

Group SJM Presentation

Impact of Hydro station power output due to river flow,
on retail electricity cost

Jensen Benard
Matt Wylie
Sujung Woo
Richard Li












Hydro station data sources

Source url:

<https://www.emi.ea.govt.nz>

Generation info:

/Wholesale/Datasets/Generation
/Generation_MD

	202008_Generation_MD.csv
	202007_Generation_MD.csv
	202006_Generation_MD.csv
	202005_Generation_MD.csv
	202004_Generation_MD.csv
	202003_Generation_MD.csv
	202002_Generation_MD.csv
	202001_Generation_MD.csv
	201912_Generation_MD.csv
	201911_Generation_MD.csv
	201910_Generation_MD.csv

Hydro station data processing

Site_Code	POC_Code	Nwk_Code	Gen_Code	Fuel_Code	Tech_Code	Trading_date	TP1	TP2	TP3	...
<chr>	<chr>	<chr>	<chr>	<chr>	<chr>	<date>	<dbl>	<dbl>	<dbl>	...
ARA	ARA2201	MRPL	aratiatia	Hydro	Hydro	2020-12-01	12360	13820	16440	...
ARA	ARA2201	MRPL	aratiatia	Hydro	Hydro	2020-12-02	34990	34990	34970	...
ARA	ARA2201	MRPL	aratiatia	Hydro	Hydro	2020-12-03	31800	24850	24690	...
ARA	ARA2201	MRPL	aratiatia	Hydro	Hydro	2020-12-04	24810	24730	24730	...
ARA	ARA2201	MRPL	aratiatia	Hydro	Hydro	2020-12-05	25110	25040	25170	...
ARA	ARA2201	MRPL	aratiatia	Hydro	Hydro	2020-12-06	14830	14820	14800	...
ARA	ARA2201	MRPL	aratiatia	Hydro	Hydro	2020-12-07	11820	11820	11820	...

River Data Sources

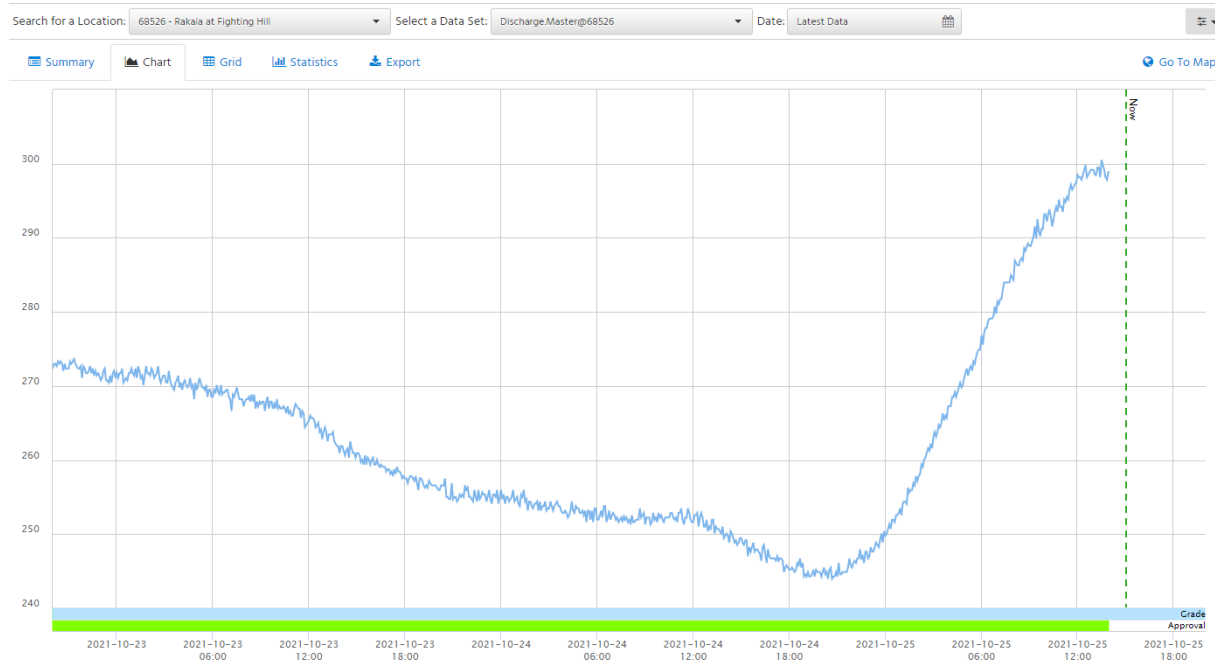


NIWA
Taihoro Nukurangi



AQUARIUS
WebPortal

- Source URL - <https://hydrowebportal.niwa.co.nz/>



	A	B	C	D
1	#Bulk Export - Points every 1 month(s)			
2			68526	
3			Rakaia at Fighting Hill	
4			Discharge.Master	
5	Start of Interval (UTC)	End of Interval (UTC+12:0)	Average (m ³ /s)	
6	1/01/2015 0:00	1/02/2015 0:00	199.2423	
7	1/02/2015 0:00	1/03/2015 0:00	155.9939	
8	1/03/2015 0:00	1/04/2015 0:00	142.9154	
9	1/04/2015 0:00	1/05/2015 0:00	205.8179	
10	1/05/2015 0:00	1/06/2015 0:00	301.8806	
11	1/06/2015 0:00	1/07/2015 0:00	212.3718	
12	1/07/2015 0:00	1/08/2015 0:00	161.869	
13	1/08/2015 0:00	1/09/2015 0:00	188.5812	
14	1/09/2015 0:00	1/10/2015 0:00	142.2178	
15	1/10/2015 0:00	1/11/2015 0:00	185.7722	
16	1/11/2015 0:00	1/12/2015 0:00	200.689	
17	1/12/2015 0:00	1/01/2016 0:00	221.1425	

Export URL

<https://hydrowebportal.niwa.co.nz/Export/BulkExport?DateRange=EntirePeriodOfRecord&TimeZone=12&Calendar=CALENDARYEAR&Interval=1m>

Copy to Clipboard

This URL can be copied and used to download the data directly for easier automatic exporting.

River data processing

Raw data (Not tidy)

A tibble: 10 × 3

X.Bulk.Export...Points.every.1.month.s.	X	X.1
<chr>	<chr>	<chr>
		TK3
	Opuha at Skipton Br. (NRWQN)	
	Discharge Value.NRWQN	
Start of Interval (UTC+12:00)	End of Interval (UTC+12:00)	Average (m^3/s)
2015-01-01 00:00:00	2015-02-01 00:00:00	8.555
2015-02-01 00:00:00	2015-03-01 00:00:00	5.59
2015-03-01 00:00:00	2015-04-01 00:00:00	2.23
2015-04-01 00:00:00	2015-05-01 00:00:00	1.817
2015-05-01 00:00:00	2015-06-01 00:00:00	1.788
2015-06-01 00:00:00	2015-07-01 00:00:00	1.906

Tidy Data

A tibble: 10 × 2

Time	Value(m^3/s)
<chr>	<chr>
2015-01-01 00:00:00	145.568221403779
2015-02-01 00:00:00	114.976124514825
2015-03-01 00:00:00	98.5150735676918
2015-04-01 00:00:00	260.14434004806
2015-05-01 00:00:00	139.35321437759
2015-06-01 00:00:00	158.668757343844
2015-07-01 00:00:00	141.940141886092
2015-08-01 00:00:00	148.165122186851
2015-09-01 00:00:00	128.414025644167
2015-10-01 00:00:00	156.361142966169

A tibble: 10 × 2

Time	Value(m^3/s)
<chr>	<chr>
2015-01-08 10:48:00	500
2015-02-12 11:50:00	380
2015-03-12 11:50:00	360
2015-04-09 11:45:00	310
2015-05-07 11:52:00	450
2015-06-11 11:50:00	350
2015-07-16 11:50:00	360
2015-08-13 11:40:00	360
2015-09-10 11:45:00	350
2015-10-08 11:50:00	350

Quick Addition to Electricity Price Dataframe

List of cities and towns in the South Island

From Wikipedia, the free encyclopedia

This is a list of **Cities and towns in the South Island** of New Zealand:

Contents: [Top](#) · [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](#) · [Z](#)

A [\[edit \]](#)

<ul style="list-style-type: none">AkaroaAlbert Town	<ul style="list-style-type: none">AlburyAlexandra	<ul style="list-style-type: none">AmberleyAnakiwa	<ul style="list-style-type: none">ApplebyArthur's Pass	<ul style="list-style-type: none">ArrowtownAshburton
--	--	--	---	---

B [\[edit \]](#)

<ul style="list-style-type: none">BalcluthaBalfourBeaumont	<ul style="list-style-type: none">BelfastBirdling's FlatBlackball	<ul style="list-style-type: none">BlenheimBluffBrighton	<ul style="list-style-type: none">BrightwaterBronteBrowns	<ul style="list-style-type: none">BrunnerBulwerBurnham
--	---	---	---	--

C [\[edit \]](#)

<ul style="list-style-type: none">Cable BayCanvastownCashmere	<ul style="list-style-type: none">CassCaveCharleston	<ul style="list-style-type: none">CheviotChristchurchClarence	<ul style="list-style-type: none">ClarksvilleCoalgateColac Bay	<ul style="list-style-type: none">CollingwoodCromwellCrushington
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- 20. 'Blenheim'
- 21. 'Bluff'
- 22. 'Brighton'
- 23. 'Brightwater'
- 24. 'Bronte'
- 25. 'Browns'
- 26. 'Brunner'
- 27. 'Bulwer'
- 28. 'Burnham'
- 29. 'Cable Bay'
- 30. 'Canvastown'

Electricity cost in South island

- Link :

<https://www.mbie.govt.nz/>

- Electricity cost and price monitoring

Previous surveys

-  Quarterly Survey of Domestic Electricity Prices to 15 May 2021 [PDF, 986 KB]
-  Quarterly Survey of Domestic Electricity Prices to 15 May 2021 [XLSX, 303 KB]
-  Quarterly Survey of Domestic Electricity Prices to 15 February 2021 [PDF, 191 KB]
-  Quarterly Survey of Domestic Electricity Prices to 15 February 2021 [XLSX, 300 KB]
-  Quarterly Survey of Domestic Electricity Prices to 15 November 2020 [PDF, 1009 KB]
- ✓  Quarterly Survey of Domestic Electricity Prices to 15 November 2020 [XLSX, 256 KB]
-  Quarterly Survey of Domestic Electricity Prices to 15 August 2020 [PDF, 704 KB]
-  Quarterly Survey of Domestic Electricity Prices to 15 August 2020 [XLSX, 254 KB]

Electricity cost in South island

- Numeric to date string
- Extracted data from 2015 to 2020.
- Extracted only the South island data.

	Place	2015-02-15	2015-05-15	2015-08-15	2015-11-15
	<chr>	<dbl>	<dbl>	<dbl>	<dbl>
1	New Zealand	28.18677	28.23048	28.31919	28.38523
2	Timaru	25.75266	25.94597	25.79636	25.80533
3	Cromwell	31.61079	31.35309	31.29330	31.16893
4	Dunedin	24.03430	24.15720	24.31303	24.40475
5	Queenstown	28.01881	27.74481	27.68368	27.58261
6	Westport	36.34455	36.35278	36.29371	36.14250
7	Waipukurau	31.29156	32.00428	32.66232	32.64384

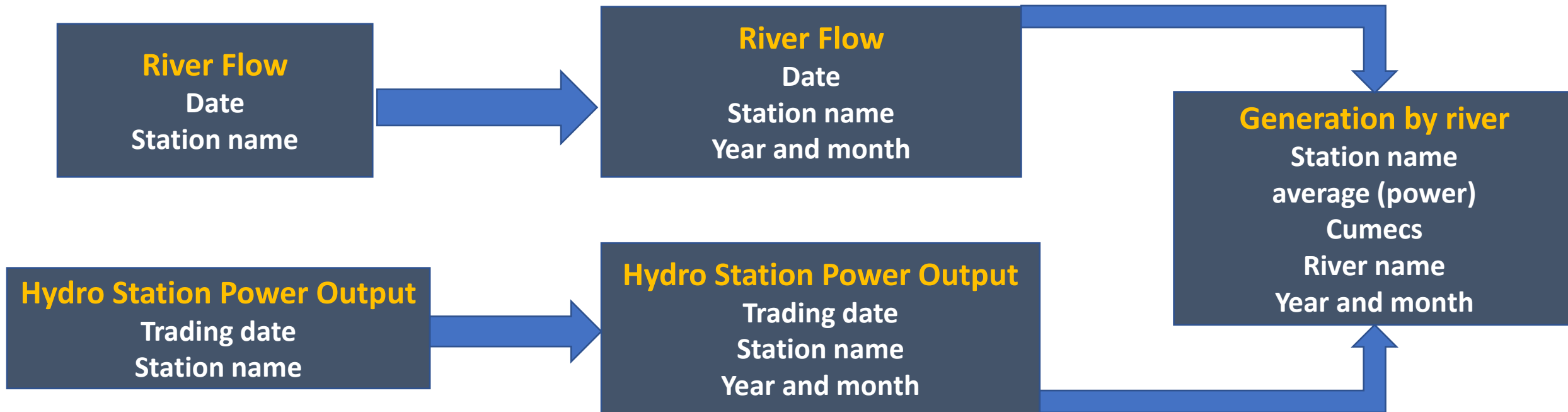
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•
•

36	Rotorua	30.90478	31.05067	31.09840
37	Taupo	30.64096	30.75456	30.82046
38	Auckland North Shore	27.61347	27.60614	27.66996
39	Auckland Central	27.15534	27.34046	27.40281
40	Cambridge	25.38704	25.35766	25.36836
41	Hamilton	27.87412	28.39826	28.53918
42	Wellington City	28.01687	26.99544	27.06409
43	Greymouth	33.07140	33.09725	33.16664

• • •

2020-05-15	2020-08-15	2020-11-15
<dbl>	<dbl>	<dbl>
30.68013	30.62976	30.51942
31.11971	31.10866	31.10690
33.20534	33.17373	32.40289
26.73949	26.74610	26.17165
29.16189	29.13184	28.26935
39.62517	39.58696	39.53206
38.07166	38.04405	38.03315

River flow and hydro station relation model



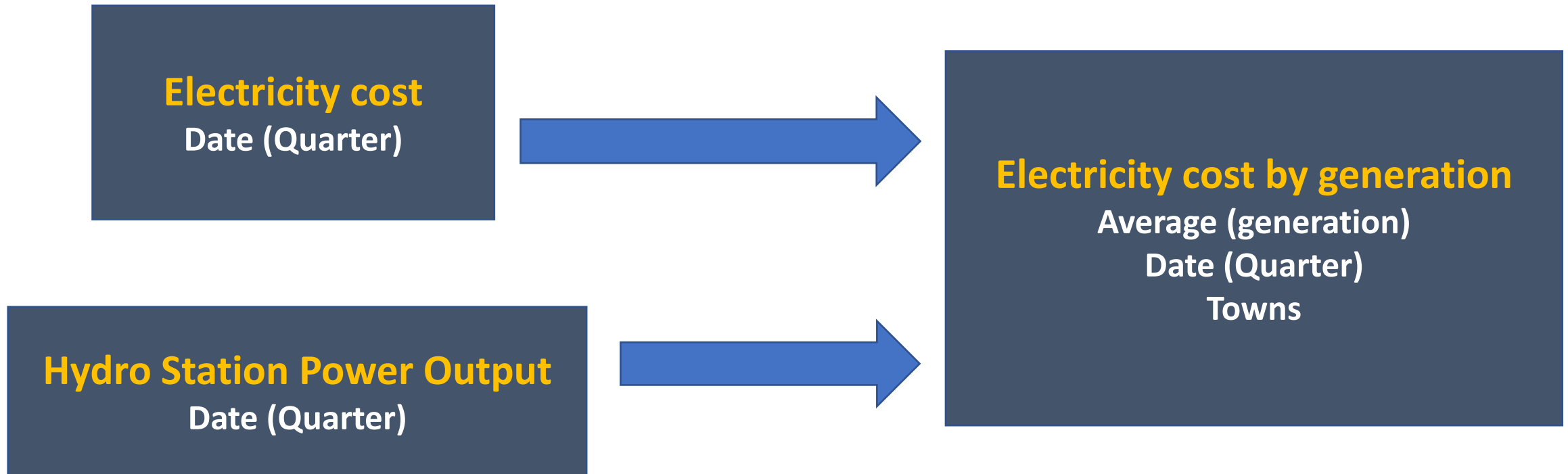
Refer to GitHub repository for a detailed model

Resulting data frame

A data.frame: 213 × 55

Gen_Code	year_month	TP1_mean	TP2_mean	TP3_mean	TP4_mean	TP5_mean	TP6_mean	TP7_mean	TP8_mean	...	TP44_mean	TP45_mean	TP46_mean	TP47_mean	TP48_mean	average	date	time	cumecs	river
<chr>	<chr>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	...	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<date>	<chr>	<dbl>	<chr>
clyde	2015-01	81821.29	73652.258	60998.065	58410.000	56873.548	56708.065	56484.194	61137.097	...	121135.81	111976.13	104053.23	99254.52	88754.84	122705.59	2015-01-01	00:00:00	491.5415	clutha
clyde	2015-02	94902.50	89136.071	87826.429	85473.214	85221.071	84694.643	84755.714	82916.429	...	138027.14	125652.50	115502.14	105897.14	97461.07	132960.58	2015-02-01	00:00:00	519.5486	clutha
clyde	2015-03	55318.71	53014.742	43734.581	33747.710	33562.387	33267.323	33428.806	33498.581	...	93028.00	79871.26	65461.29	61741.81	58140.81	94212.07	2015-03-01	00:00:00	349.7788	clutha
clyde	2015-04	51756.20	33704.900	21445.667	13378.233	12565.367	11399.500	11657.033	11678.800	...	85784.57	75690.07	71069.67	66469.80	61969.47	90746.94	2015-04-01	00:00:00	741.6083	clutha
clyde	2015-05	154906.48	142811.290	126620.871	114111.516	111650.839	111137.484	109573.774	109106.613	...	167424.87	167759.35	163077.39	163495.71	160097.55	156261.51	2015-05-01	00:00:00	668.5790	clutha
clyde	2015-06	146098.70	126624.167	111137.700	97823.000	90409.467	88807.567	90403.900	88798.267	...	173579.13	170076.87	164341.57	161765.77	157518.93	155923.54	2015-06-01	00:00:00	860.7566	clutha
clyde	2015-07	110625.71	104761.419	93682.161	84719.806	80587.548	78877.323	77953.903	77669.516	...	151556.39	139154.42	127937.13	122102.35	115752.03	143275.22	2015-07-01	00:00:00	694.8239	clutha
clyde	2015-08	97515.39	82806.452	69095.935	52532.355	50849.226	49196.065	48987.258	48983.968	...	121812.90	114443.74	109234.48	104811.23	102938.42	125903.52	2015-08-01	00:00:00	641.3159	clutha
clyde	2015-09	51845.80	26623.633	16018.033	3984.033	3517.533	1854.400	1753.067	7581.700	...	97510.43	91807.73	77261.27	NA	NA	97250.76	2015-09-01	00:00:00	411.7504	clutha
clyde	2015-10	112994.58	102951.323	90393.290	84987.161	82322.161	77793.935	77632.581	77916.484	...	137911.52	133642.65	129491.03	126583.03	122450.32	133262.57	2015-10-01	00:00:00	633.2285	clutha
clyde	2015-11	77407.80	67492.633	61420.900	52149.000	49965.567	48351.267	51269.833	60214.667	...	129612.43	116700.27	110557.30	103196.27	95637.13	122041.69	2015-11-01	00:00:00	750.1324	clutha
clyde	2015-12	122187.87	115066.065	103938.613	99742.677	98137.710	97621.774	97920.355	100478.710	...	146964.87	143234.77	134130.06	127344.84	122801.84	138256.20	2015-12-01	00:00:00	451.1735	clutha
clyde	2016-01	55592.35	35906.935	32306.387	28681.194	28094.129	27991.548	31168.226	43559.935	...	96159.97	91053.65	76007.35	64236.90	62165.71	95176.33	2016-01-01	00:00:00	522.8765	clutha
clyde	2016-02	79687.97	64365.241	48160.310	41940.483	32801.069	32132.103	30262.276	30559.793	...	125360.83	108580.66	97117.86	91487.86	90321.79	120171.97	2016-02-01	00:00:00	643.1175	clutha
clyde	2016-03	109671.90	101466.097	88277.774	72956.774	68225.581	68357.161	66318.968	66879.677	...	143377.48	144972.71	139954.32	124976.10	121977.58	135854.47	2016-03-01	00:00:00	638.1669	clutha
clyde	2016-04	99086.30	88257.333	74899.667	72689.467	70618.100	69737.933	69650.200	69580.467	...	127210.97	117184.53	112410.30	107721.77	102259.10	137155.32	2016-04-01	00:00:00	523.2930	clutha

Hydro station and electricity cost relation model

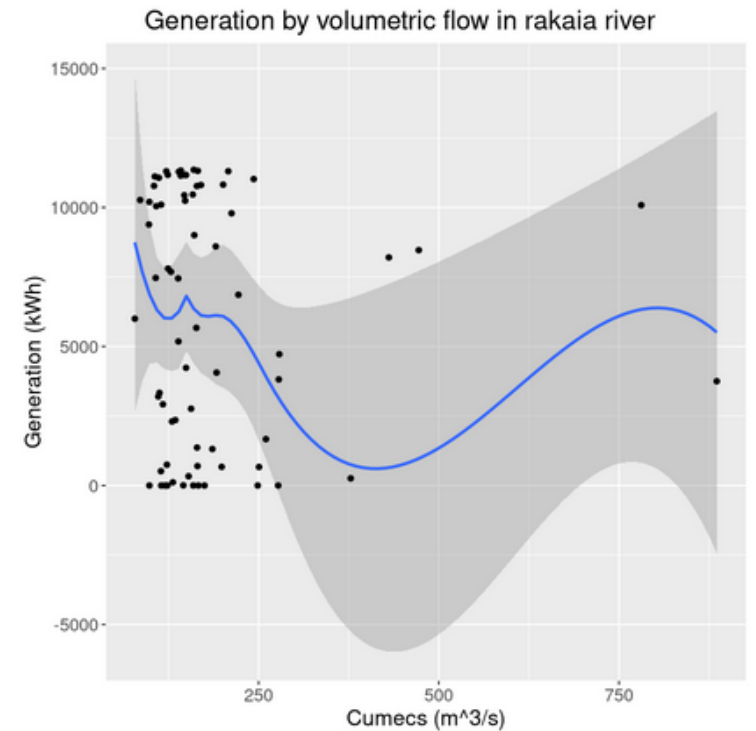
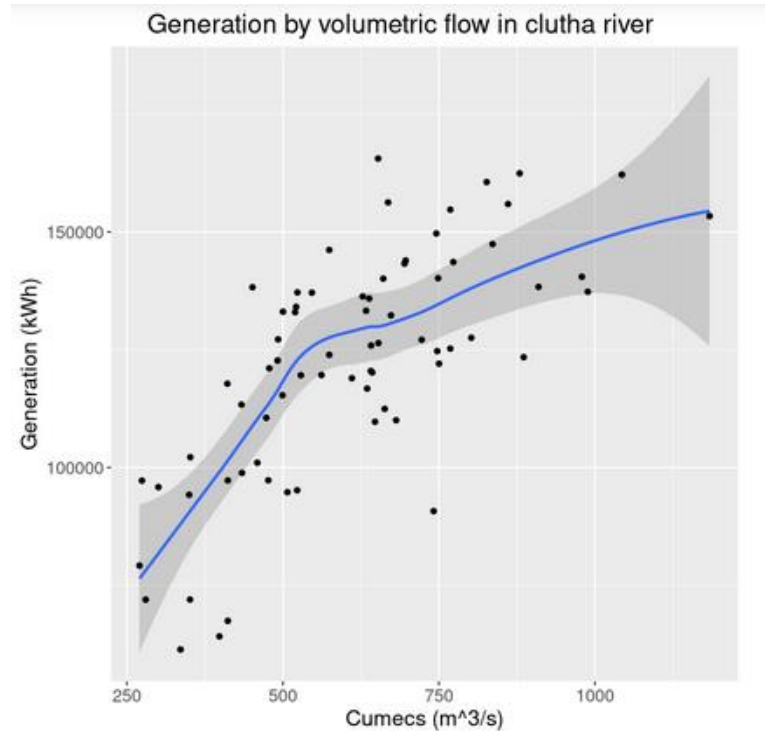
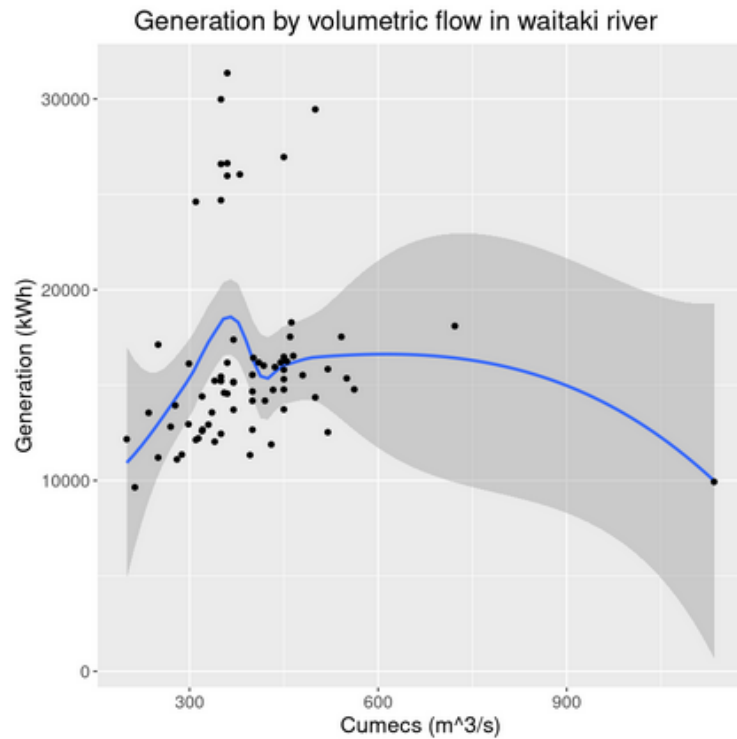


Refer to GitHub repository for a detailed model

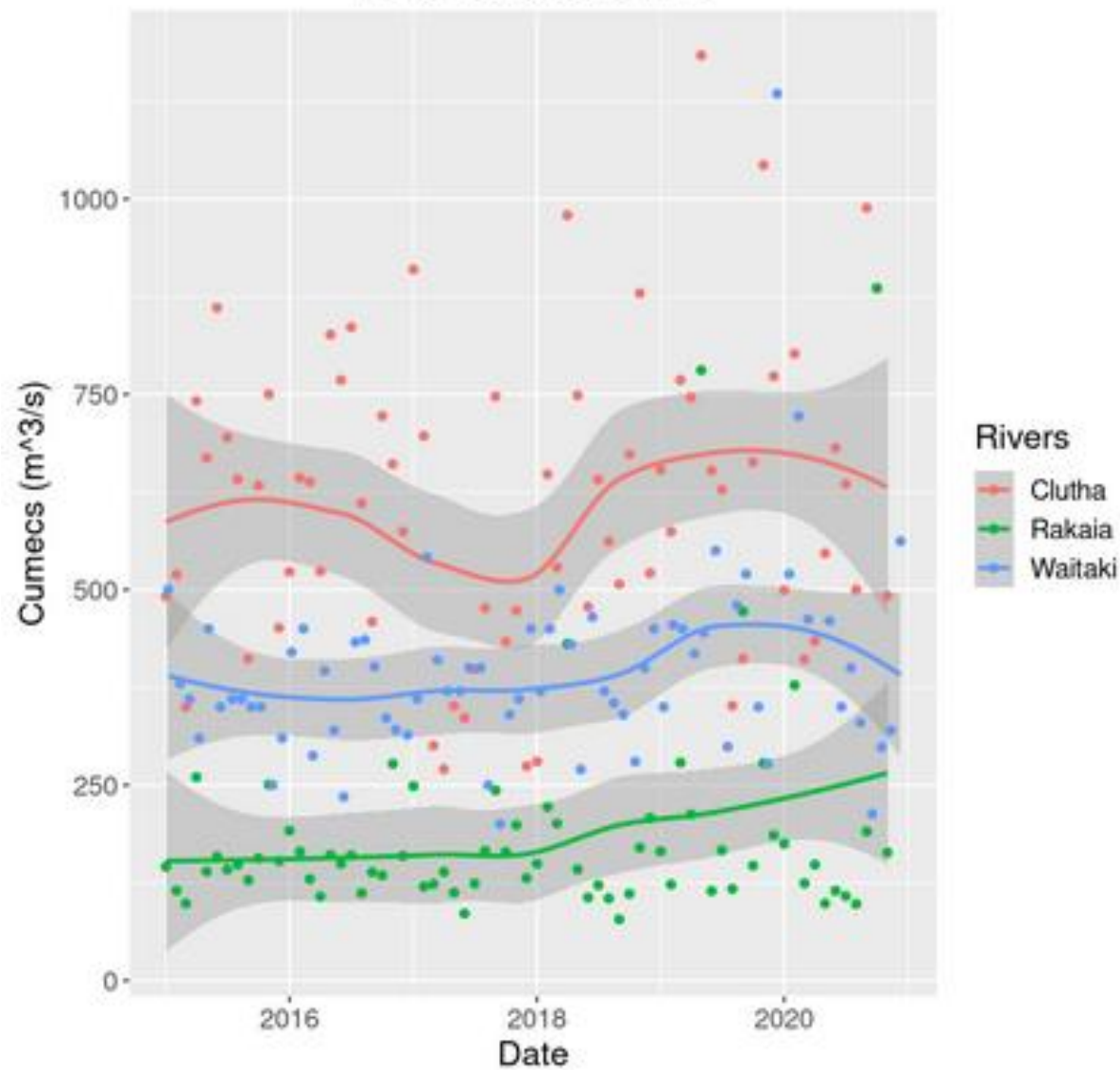
Resulting data frame

quarter	Average_quarterly_gen	Ashburton	Balclutha	Christchurch	Cromwell	Dunedin	Greymouth	Invercargill	Kaiapoi	Nelson	Oamaru
<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>	<dbl>
2015.1	33733.54	26.49519	38.88087	26.44894	31.61079	24.03430	33.07140	25.50256	25.82454	29.88088	25.42334
2015.2	38372.67	26.47694	38.92987	26.51883	31.35309	24.15720	33.09725	25.83934	26.00937	29.70124	25.60458
2015.3	42392.42	26.44140	38.88232	26.55521	31.29330	24.31303	33.16664	25.79006	26.03858	29.56135	25.59185
2015.4	37589.03	26.83552	39.09146	27.03113	31.16893	24.40475	33.07915	25.83706	26.23272	29.79704	25.95737
2016.1	36951.03	26.78588	38.89976	27.00975	31.09872	24.40141	33.05464	25.83238	26.23361	29.75327	25.92493
2016.2	39065.95	26.81387	39.38390	27.31289	31.27592	25.00323	33.29567	26.57605	26.24327	30.08909	26.31350
2016.3	44185.77	26.99418	39.90139	27.40152	31.73074	24.95325	33.74750	26.94333	27.15119	30.01814	26.32029
2016.4	39842.53	27.21859	39.98755	27.55725	31.93961	25.10718	33.79802	27.33465	27.35478	30.11192	26.72317
2017.1	38805.56	27.20529	40.11581	27.62556	32.06997	24.91248	33.91200	27.40530	27.34752	30.14016	26.80670
2017.2	37251.69	27.16230	40.33037	27.79355	32.04556	24.89458	34.05292	27.42788	27.48367	30.09130	26.97080
2017.3	39721.79	27.11622	40.81841	27.81068	32.00983	24.85118	34.01094	27.53717	27.61384	30.02583	26.96790
2017.4	37836.56	27.24481	40.77182	27.90844	32.33186	25.16045	34.59248	27.46666	28.15473	30.01248	27.18309
2018.1	36340.03	27.26169	40.97924	28.21048	32.56013	25.33528	34.70126	27.50189	28.30552	30.06836	27.26689
2018.2	42227.82	27.23729	41.81900	28.35719	32.20543	25.32620	34.65757	27.46804	27.79421	29.75635	27.38098

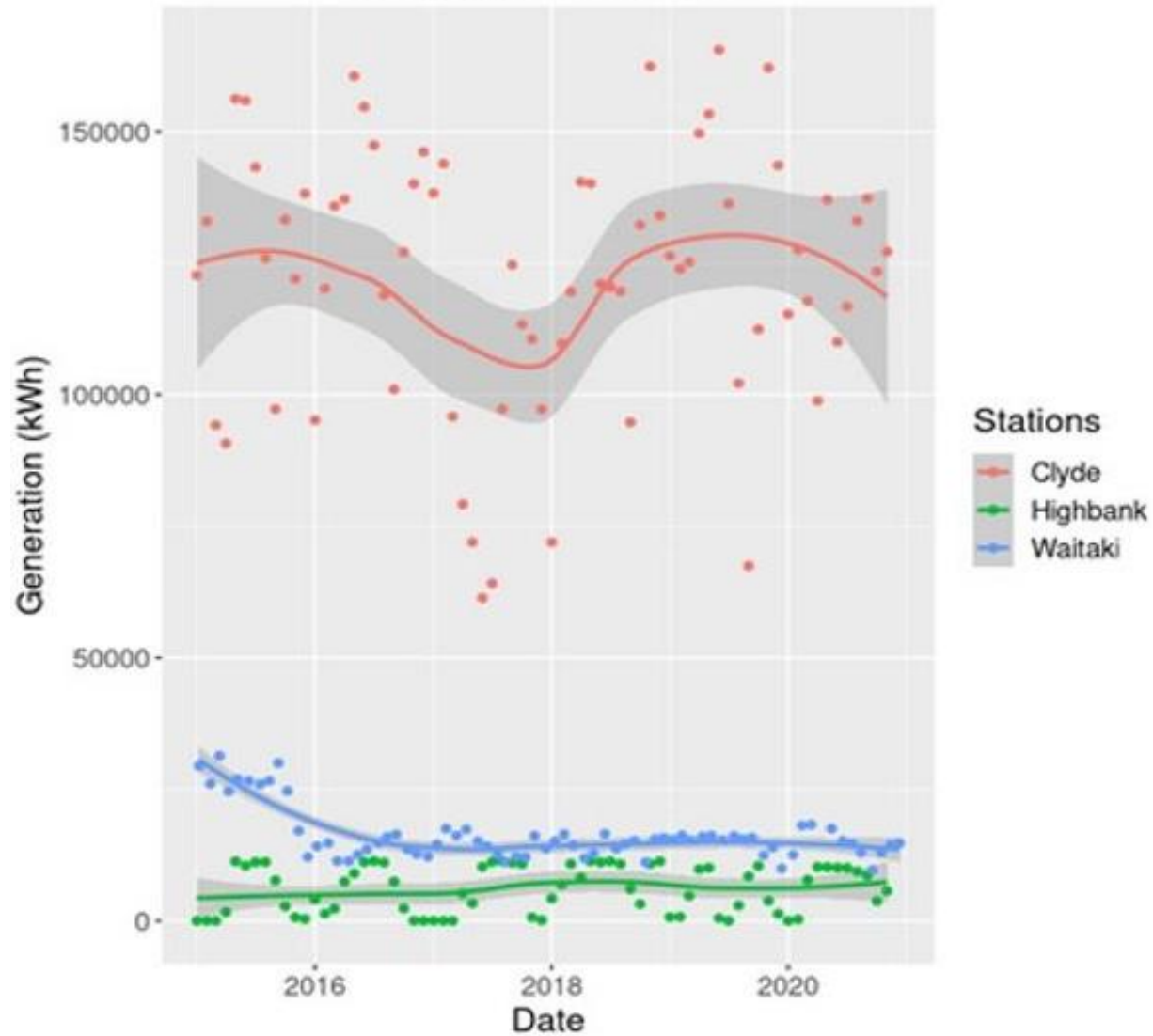
Generation and River flow



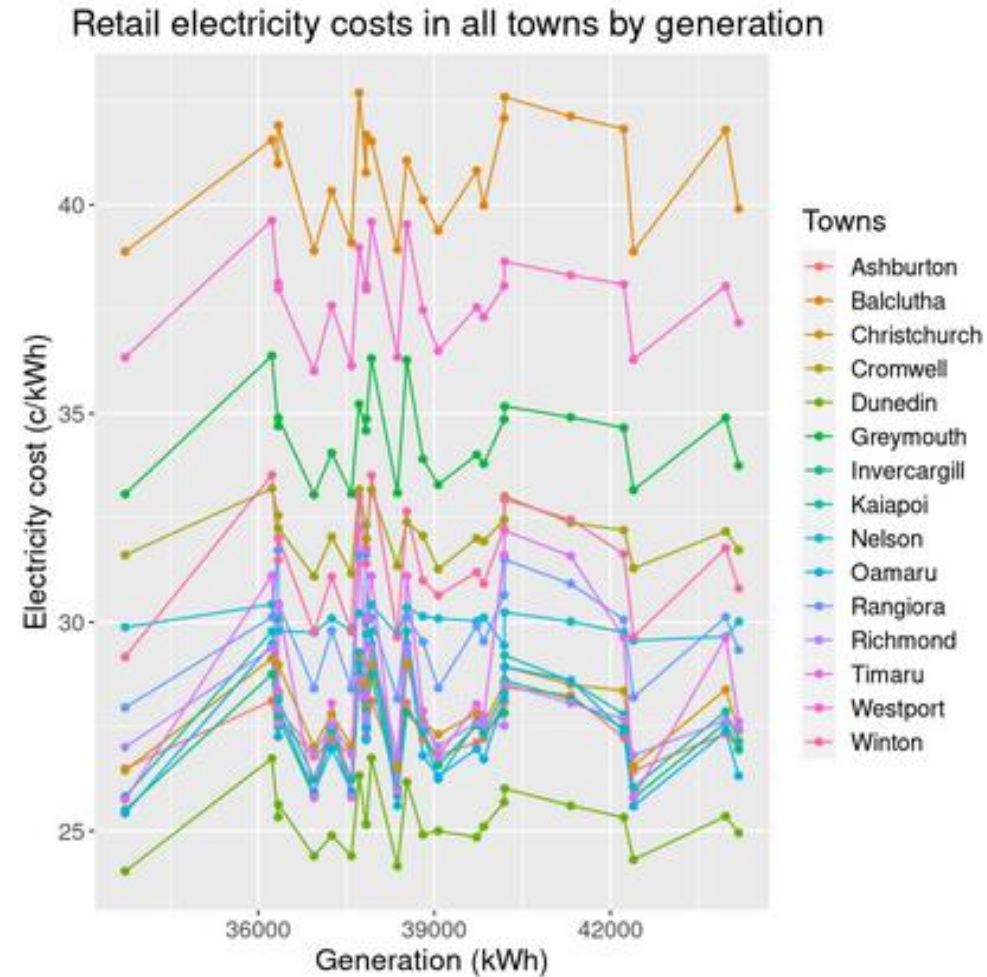
River flows over time



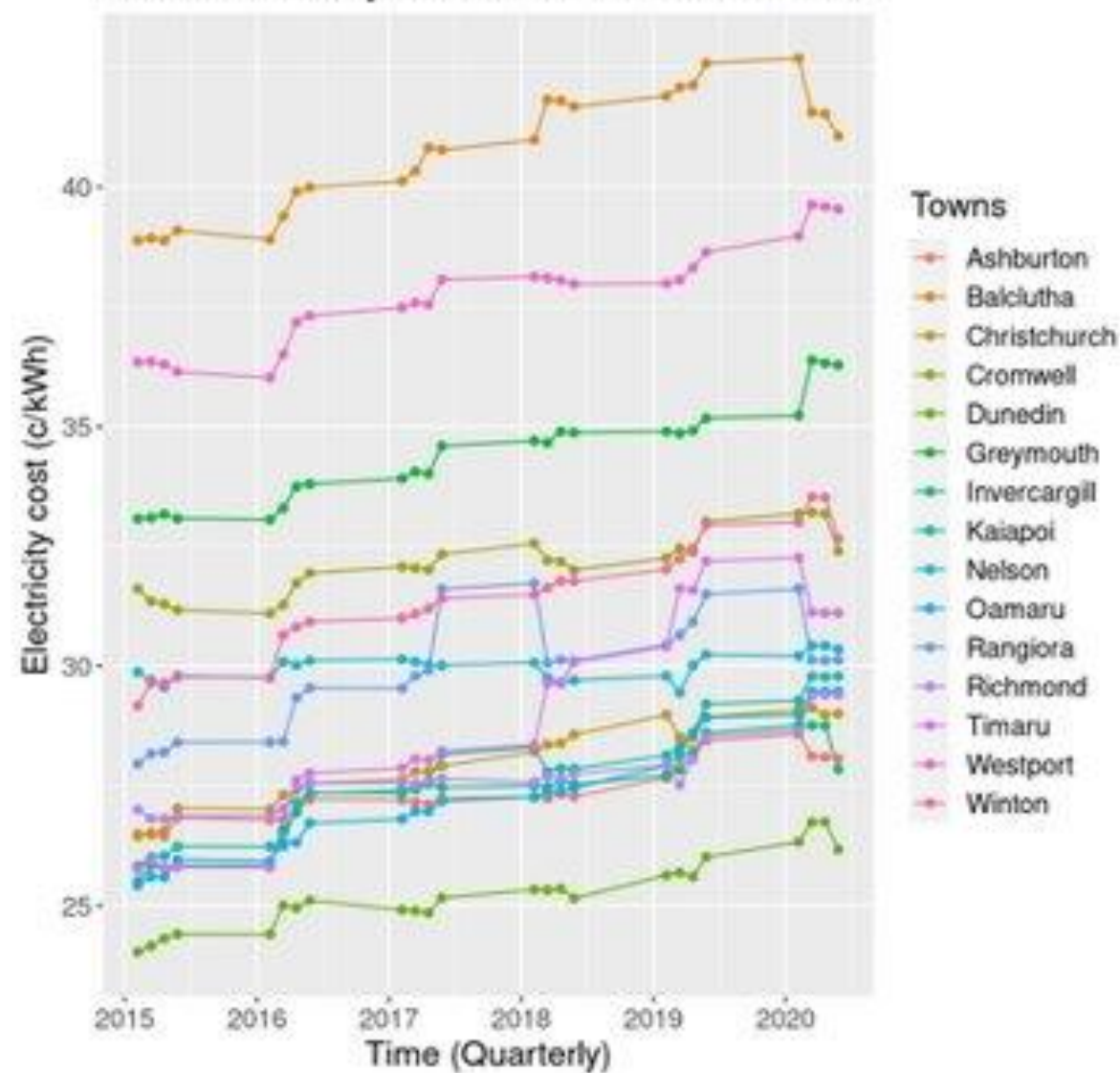
Generation over time



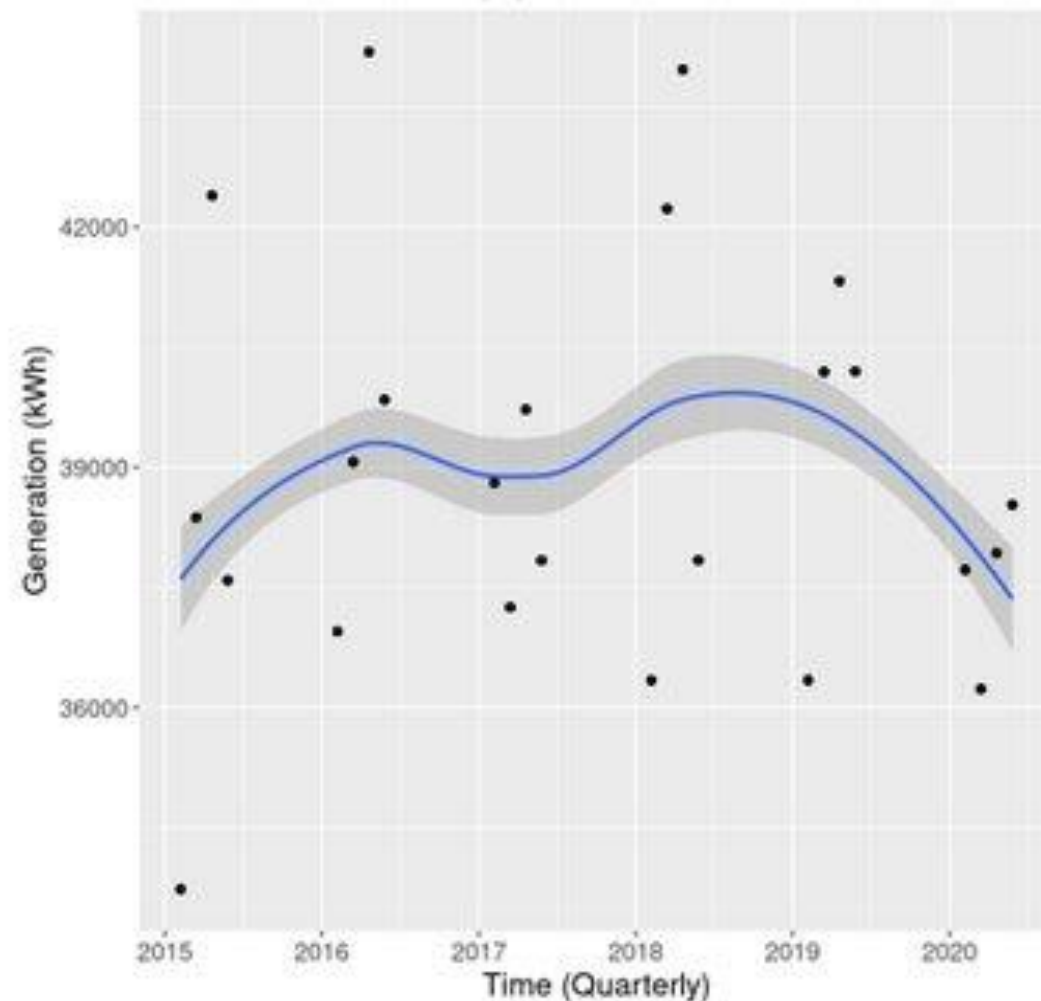
Retail cost and Generation



Retail electricity costs in all towns over time



Quarterly generation over time



Link to GitHub Repository



- <https://github.com/Jencreate/DATA201SJM>