	402	40.79	47.0287	Hydro				1953	AzerEnerji	AzerEnerji	http://ww	WRI						536.55			
502	AZE	Azerbaijan	Sangachal	WRI1002192	299	40.1794	49.47	Gas				2008	AzerEnerji	AzerEnerji	http://ww	WRI						2903.678			
503	AZE	Azerbaijan	Shamkir	WRI1002197	405	40.9487	46.168	Hydro					AzerEnerji	AzerEnerji	http://ww	GEODB						540.554			
504	AZE	Azerbaijan	Shimal	WRI1002198	400	40.4995	50.2077	Gas				2002	AzerEnerji	AzerEnerji	http://ww	WRI						3884.519			
505	AZE	Azerbaijan	Sumqayit	WRI1002199	525	40.6036	49.6332	Gas				2009	AzerEnerji	AzerEnerji	http://ww	GEODB						5098.431			
506	AZE	Azerbaijan	Varvara	WRI1002201	16	40.6837	47.0926	Hydro				1957	AzerEnerji	AzerEnerji	http://ww	GEODB						21.355			

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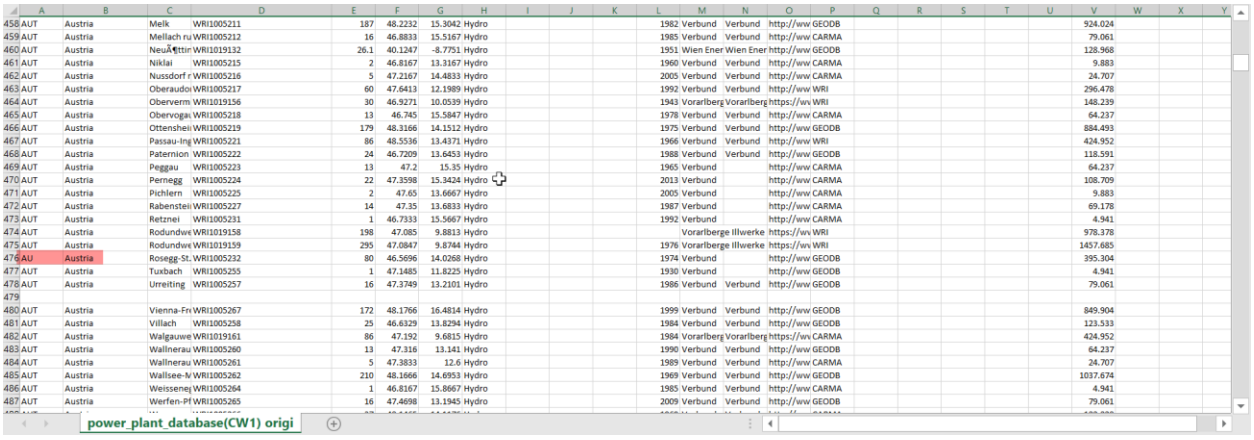
Fig 2.5.1 – g – "AZ" in place of "AZE"



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
458	AUT	Austria	Melk	WRI1005211	187	48.2232	15.3042	Hydro				1982	Verbund	Verbund	http://ww	GEODB						924.024			
459	AUT	Austria	Mellach ru	WRI1005212	16	46.8833	15.5167	Hydro				1985	Verbund	Verbund	http://ww	CARMA						79.061			
460	AUT	Austria	Neu Ã¶tting	WRI1019132	26.1	40.1247	-8.7751	Hydro				1951	Wien Ener	Wien Ener	http://ww	GEODB						128.968			
461	AUT	Austria	Niklai	WRI1005215	2	46.8167	13.3167	Hydro				1960	Verbund	Verbund	http://ww	CARMA						9.883			
462	AUT	Austria	Nussdorf r	WRI1005216	5	47.2167	14.4833	Hydro				2005	Verbund	Verbund	http://ww	CARMA						24.707			
463	AUT	Austria	Oberaudor	WRI1005217	60	47.6413	12.1989	Hydro				1992	Verbund	Verbund	http://ww	WRI						296.478			
464	AUT	Austria	Oberverm	WRI1019156	30	46.9271	10.0539	Hydro				1943	Vorarlberg	Vorarlberg	https://ww	WRI						148.239			
465	AUT	Austria	Obervoga	WRI1005218	13	46.745	15.5847	Hydro				1978	Verbund	Verbund	http://ww	CARMA						64.237			
466	AUT	Austria	Ottenshei	WRI1005219	179	48.3166	14.1512	Hydro				1975	Verbund	Verbund	http://ww	GEODB						884.493			
467	AUT	Austria	Passau-Ing	WRI1005221	86	48.5536	13.4371	Hydro				1966	Verbund	Verbund	http://ww	WRI						424.952			
468	AUT	Austria	Paternion	WRI1005222	24	46.7209	13.6453	Hydro				1988	Verbund	Verbund	http://ww	GEODB						118.591			
469	AUT	Austria	Peggau	WRI1005223	13	47.2	15.35	Hydro				1965	Verbund		http://ww	CARMA						64.237			
470	AUT	Austria	Pernegg	WRI1005224	22	47.3598	15.3424	Hydro				2013	Verbund		http://ww	CARMA						108.709			
471	AUT	Austria	Pichlern	WRI1005225	2	47.65	13.6667	Hydro				2005	Verbund		http://ww	CARMA						9.883			
472	AUT	Austria	Rabenstei	WRI1005227	14	47.35	13.6833	Hydro				1987	Verbund		http://ww	CARMA						69.178			
473	AUT	Austria	Retznei	WRI1005231	1	46.7333	15.5667	Hydro				1992	Verbund		http://ww	CARMA						4.941			
474	AUT	Austria	Rodundwe	WRI1019158	198	47.085	9.8813	Hydro					Vorarlberge	Illwerke	https://ww	WRI						978.378			
475	AUT	Austria	Rodundwe	WRI1019159	295	47.0847	9.8744	Hydro				1976	Vorarlberge	Illwerke	https://ww	WRI						1457.685			
476	AU	Austria	Rosegg-St.	WRI1005232	80	46.5696	14.0268	Hydro				1974	Verbund		http://ww	GEODB						395.304			
477	AUT	Austria	Tuxbach	WRI1005255	1	47.1485	11.8225	Hydro				1930	Verbund		http://ww	GEODB						4.941			
478	AUT	Austria	Urreiting	WRI1005257	16	47.3749	13.2101	Hydro				1986	Verbund	Verbund	http://ww	GEODB						79.061			
479																									
480	AUT	Austria	Vienna-Fri	WRI1005267	172	48.1766	16.4814	Hydro				1999	Verbund	Verbund	http://ww	GEODB						849.904			
481	AUT	Austria	Villach	WRI1005258	25	46.6329	13.8294	Hydro				1984	Verbund	Verbund	http://ww	GEODB						123.533			
482	AUT	Austria	Walgauwe	WRI1019161	86	47.192	9.6815	Hydro				1984	Vorarlberg	Vorarlberg	https://ww	CARMA						424.952			
483	AUT	Austria	Wallnerau	WRI1005260	13	47.316	13.141	Hydro				1990	Verbund	Verbund	http://ww	GEODB						64.237			
484	AUT	Austria	Wallnerau	WRI1005261	5	47.3833	12.6	Hydro				1989	Verbund	Verbund	http://ww	CARMA						24.707			
485	AUT	Austria	Wallsee-M	WRI1005262	210	48.1666	14.6953	Hydro				1969	Verbund	Verbund	http://ww	GEODB						1037.674			
486	AUT	Austria	Weissenej	WRI1005264	1	46.8167	15.8667	Hydro				1985	Verbund	Verbund	http://ww	CARMA						4.941			
487	AUT	Austria	Werfen-Pf	WRI1005265	16	47.4698	13.1945	Hydro				2009	Verbund	Verbund	http://ww	GEODB						79.061			

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Fig 2.5.1 – h – "AU" in place of "AUT"

2.5.2 Observation

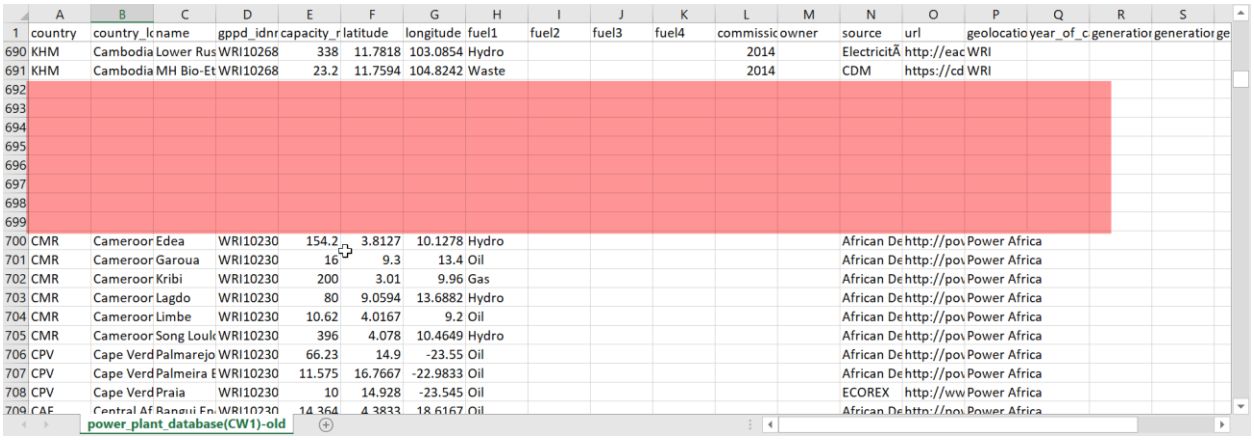
S.No	Type	Mis-Spelled Word	Correct Spelling	Row Number
1	Country name displayed in Code column	Spain	ESP	3511,3512,3523,3524,3507
2	Country name displayed in Code column	Chile	CHL	765, 766, 767, 768, 834, 835, 836, 837
3	country_long column has wrong country name	Netflix and Chile	Chile	732,751
4	Wrong Country name displayed	New Zealan	Netherlands	2730, 2731, 2732, 2762
5	Wrong Country name displayed	London	United Kingdom	4663, 4674, 4681
6	Country code displayed in country_long column	YEM	Yemen	49997 – 4999
7	Wrong country code displayed in country column	AZ	AZE	494, 497
8	Wrong country code displayed in country column	AU	AUT	476

Table 2.5.2 – Wrong Data Rows

2.6 Remove Empty Rows

2.6.1 Description

There were a lot of empty row between rows of data in the spreadsheet. The empty rows were removed using Microsoft Excel.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	country	country_lc	name	gppd_idnr	capacity_r	latitude	longitude	fuel1	fuel2	fuel3	fuel4	commissic	owner	source	url	geolocatio	year_of_c	generatior	generatio ge
690	KHM	Cambodia	Lower Rus	WRI10268	338	11.7818	103.0854	Hydro				2014		ElectricitÃ	http://eac	WRI			
691	KHM	Cambodia	MH Bio-Et	WRI10268	23.2	11.7594	104.8242	Waste				2014		CDM	https://cd	WRI			
692																			
693																			
694																			
695																			
696																			
697																			
698																			
699																			
700	CMR	Cameroor	Edea	WRI10230	154.2	3.8127	10.1278	Hydro						African De	http://pov	Power Africa			
701	CMR	Cameroor	Garoua	WRI10230	16	9.3	13.4	Oil						African De	http://pov	Power Africa			
702	CMR	Cameroor	Kribi	WRI10230	200	3.01	9.96	Gas						African De	http://pov	Power Africa			
703	CMR	Cameroor	Lagdo	WRI10230	80	9.0594	13.6882	Hydro						African De	http://pov	Power Africa			
704	CMR	Cameroor	Limbe	WRI10230	10.62	4.0167	9.2	Oil						African De	http://pov	Power Africa			
705	CMR	Cameroor	Song Loulc	WRI10230	396	4.078	10.4649	Hydro						African De	http://pov	Power Africa			
706	CPV	Cape Verd	Palmarejo	WRI10230	66.23	14.9	-23.55	Oil						African De	http://pov	Power Africa			
707	CPV	Cape Verd	Palmeira E	WRI10230	11.575	16.7667	-22.9833	Oil						African De	http://pov	Power Africa			
708	CPV	Cape Verd	Praia	WRI10230	10	14.928	-23.545	Oil						ECOREX	http://ww	Power Africa			
709	CAF	Central Af	Bangui En	WRI10230	14.364	4.3833	18.6167	Oil						African De	http://pov	Power Africa			

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Fig 2.6.1 – a – Empty Rows

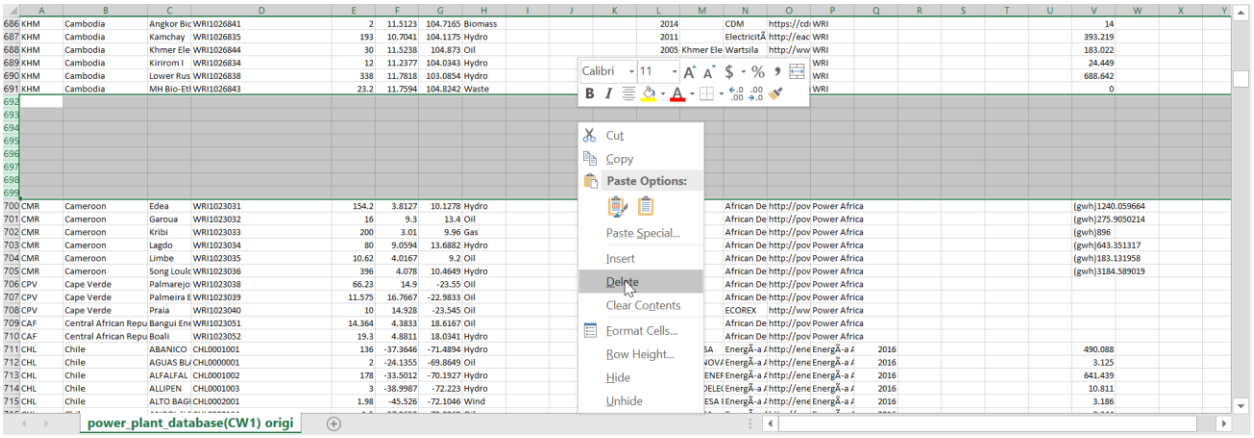

Fig 2.6.2 – b – Delete Empty Rows

2.6.2 Observation

The empty rows are observed in the following rows as well.

S.No:	Row Number
1	536
2	591
3	692 - 699
4	785
5	856
6	933
7	1012
8	1080

9	1126
10	1195
11	1201
12	1281
13	1324
14	1368
15	1449 - 1460
16	1535
17	1619
18	1688
19	1841
20	1880
21	1943
22	2084
23	2109
24	2120
25	2169
26	2828
27	3011
28	3148
29	3284
30	3306
31	3380
32	3442
33	3467 - 3470

Table 2.6.2 – Displaced Rows

2.7 Remove Irrelevant Columns

2.7.1 Description

The spreadsheet has a “Fuel 4” column which has only one entry and all the other cells are empty and another column “gppd_idnr” which only has the unique ID for each power plant and does not contribute any valid information to analysis is removed. Hence, they were removed from the spreadsheet using Open Refine. The dropdown arrow for the “Fuel 4” and “gppd_idnr” columns were clicked and then “Edit Column” was selected. Then in the opo-down list, “Remove this column” option was selected and the respective columns were removed.

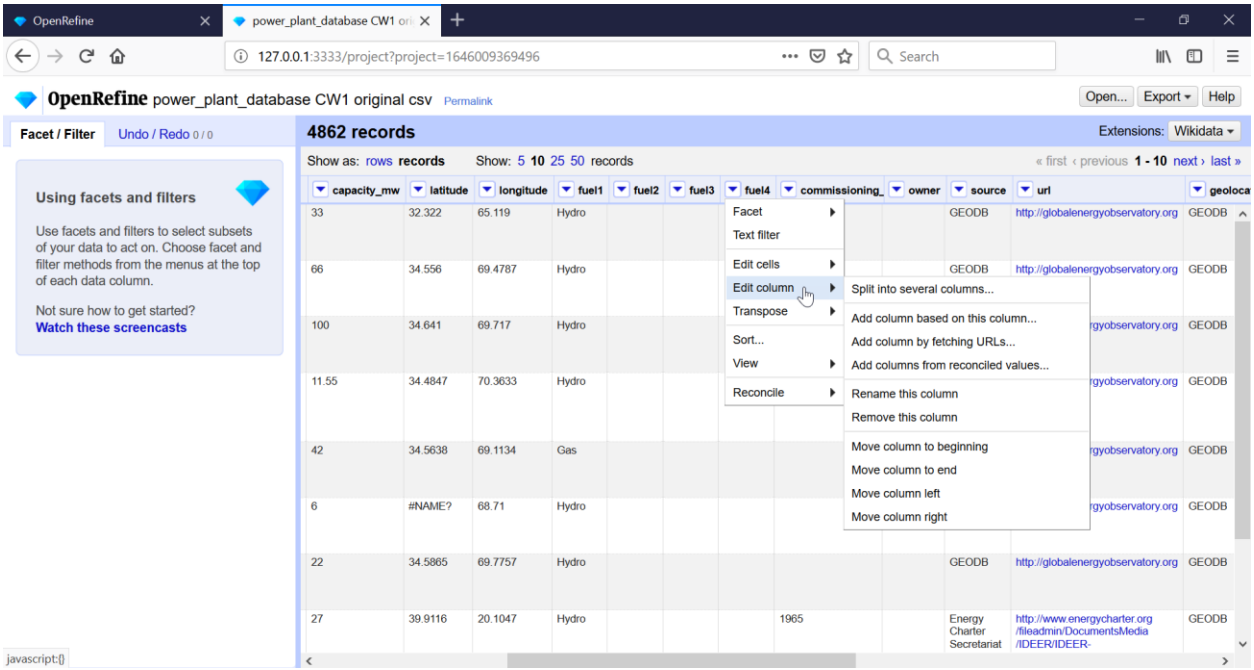

Fig 2.7.1 – a – Remove "Fuel 4" column

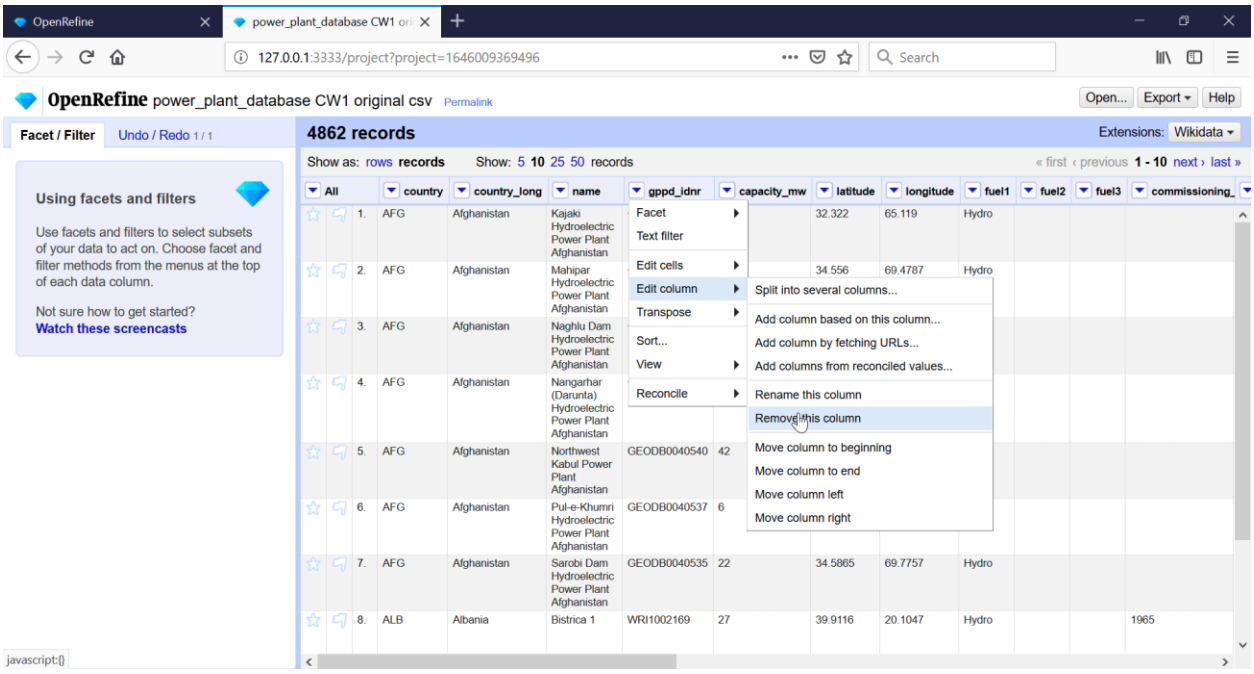

Fig 2.7.1 – b – Remove "gppd_inr" column