Regional peak demand forecast from 2007

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November 2007

1. Introduction

This document presents regional, island and national forecasts of peak electricity demand, covering a 40-year period.

This is an update of the long-term regional peak demand forecast published by the Commission as draft Grid Planning Assumptions (GPAs) in May 2007[1], updated with new data from winter 2007 and with a new regional energy forecast, and with some changes to assumptions.

The forecast predicts annual half-hourly peak demand at grid exit point (at GXP, i.e. inclusive of local lines losses), by transmission region. Embedded generation is netted from demand – i.e. the demand forecast presented is for the expected demand less that which is satisfied by embedded generation.

This forecast is consistent with the GPAs long-term energy demand forecast[2], which is also expressed in terms of demand at GXP net of embedded generation, and uses the same region definitions.

The forecasts presented are not consistent, however, with the medium-term peak demand forecasts prepared by the Commission for Security of Supply purposes[3]. The medium-term forecast treats embedded generation differently and uses different region definitions. The numbers produced by these two forecasts are therefore not directly comparable.

For some purposes, the instantaneous peak demand is more relevant than the half-hourly peak. The instantaneous peak can be expected to exceed half-hourly peak by a small margin, so an appropriate margin for within-half-hour variation should be allowed when estimating instantaneous peaks. Based on the analysis carried out in the Commission's Security of Supply medium-term demand forecast, an allowance of 1.3% for within-half-hour variation is appropriate on a national level (1.9% for North Island only, 1.4% for South Island only).

The forecast uses a different methodology from that used by the Commission for the Initial Statement of Opportunities (SOO). The goals driving the changes are:

1. to make sure that forecast peak growth over the next few years is similar to actual historical growth over the last few years, in each region; and

2. to provide a 'prudent' forecast, allowing for various influences which may result in higher peak demand than expected.

The initial SOO included an 'expected' peak demand forecast, indicating our expectation of the most likely trajectory of peak demand growth. However there was not time at that stage to also produce a 'prudent' forecast, indicating maximum likely values of peak demand in each year. This document does provide a 'prudent' forecast, for which we have used a 10% probability of exceedance criterion (10% POE, P10) – in any given year, there is a 10% chance that peak demand will exceed the prudent forecast. (Several submitters queried the use of a P10 forecast, commenting that a P5 or P1 forecast would be more prudent. The use of P10 is

[1] http://www.electricitycommission.govt.nz/opdev/modelling/gpas/May2007/Demand/index.html
[2] http://www.electricitycommission.govt.nz/pdfs/opdev/modelling/pdfconsultation/GPA/Demand-Forecast-Review.pdf
[3] http://www.electricitycommission.govt.nz/opdev/modelling/demand/security/index.html

primarily driven by the requirements of the Grid Investment Test – see section 1.1 below.)

We note that the forecast presented is a 'business as usual' forecast, not explicitly allowing for any changes in consumer behaviour or technology. It also makes no explicit allowance for the possibility of increased future demand-side response with the intention of reducing peak loads. In the Commission's generation scenario modelling work, we treat increased demand-side response as a potential tool for meeting future peaks, rather than as a reduction applied to the peak forecast.

1.1 Use of the prudent forecast in the Grid Investment Test

Several submitters queried the use of a P10 forecast, commenting that a P5 or P1 forecast would be more prudent. The use of P10 is primarily driven by the requirements of the Grid Investment Test.

The prudent forecast can be used only in certain parts of a GIT application, where reliance on that forecast could not lead to substantial actual unserved energy. For major investments, a simple deterministic timing criterion such as meeting a P10 prudent forecast might not be prudent enough.

The timing of transmission investments where there is risk of substantial unserved energy should be determined on the basis of an economic test; that is, the point in time when the annualised cost of the investment is less than the expected benefit of the investment, should set the commissioning date. The Commission would expect this analysis to encompass the full range of possible demand growth rates, and their probabilities (perhaps by using a Load Probability Curve, in a reliability study). This would implicitly include consideration of P1, P5, P10 etc.

For projects with little risk of unserved energy, or modelled projects that occur after a proposed major investment, the P10 prudent forecast can be used. The P10 forecast also provides a useful mechanism to ensure the power system analysis underlying a proposal is complete, in the sense that it includes all credible modelled projects over the 20 year time-frame of the GIT assessment.

2. Methodology

This section describes the methodology used to produce the peak demand forecast. Subsections describe:

- the region definitions used
- the calculation of historical peaks
- the methodology used to produce the expected forecasts
- the Monte Carlo approach used to generate the prudent forecasts
- modifications to the approach used in specific regions.

All references to 'years' in this document denote calendar years, except where otherwise noted.

'Energy demand' refers to total electricity demand in GWh (as opposed to non-electricity energy demand!).

2.1 Region definitions

The analysis has been carried out at the 'transmission region' level, for consistency with the Commission's GPA energy demand forecast. North Island regions are Auckland, Bay of Plenty, Central, Hawkes Bay, North Isthmus, Taranaki, Waikato and Wellington; South Island regions are Canterbury, Nelson/Marlborough, Otago/Southland, South Canterbury, and West Coast.

Forecasts have also been carried out at island and national level. The island and regional forecasts are independently derived from source data – neither is calculated from the other via diversity factors. The national forecast is likewise produced independently of the regional forecasts.

We also include forecasts at the 'half-island' level, again produced independently rather than by a diversity-based approach. These regions include:

- Upper North Island (UNI, defined as Auckland and North Isthmus),
- Lower North Island (LNI, all other North Island regions),
- Upper South Island (USI, defined as Canterbury, Nelson/Marlborough, South Canterbury and West Coast),
- Lower South Island (LSI, Otago/Southland only).

2.2 Historical peak data

GXP-level historical peak data were extracted from the metering data section of the Commission's October 2007 Centralised Dataset (CDS), using the region definitions included in the 'regions.txt' file. This is consistent with the process used to produce the regional load table in the MySQL Halfhourly Database (also included as part of the October 2007 CDS).

The peak for a given year is the maximum half-hourly load over all trading periods in the calendar year. Years included are from 1997 to 2007. (Our view is that, in terms of peak demand, data from before 1997 are not relevant to current conditions.)

The resulting annual peaks are shown in the tables in Section 3.1.

The SQL code used to extract these historical peaks from the MySQL Half-hourly Database can be supplied on request.

2.3 Methodology – expected forecast

The expected peak demand forecast for each region is based on two data sources: (a) the historical peak data described in Section 2.2, and (b) the Commission's GPAs energy demand forecast.

The approach is designed to make expected peak demand growth follow expected energy demand growth in the long run. In the short term the expected peak forecasts follow recent historical trends in peak demand.

For each region, the first step is to calculate a weighted least squares fit of an exponential curve to the historical peaks. The exponential curve is used to represent annual growth by a constant factor in expected peak demand (as opposed to growth by a constant increment, which would be implied by a linear fit). The use of weighted least squares is intended to put high weight on recent data and lower weight on older data, encouraging a good fit to the most recent part of the series. Weights start from a baseline figure in 1997 and increase by 40% in each successive year up till 2005, after which they are held constant. (The exception is that a null weight is assigned to the 2001 and 2003 years in which savings campaigns occurred – see Section 2.5.)

The peak demand forecast starts from the value of the fitted exponential curve for 2007. Beyond that point,

- the predicted growth rate in the first forecast year (2008) is equal to the historical peak growth rate (i.e. the slope of the fitted curve),
- over the following five years, the predicted growth rate trends smoothly from the historical peak growth rate to the growth rate of the GPAs energy demand forecast,
- beyond 2012, the predicted growth rate is equal to that of the energy demand forecast.

2.4 Methodology – prudent forecast

The prudent peak forecast is produced using a Monte Carlo method, based on a 10% POE criterion. The prudent peak forecast in a given region and year is the 90th percentile of a range of randomly generated values distributed around the expected forecast.

The following sources of variation are included in the Monte Carlo analysis:

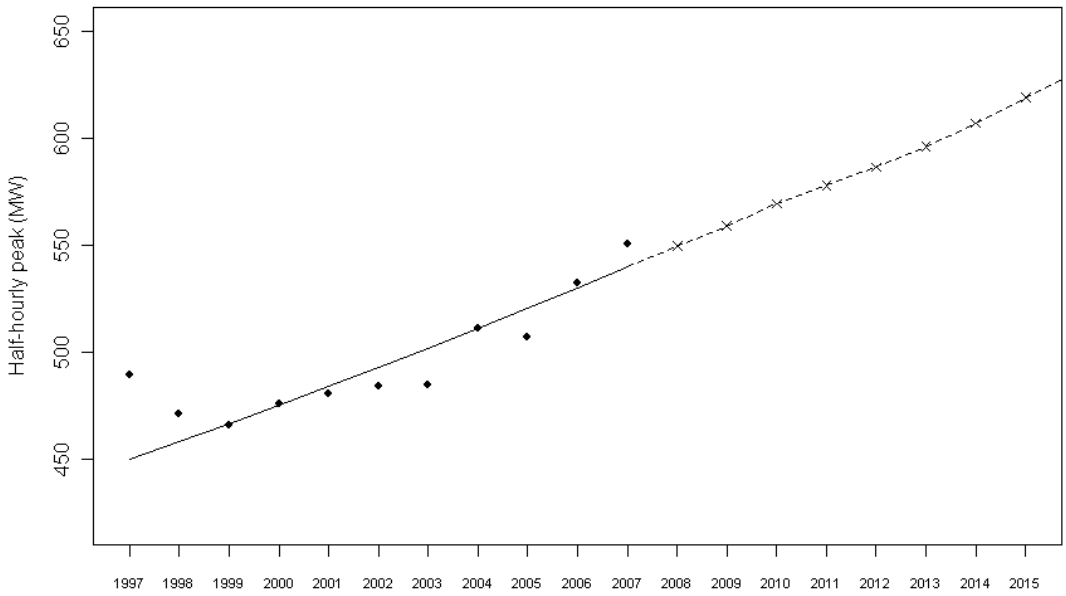
- Between-year variation in peak demand, driven by temperature, use of load control, and consumer behaviour. The peak in any given year may be higher or lower than the expected value, due to any or all of the above factors. We

assume a normal distribution of peaks around the expected value and estimate the standard deviation of this distribution as the standard deviation of the historical peaks around the fitted trend. Each randomisation of peak demand is incremented by a random draw from this normal distribution.

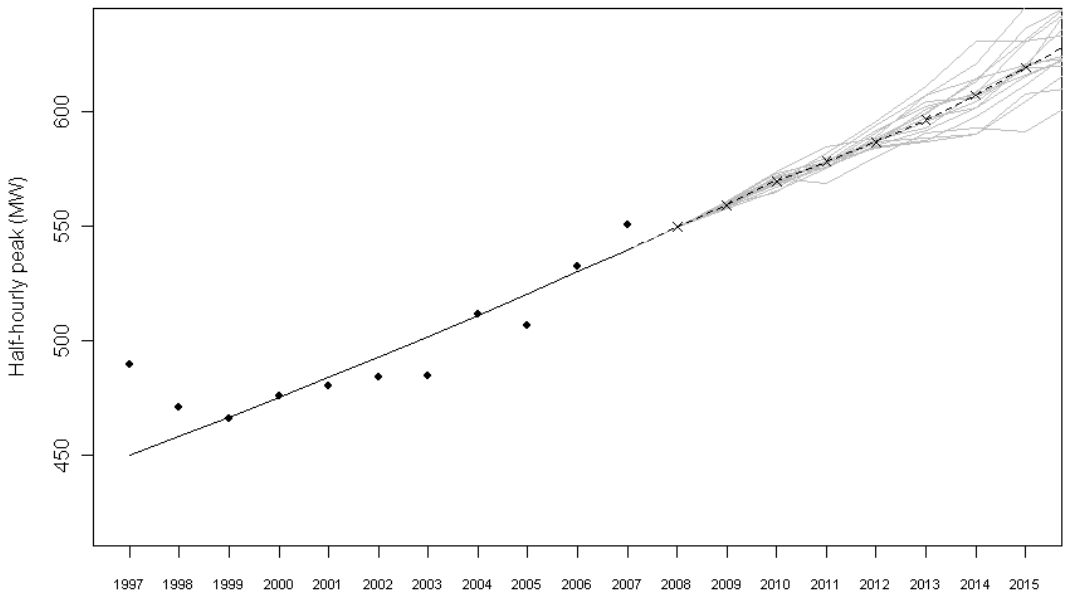
- Uncertainty in energy forecasts. The Monte Carlo analysis of total energy demand can be used to generate randomised trajectories, based on random draws from the assumed distributions of the exogenous variables used in the forecast (e.g. GDP, population). Each randomisation of peak demand is based on a random draw from the list of randomised energy trajectories.
- Peak demand may grow faster than energy demand for a relatively short period (as has recently been observed in the upper North Island). We do not expect to see peak growing faster than total demand in the long term, but the prudent peak demand analysis takes into account the possibility of a period of accelerated peak growth. In one in five (20%) of the randomisations of peak demand, peak growth rates are increased by 1% for an initial five-year period.

The following plots demonstrate the Monte Carlo approach. Numbers shown are chosen for illustrative purposes and do not correspond to actual peak demand figures.

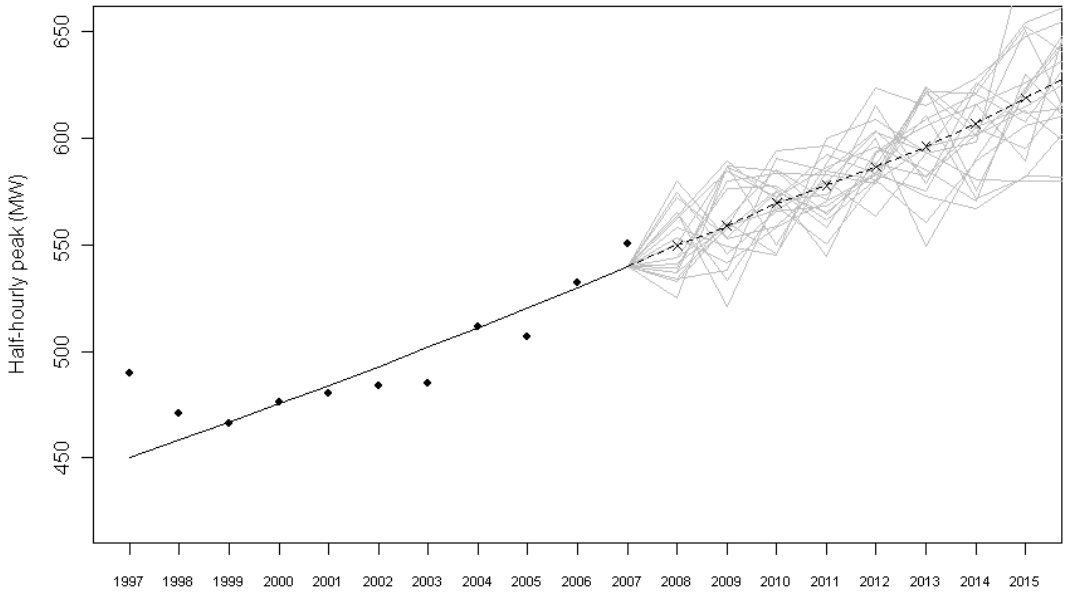
(a) The 'expected' peak forecast is derived from historical trends and from the expected forecast of energy growth.



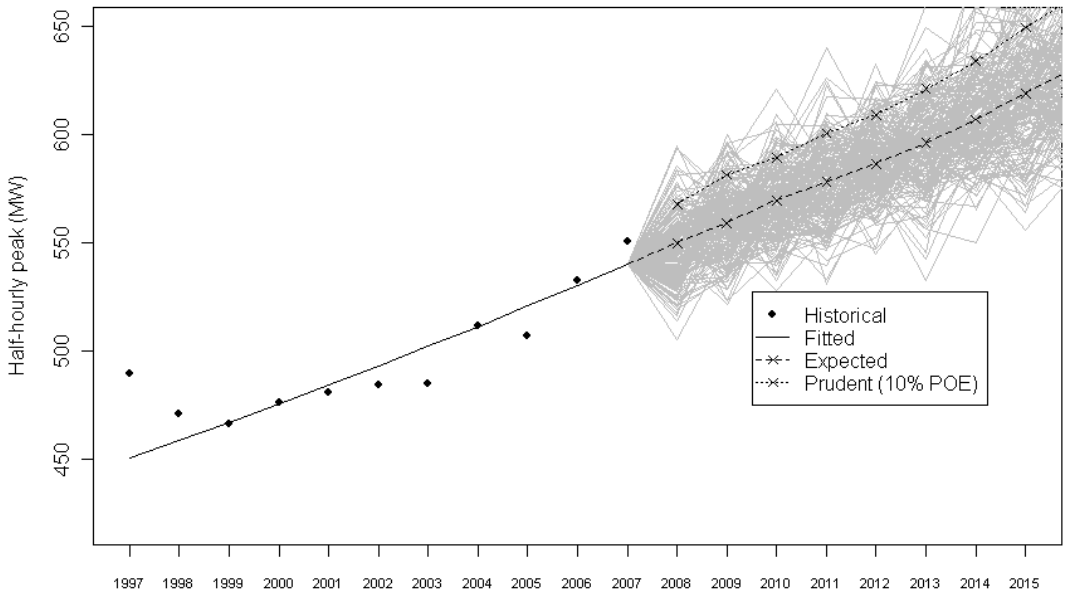
(b) Many randomised trajectories of energy demand growth have been produced; each leads to a different trajectory of peak demand growth. A few of these trajectories are shown here.



(c) Next, in 20% of these randomisations, it is assumed that peak demand growth is faster than energy demand growth over a period of up to 5 years. Then, between-year variation in peak demand is then added to each trajectory.



(d) The 90th percentile of the values in each year is the prudent forecast.



Note that the gap between 'expected' and 'prudent' forecasts is considerably larger than the likely variation from year to year. In the longer term, it would not be expected that peak demand would jump from the current 'expected' forecast to the 'prudent' forecast from one year to the next. Rather, it would be expected that the level of the prudent forecast would be reached only after several years of growth above the 'expected' line.

2.5 Treatment of 'savings campaign years'

The data for the 2001 and 2003 'savings campaign years' have been removed from analyses – i.e. those data points have been assigned a weight of zero in the regressions and are not included in the estimation of variability.

Both of these years were affected by electricity shortages, leading to nationwide savings campaigns, which in both cases overlapped the winter period in which annual peaks might have occurred. The 2003 savings campaign covered the period from March to June; the 2001 campaign was from August to September. Since annual peaks typically occur between May and August inclusive, either savings campaign might have had the effect of reducing peak demand. The 2003 annual peak was certainly low, nationally and in most regions; it is unclear to what extent this is due to the savings campaign, as opposed to the generally mild winter.

We justify the removal of these data points from the analysis as follows:

- the demand forecast is intended to project future peak demand *in the absence of unusual demand-side response*. Demand-side response over and above the usual (e.g. that caused by political intervention at a nationwide level) is considered as a possible means of meeting the forecast peaks, rather than as an influence towards reducing them. Thus, the forecast should not be based on historical years that were affected by savings campaigns.

- the 2003 point is a statistical outlier – including it has the effect of inflating the estimate of between-year variation in peak demand, and hence of increasing the prudent (P10) forecast for all future years. This increase is spurious, stemming from the technique used to model between-year variation. Logically, the existence of a year when demand was considerably less than predicted should not lead to a prediction that demand may be considerably *more* than predicted in some future year. (We would prefer to use a nonparametric 'bootstrapping' approach which would avoid this problem, but a series of 10 data points is arguably too short to use bootstrapping.)

- the removal of 'shortage years' is consistent with the methodology used by the Commission in the national energy forecast, where 1992, 2001 and 2003 data points are excluded.

A better way to model these 'shortage years' would be to estimate what the peak demand in these years *would have been* in the absence of the savings campaigns and to replace the actual points by these estimates. However, it is not clear at this stage how these estimates could be calculated.

2.6 Modifications used in specific regions

Historical events impacting on peak demand have made some modifications to the approach necessary.

The last decade of historical peak demand data for the Taranaki region is dominated by a sharp drop caused by the closure of the Motunui Methanex plant. There is no expectation that this plant will reopen in the near future. (As opposed to the Methanex plant at Waitara Valley, which is expected to open sporadically.) If no

adjustments are made to the statistical model for this area, then the forecast is for continuing reduction in peak demand.

To fix this problem, the Taranaki historical series has been calculated 'net of Methanex' – in other words, the historical peak and energy demand figures have been produced from data with the Methanex load subtracted. (This has the effect of subtracting about 10 MW from the relevant peaks and about 7 MW from the average energy demand.) The consequence should be a more accurate demand forecast (though the historical figures shown will be lower than actuals).

The 2006 winter peak in South Canterbury was low, due to the outages experienced that June. This is not representative of underlying demand growth in the region. Accordingly the actual South Canterbury peak and total energy demand figures for 2006 have been replaced with 2005 figures inflated by 3%.

An extra 22 MW of load has been added to the West Coast region and all combinations of regions including it (Upper South Island, South Island, New Zealand), to account for new loads including the Pyke River coal mine, Westland Dairy powder plant, and Globe Progress gold mine.

An extra 5 MW of load has been added to the Otago/Southland region and all combinations of regions including it (Lower South Island, South Island, New Zealand), to account for new irrigation load at Black Point.

An extra 9 MW of load has been added to the Taranaki region and all combinations of regions including it (Lower North Island, North Island, New Zealand), to account for new gas processing load.

It has been pointed out that the Tiwai aluminium smelter was operating at reduced load during the winter of 2006, in response to high spot prices earlier in the year (the same situation applied in 2001 and 2003). If the peaks experienced in winter 2006 had not been preceded by a dry summer leading to adverse hydrological conditions and high prices, then the Tiwai load could have been higher than it was, leading to higher peaks. The load reduction at Tiwai during the 2006 annual peak was approximately 25 MW. However, no adjustment to the load forecast has been made on this basis. We consider that this reduction in load does not fall in the category of 'unusual demand-side response' and thus it would not be appropriate to alter the forecast.

2.7 Impacts of energy efficiency and demand-side response

The Commission's forecasts make no explicit allowances for the impact of improved energy efficiency on energy consumption or peak demand. Energy efficiency has steadily improved during the historical period on which the forecasts are based, and we expect that this trend will continue, but our forecast does not assume that the rate of improvement in energy efficiency will increase over the long term.

However, if it can be robustly established that an expected policy change will lead to a substantial change in future peak demand, we will consider incorporating that change into the forecasts as an explicit adjustment. The policy would need to be clearly different from previous policies, rather than an evolution of past changes.

Similarly, the Commission's forecasts of energy consumption and peak demand make no explicit allowance for the possible impacts of increased availability of

demand-side response. We have not revised our peaks downwards to model the effect of active load management. We consider that active load management will be one of the options for dealing with the demand peaks that are forecast (other options include building new baseload or peaking plant).

3. Forecasts

This section presents the numerical forecasts. For each region, each island, and all New Zealand, the expected and prudent (10% POE) forecasts are presented in table form. These forecasts are also available for download as text files at: http://www.electricitycommission.govt.nz/pdfs/opdev/modelling/pdfconsultation/GPA/Peak-forecasts.zip .

Plots of forecasts are also provided, covering the period to 2020 only.

All forecasts are of annual peak electricity demand at GXP, on a half-hourly time frame, including local area losses and net of embedded generation.

3.1 Forecasts (as tables)

National forecast

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	5376	-	-
1999	5579	-	-
2000	5606	-	-
2001	5786	-	-
2002	5859	-	-
2003	5749	-	-
2004	6089	-	-
2005	6119	-	-
2006	6421	-	-
2007	6466	-	-
2008	-	6622	6757
2009	-	6747	6909
2010	-	6890	7107
2011	-	7009	7285
2012	-	7122	7470
2013	-	7236	7619
2014	-	7351	7746
2015	-	7469	7914
2016	-	7574	8021
2017	-	7682	8179
2018	-	7790	8290
2019	-	7901	8433
2020	-	8012	8583
2021	-	8108	8709
2022	-	8206	8817
2023	-	8305	8924
2024	-	8404	9120
2025	-	8505	9244
2026	-	8604	9334
2027	-	8703	9463
2028	-	8803	9652
2029	-	8902	9725
2030	-	9007	9877
2031	-	9113	10056
2032	-	9219	10206
2033	-	9327	10347
2034	-	9434	10435
2035	-	9544	10684
2036	-	9661	10800
2037	-	9779	10907
2038	-	9899	11104
2039	-	10020	11278
2040	-	10142	11498
2041	-	10265	11650
2042	-	10390	11849
2043	-	10518	11978
2044	-	10640	12285
2045	-	10771	12393
2046	-	10895	12559
2047	-	11021	12777

Island forecasts

North Island

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	3557	-	-
1999	3699	-	-
2000	3705	-	-
2001	3894	-	-
2002	3885	-	-
2003	3851	-	-
2004	4110	-	-
2005	4087	-	-
2006	4307	-	-
2007	4328	-	-
2008	-	4431	4555
2009	-	4520	4661
2010	-	4621	4779
2011	-	4706	4891
2012	-	4791	5046
2013	-	4882	5153
2014	-	4981	5276
2015	-	5086	5388
2016	-	5186	5496
2017	-	5290	5637
2018	-	5395	5790
2019	-	5500	5884
2020	-	5605	6053
2021	-	5696	6135
2022	-	5787	6265
2023	-	5877	6401
2024	-	5967	6511
2025	-	6058	6655
2026	-	6145	6752
2027	-	6233	6847
2028	-	6321	7006
2029	-	6409	7115
2030	-	6500	7219
2031	-	6594	7344
2032	-	6687	7487
2033	-	6782	7621
2034	-	6876	7735
2035	-	6973	7864
2036	-	7076	8070
2037	-	7179	8147
2038	-	7284	8317
2039	-	7391	8476
2040	-	7499	8619
2041	-	7607	8719
2042	-	7717	8875
2043	-	7830	9101
2044	-	7938	9232
2045	-	8053	9353
2046	-	8163	9499
2047	-	8274	9634

South Island

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	1826	-	-
1999	1888	-	-
2000	1901	-	-
2001	1967	-	-
2002	1994	-	-
2003	1941	-	-
2004	2026	-	-
2005	2071	-	-
2006	2121	-	-
2007	2173	-	-
2008	-	2225	2251
2009	-	2264	2310
2010	-	2308	2374
2011	-	2343	2433
2012	-	2374	2488
2013	-	2399	2529
2014	-	2421	2540
2015	-	2438	2561
2016	-	2449	2575
2017	-	2459	2595
2018	-	2469	2612
2019	-	2480	2624
2020	-	2492	2643
2021	-	2502	2652
2022	-	2514	2678
2023	-	2527	2698
2024	-	2541	2715
2025	-	2556	2743
2026	-	2571	2753
2027	-	2586	2776
2028	-	2602	2794
2029	-	2618	2829
2030	-	2635	2841
2031	-	2652	2867
2032	-	2669	2892
2033	-	2686	2919
2034	-	2704	2950
2035	-	2721	2985
2036	-	2740	3006
2037	-	2759	3041
2038	-	2779	3065
2039	-	2798	3095
2040	-	2818	3138
2041	-	2838	3162
2042	-	2858	3196
2043	-	2878	3230
2044	-	2897	3255
2045	-	2918	3293
2046	-	2938	3321
2047	-	2958	3376

Half-island forecasts

Upper North Island

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	1658	-	-
1999	1658	-	-
2000	1664	-	-
2001	1793	-	-
2002	1771	-	-
2003	1823	-	-
2004	1892	-	-
2005	1941	-	-
2006	2059	-	-
2007	2052	-	-
2008	-	2122	2202
2009	-	2178	2265
2010	-	2240	2346
2011	-	2296	2419
2012	-	2352	2484
2013	-	2412	2560
2014	-	2478	2630
2015	-	2548	2719
2016	-	2617	2823
2017	-	2688	2902
2018	-	2760	2983
2019	-	2833	3081
2020	-	2905	3163
2021	-	2969	3235
2022	-	3033	3326
2023	-	3097	3430
2024	-	3161	3497
2025	-	3226	3592
2026	-	3288	3668
2027	-	3349	3738
2028	-	3411	3818
2029	-	3473	3913
2030	-	3537	3995
2031	-	3603	4076
2032	-	3668	4183
2033	-	3735	4264
2034	-	3801	4359
2035	-	3869	4419
2036	-	3941	4524
2037	-	4013	4652
2038	-	4087	4704
2039	-	4161	4823
2040	-	4237	4942
2041	-	4313	5028
2042	-	4390	5121
2043	-	4469	5270
2044	-	4546	5353
2045	-	4627	5456
2046	-	4704	5584
2047	-	4783	5686

Lower North Island

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	1946	-	-
1999	2074	-	-
2000	2060	-	-
2001	2130	-	-
2002	2127	-	-
2003	2064	-	-
2004	2220	-	-
2005	2179	-	-
2006	2293	-	-
2007	2301	-	-
2008	-	2341	2402
2009	-	2375	2448
2010	-	2416	2501
2011	-	2448	2560
2012	-	2479	2602
2013	-	2511	2642
2014	-	2546	2690
2015	-	2583	2739
2016	-	2617	2787
2017	-	2651	2830
2018	-	2686	2874
2019	-	2722	2933
2020	-	2757	2991
2021	-	2785	3023
2022	-	2814	3060
2023	-	2842	3108
2024	-	2870	3156
2025	-	2898	3175
2026	-	2926	3221
2027	-	2954	3268
2028	-	2982	3305
2029	-	3010	3348
2030	-	3040	3398
2031	-	3070	3436
2032	-	3100	3487
2033	-	3130	3506
2034	-	3161	3559
2035	-	3192	3632
2036	-	3225	3691
2037	-	3258	3746
2038	-	3292	3753
2039	-	3326	3809
2040	-	3361	3876
2041	-	3396	3939
2042	-	3431	3991
2043	-	3467	4056
2044	-	3502	4104
2045	-	3539	4148
2046	-	3573	4216
2047	-	3608	4286

Upper South Island

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	875	-	-
1999	917	-	-
2000	905	-	-
2001	968	-	-
2002	1000	-	-
2003	942	-	-
2004	994	-	-
2005	1023	-	-
2006	1069	-	-
2007	1078	-	-
2008	-	1124	1151
2009	-	1149	1181
2010	-	1176	1218
2011	-	1200	1249
2012	-	1222	1286
2013	-	1242	1308
2014	-	1260	1327
2015	-	1276	1345
2016	-	1288	1365
2017	-	1301	1387
2018	-	1313	1408
2019	-	1326	1421
2020	-	1340	1448
2021	-	1352	1463
2022	-	1364	1488
2023	-	1378	1508
2024	-	1392	1522
2025	-	1406	1549
2026	-	1420	1557
2027	-	1435	1583
2028	-	1449	1615
2029	-	1464	1620
2030	-	1479	1650
2031	-	1495	1682
2032	-	1510	1694
2033	-	1526	1726
2034	-	1542	1737
2035	-	1558	1765
2036	-	1575	1795
2037	-	1592	1827
2038	-	1610	1843
2039	-	1627	1876
2040	-	1645	1900
2041	-	1663	1930
2042	-	1681	1947
2043	-	1699	1976
2044	-	1716	2012
2045	-	1735	2047
2046	-	1753	2074
2047	-	1770	2102

Lower South Island

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	963	-	-
1999	974	-	-
2000	996	-	-
2001	1017	-	-
2002	1025	-	-
2003	1012	-	-
2004	1040	-	-
2005	1059	-	-
2006	1062	-	-
2007	1103	-	-
2008	-	1110	1122
2009	-	1125	1147
2010	-	1142	1178
2011	-	1154	1201
2012	-	1164	1223
2013	-	1171	1229
2014	-	1176	1235
2015	-	1179	1236
2016	-	1178	1234
2017	-	1177	1237
2018	-	1176	1239
2019	-	1175	1237
2020	-	1175	1237
2021	-	1175	1234
2022	-	1175	1234
2023	-	1176	1238
2024	-	1177	1241
2025	-	1179	1244
2026	-	1181	1245
2027	-	1184	1247
2028	-	1186	1251
2029	-	1188	1259
2030	-	1191	1260
2031	-	1194	1267
2032	-	1197	1266
2033	-	1200	1276
2034	-	1203	1276
2035	-	1206	1278
2036	-	1209	1285
2037	-	1212	1290
2038	-	1216	1296
2039	-	1219	1298
2040	-	1223	1307
2041	-	1226	1315
2042	-	1230	1318
2043	-	1233	1317
2044	-	1237	1331
2045	-	1240	1333
2046	-	1244	1344
2047	-	1247	1343

North Island regional forecasts

Auckland

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	1038	-	-
1999	1056	-	-
2000	1046	-	-
2001	1128	-	-
2002	1112	-	-
2003	1130	-	-
2004	1172	-	-
2005	1211	-	-
2006	1310	-	-
2007	1299	-	-
2008	-	1338	1402
2009	-	1375	1444
2010	-	1414	1495
2011	-	1450	1540
2012	-	1486	1586
2013	-	1527	1626
2014	-	1571	1685
2015	-	1620	1734
2016	-	1668	1798
2017	-	1718	1853
2018	-	1769	1911
2019	-	1820	1963
2020	-	1870	2042
2021	-	1916	2093
2022	-	1961	2152
2023	-	2005	2213
2024	-	2050	2272
2025	-	2095	2340
2026	-	2137	2390
2027	-	2180	2424
2028	-	2223	2488
2029	-	2266	2537
2030	-	2310	2601
2031	-	2355	2654
2032	-	2400	2701
2033	-	2447	2770
2034	-	2493	2837
2035	-	2540	2899
2036	-	2590	2953
2037	-	2640	3025
2038	-	2691	3113
2039	-	2743	3170
2040	-	2796	3221
2041	-	2849	3296
2042	-	2903	3359
2043	-	2958	3433
2044	-	3012	3504
2045	-	3069	3574
2046	-	3123	3671
2047	-	3178	3770

Bay of Plenty

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	374	-	-
1999	390	-	-
2000	402	-	-
2001	408	-	-
2002	422	-	-
2003	412	-	-
2004	444	-	-
2005	442	-	-
2006	456	-	-
2007	428	-	-
2008	-	455	473
2009	-	461	483
2010	-	469	492
2011	-	475	503
2012	-	481	511
2013	-	488	520
2014	-	494	527
2015	-	501	535
2016	-	508	549
2017	-	516	557
2018	-	524	570
2019	-	532	579
2020	-	541	595
2021	-	549	606
2022	-	557	614
2023	-	565	627
2024	-	573	638
2025	-	581	648
2026	-	589	661
2027	-	598	671
2028	-	606	684
2029	-	614	698
2030	-	622	708
2031	-	631	725
2032	-	640	731
2033	-	648	744
2034	-	657	756
2035	-	666	767
2036	-	676	781
2037	-	685	799
2038	-	695	813
2039	-	705	823
2040	-	715	838
2041	-	725	852
2042	-	735	871
2043	-	745	885
2044	-	755	899
2045	-	766	914
2046	-	776	933
2047	-	786	949

Central

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	304	-	-
1999	298	-	-
2000	307	-	-
2001	319	-	-
2002	312	-	-
2003	307	-	-
2004	325	-	-
2005	310	-	-
2006	334	-	-
2007	335	-	-
2008	-	335	346
2009	-	339	351
2010	-	345	359
2011	-	349	367
2012	-	353	374
2013	-	358	382
2014	-	362	387
2015	-	367	392
2016	-	371	400
2017	-	375	401
2018	-	379	409
2019	-	383	413
2020	-	387	419
2021	-	390	422
2022	-	393	426
2023	-	395	429
2024	-	398	434
2025	-	401	438
2026	-	404	443
2027	-	406	447
2028	-	409	450
2029	-	412	454
2030	-	415	461
2031	-	418	464
2032	-	421	467
2033	-	424	471
2034	-	427	478
2035	-	430	482
2036	-	434	490
2037	-	437	495
2038	-	440	501
2039	-	444	506
2040	-	447	512
2041	-	451	515
2042	-	454	524
2043	-	458	528
2044	-	461	537
2045	-	465	543
2046	-	468	548
2047	-	472	555

Hawkes Bay

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	272	-	-
1999	278	-	-
2000	285	-	-
2001	293	-	-
2002	287	-	-
2003	279	-	-
2004	291	-	-
2005	291	-	-
2006	283	-	-
2007	296	-	-
2008	-	294	301
2009	-	296	304
2010	-	299	309
2011	-	301	314
2012	-	303	318
2013	-	305	321
2014	-	306	323
2015	-	308	326
2016	-	310	329
2017	-	311	332
2018	-	313	335
2019	-	314	339
2020	-	316	343
2021	-	318	346
2022	-	319	347
2023	-	321	352
2024	-	322	354
2025	-	324	359
2026	-	325	360
2027	-	327	366
2028	-	329	368
2029	-	330	370
2030	-	332	374
2031	-	334	377
2032	-	336	381
2033	-	338	384
2034	-	340	389
2035	-	342	395
2036	-	344	397
2037	-	346	399
2038	-	348	405
2039	-	350	408
2040	-	353	411
2041	-	355	416
2042	-	357	422
2043	-	359	427
2044	-	361	432
2045	-	363	434
2046	-	366	439
2047	-	368	442

North Isthmus

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	622	-	-
1999	629	-	-
2000	635	-	-
2001	673	-	-
2002	688	-	-
2003	701	-	-
2004	725	-	-
2005	748	-	-
2006	808	-	-
2007	797	-	-
2008	-	831	857
2009	-	856	885
2010	-	883	915
2011	-	906	946
2012	-	928	977
2013	-	949	1001
2014	-	971	1032
2015	-	995	1056
2016	-	1017	1082
2017	-	1039	1108
2018	-	1062	1132
2019	-	1084	1168
2020	-	1107	1196
2021	-	1128	1223
2022	-	1148	1252
2023	-	1169	1281
2024	-	1189	1301
2025	-	1210	1329
2026	-	1231	1367
2027	-	1251	1391
2028	-	1271	1422
2029	-	1292	1438
2030	-	1313	1475
2031	-	1334	1501
2032	-	1356	1528
2033	-	1377	1551
2034	-	1399	1588
2035	-	1421	1624
2036	-	1444	1658
2037	-	1468	1693
2038	-	1492	1721
2039	-	1516	1762
2040	-	1540	1791
2041	-	1564	1823
2042	-	1589	1865
2043	-	1614	1886
2044	-	1638	1936
2045	-	1664	1968
2046	-	1689	2002
2047	-	1714	2035

Taranaki (*)

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	125	-	-
1999	124	-	-
2000	135	-	-
2001	126	-	-
2002	129	-	-
2003	123	-	-
2004	126	-	-
2005	125	-	-
2006	131	-	-
2007	131	-	-
2008	-	139	144
2009	-	140	145
2010	-	141	147
2011	-	141	148
2012	-	142	150
2013	-	143	151
2014	-	143	152
2015	-	144	152
2016	-	144	154
2017	-	145	155
2018	-	145	155
2019	-	145	157
2020	-	146	158
2021	-	146	158
2022	-	146	159
2023	-	146	159
2024	-	146	160
2025	-	146	160
2026	-	147	162
2027	-	147	162
2028	-	147	163
2029	-	148	164
2030	-	148	165
2031	-	148	166
2032	-	149	168
2033	-	149	168
2034	-	150	168
2035	-	150	168
2036	-	151	171
2037	-	151	171
2038	-	152	174
2039	-	152	173
2040	-	153	175
2041	-	153	176
2042	-	154	178
2043	-	155	179
2044	-	155	180
2045	-	156	182
2046	-	156	184
2047	-	157	185

(*) Net of Methanex plant. Values from 2008 on are increased by 8 MW to account for new loads

Waikato

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	471	-	-
1999	466	-	-
2000	476	-	-
2001	481	-	-
2002	484	-	-
2003	485	-	-
2004	511	-	-
2005	507	-	-
2006	532	-	-
2007	551	-	-
2008	-	550	570
2009	-	559	585
2010	-	570	595
2011	-	578	609
2012	-	587	623
2013	-	596	633
2014	-	607	648
2015	-	619	662
2016	-	631	678
2017	-	643	695
2018	-	655	707
2019	-	666	723
2020	-	677	740
2021	-	686	752
2022	-	695	763
2023	-	703	773
2024	-	711	786
2025	-	719	799
2026	-	727	811
2027	-	735	820
2028	-	743	839
2029	-	750	843
2030	-	759	855
2031	-	767	866
2032	-	775	883
2033	-	783	902
2034	-	792	909
2035	-	800	923
2036	-	809	933
2037	-	818	946
2038	-	828	966
2039	-	837	983
2040	-	846	993
2041	-	856	1014
2042	-	866	1022
2043	-	875	1037
2044	-	885	1053
2045	-	895	1068
2046	-	904	1093
2047	-	914	1102

Wellington

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	545	-	-
1999	556	-	-
2000	572	-	-
2001	567	-	-
2002	580	-	-
2003	555	-	-
2004	626	-	-
2005	592	-	-
2006	639	-	-
2007	653	-	-
2008	-	655	676
2009	-	667	691
2010	-	681	707
2011	-	692	725
2012	-	703	742
2013	-	715	754
2014	-	727	772
2015	-	740	786
2016	-	751	801
2017	-	763	820
2018	-	774	833
2019	-	785	849
2020	-	796	861
2021	-	804	875
2022	-	813	890
2023	-	821	897
2024	-	830	911
2025	-	838	922
2026	-	846	931
2027	-	855	947
2028	-	863	960
2029	-	871	973
2030	-	880	982
2031	-	889	994
2032	-	897	1006
2033	-	906	1012
2034	-	915	1028
2035	-	924	1042
2036	-	934	1056
2037	-	944	1071
2038	-	954	1084
2039	-	964	1105
2040	-	975	1117
2041	-	985	1141
2042	-	995	1151
2043	-	1006	1164
2044	-	1016	1181
2045	-	1027	1205
2046	-	1037	1217
2047	-	1048	1235

South Island regional forecasts

Canterbury

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	615	-	-
1999	648	-	-
2000	632	-	-
2001	681	-	-
2002	711	-	-
2003	663	-	-
2004	700	-	-
2005	707	-	-
2006	750	-	-
2007	744	-	-
2008	-	764	786
2009	-	779	804
2010	-	797	829
2011	-	813	848
2012	-	828	869
2013	-	842	890
2014	-	855	906
2015	-	868	920
2016	-	878	939
2017	-	888	953
2018	-	899	969
2019	-	910	981
2020	-	921	996
2021	-	931	1014
2022	-	941	1027
2023	-	952	1048
2024	-	963	1066
2025	-	974	1076
2026	-	985	1095
2027	-	997	1117
2028	-	1008	1129
2029	-	1020	1142
2030	-	1032	1160
2031	-	1044	1183
2032	-	1056	1196
2033	-	1068	1224
2034	-	1080	1233
2035	-	1093	1257
2036	-	1106	1276
2037	-	1119	1298
2038	-	1133	1319
2039	-	1146	1345
2040	-	1160	1359
2041	-	1173	1374
2042	-	1187	1394
2043	-	1201	1426
2044	-	1214	1438
2045	-	1229	1477
2046	-	1242	1495
2047	-	1256	1516

Nelson/Marlborough

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	156	-	-
1999	166	-	-
2000	165	-	-
2001	175	-	-
2002	179	-	-
2003	180	-	-
2004	189	-	-
2005	194	-	-
2006	198	-	-
2007	213	-	-
2008	-	214	220
2009	-	221	227
2010	-	227	235
2011	-	233	242
2012	-	237	250
2013	-	241	254
2014	-	244	258
2015	-	246	261
2016	-	248	264
2017	-	249	266
2018	-	251	269
2019	-	253	271
2020	-	254	275
2021	-	256	278
2022	-	258	280
2023	-	260	284
2024	-	262	287
2025	-	264	290
2026	-	266	293
2027	-	268	298
2028	-	270	301
2029	-	273	306
2030	-	275	308
2031	-	278	312
2032	-	280	315
2033	-	282	319
2034	-	285	323
2035	-	287	328
2036	-	290	333
2037	-	293	336
2038	-	295	342
2039	-	298	346
2040	-	301	350
2041	-	303	355
2042	-	306	359
2043	-	309	364
2044	-	312	368
2045	-	314	373
2046	-	317	381
2047	-	320	385

Otago/Southland (*)

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	963	-	-
1999	974	-	-
2000	996	-	-
2001	1017	-	-
2002	1025	-	-
2003	1012	-	-
2004	1040	-	-
2005	1059	-	-
2006	1062	-	-
2007	1103	-	-
2008	-	1110	1124
2009	-	1125	1148
2010	-	1142	1176
2011	-	1154	1199
2012	-	1164	1222
2013	-	1171	1228
2014	-	1176	1234
2015	-	1179	1240
2016	-	1178	1230
2017	-	1177	1236
2018	-	1176	1234
2019	-	1175	1234
2020	-	1175	1236
2021	-	1175	1233
2022	-	1175	1233
2023	-	1176	1240
2024	-	1177	1239
2025	-	1179	1241
2026	-	1181	1239
2027	-	1184	1246
2028	-	1186	1252
2029	-	1188	1259
2030	-	1191	1259
2031	-	1194	1262
2032	-	1197	1268
2033	-	1200	1272
2034	-	1203	1273
2035	-	1206	1284
2036	-	1209	1289
2037	-	1212	1297
2038	-	1216	1299
2039	-	1219	1305
2040	-	1223	1315
2041	-	1226	1319
2042	-	1230	1324
2043	-	1233	1327
2044	-	1237	1338
2045	-	1240	1338
2046	-	1244	1355
2047	-	1247	1348

(*) Values from 2008 on are increased by 5 MW to account for new loads

South Canterbury

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	42	-	-
1999	43	-	-
2000	43	-	-
2001	44	-	-
2002	47	-	-
2003	44	-	-
2004	46	-	-
2005	47	-	-
2006	49	-	-
2007	50	-	-
2008	-	72	74
2009	-	73	75
2010	-	74	77
2011	-	75	78
2012	-	75	79
2013	-	76	80
2014	-	77	81
2015	-	77	81
2016	-	78	82
2017	-	78	82
2018	-	79	83
2019	-	79	84
2020	-	80	84
2021	-	80	84
2022	-	80	85
2023	-	81	86
2024	-	81	86
2025	-	81	86
2026	-	82	87
2027	-	82	88
2028	-	82	88
2029	-	83	89
2030	-	83	89
2031	-	83	90
2032	-	84	90
2033	-	84	90
2034	-	84	91
2035	-	85	92
2036	-	85	93
2037	-	85	94
2038	-	86	94
2039	-	86	95
2040	-	87	95
2041	-	87	96
2042	-	87	96
2043	-	88	97
2044	-	88	98
2045	-	89	99
2046	-	89	99
2047	-	90	100

(*) Value used for 2006 is artificial – real value was affected by outages

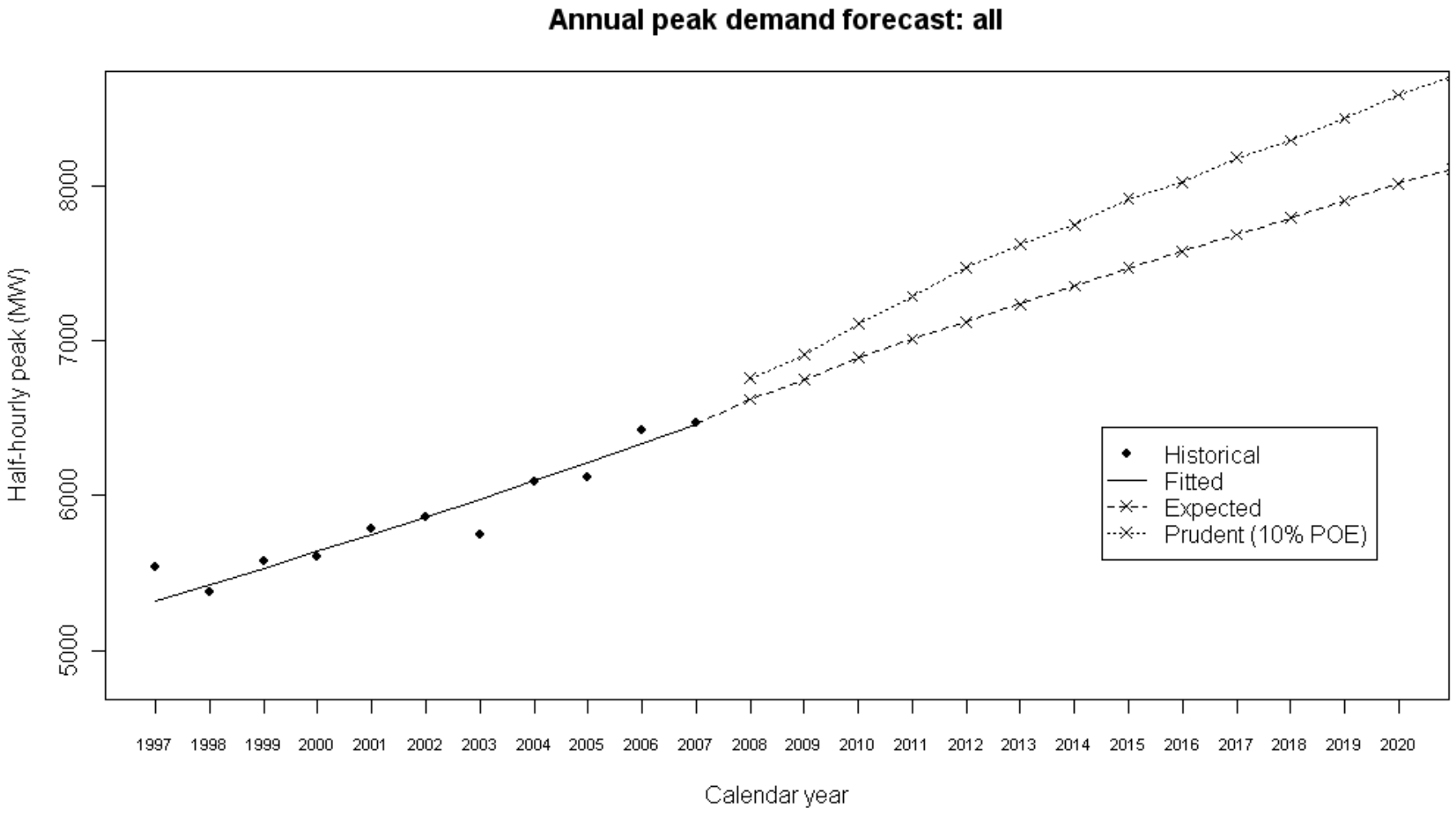
West Coast

Year	Observed peak (MW)	Expected peak (MW)	Prudent peak (MW)
1998	42	-	-
1999	43	-	-
2000	43	-	-
2001	44	-	-
2002	47	-	-
2003	44	-	-
2004	46	-	-
2005	47	-	-
2006	49	-	-
2007	50	-	-
2008	-	72	74
2009	-	73	75
2010	-	74	77
2011	-	75	78
2012	-	75	79
2013	-	76	80
2014	-	77	81
2015	-	77	81
2016	-	78	82
2017	-	78	82
2018	-	79	83
2019	-	79	84
2020	-	80	84
2021	-	80	84
2022	-	80	85
2023	-	81	86
2024	-	81	86
2025	-	81	86
2026	-	82	87
2027	-	82	88
2028	-	82	88
2029	-	83	89
2030	-	83	89
2031	-	83	90
2032	-	84	90
2033	-	84	90
2034	-	84	91
2035	-	85	92
2036	-	85	93
2037	-	85	94
2038	-	86	94
2039	-	86	95
2040	-	87	95
2041	-	87	96
2042	-	87	96
2043	-	88	97
2044	-	88	98
2045	-	89	99
2046	-	89	99
2047	-	90	100

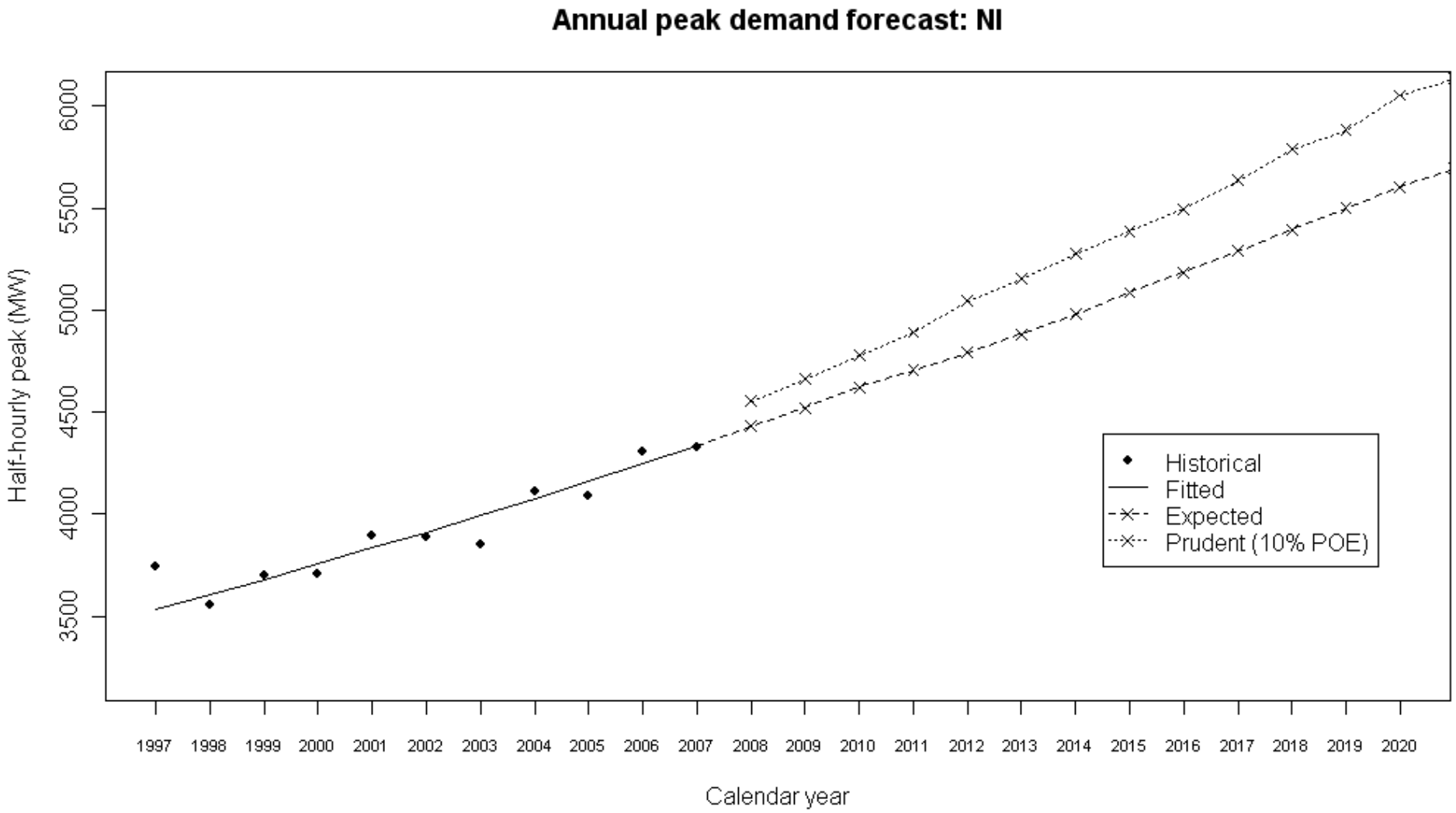
(*) Values from 2008 on are increased by 22 MW to account for new loads

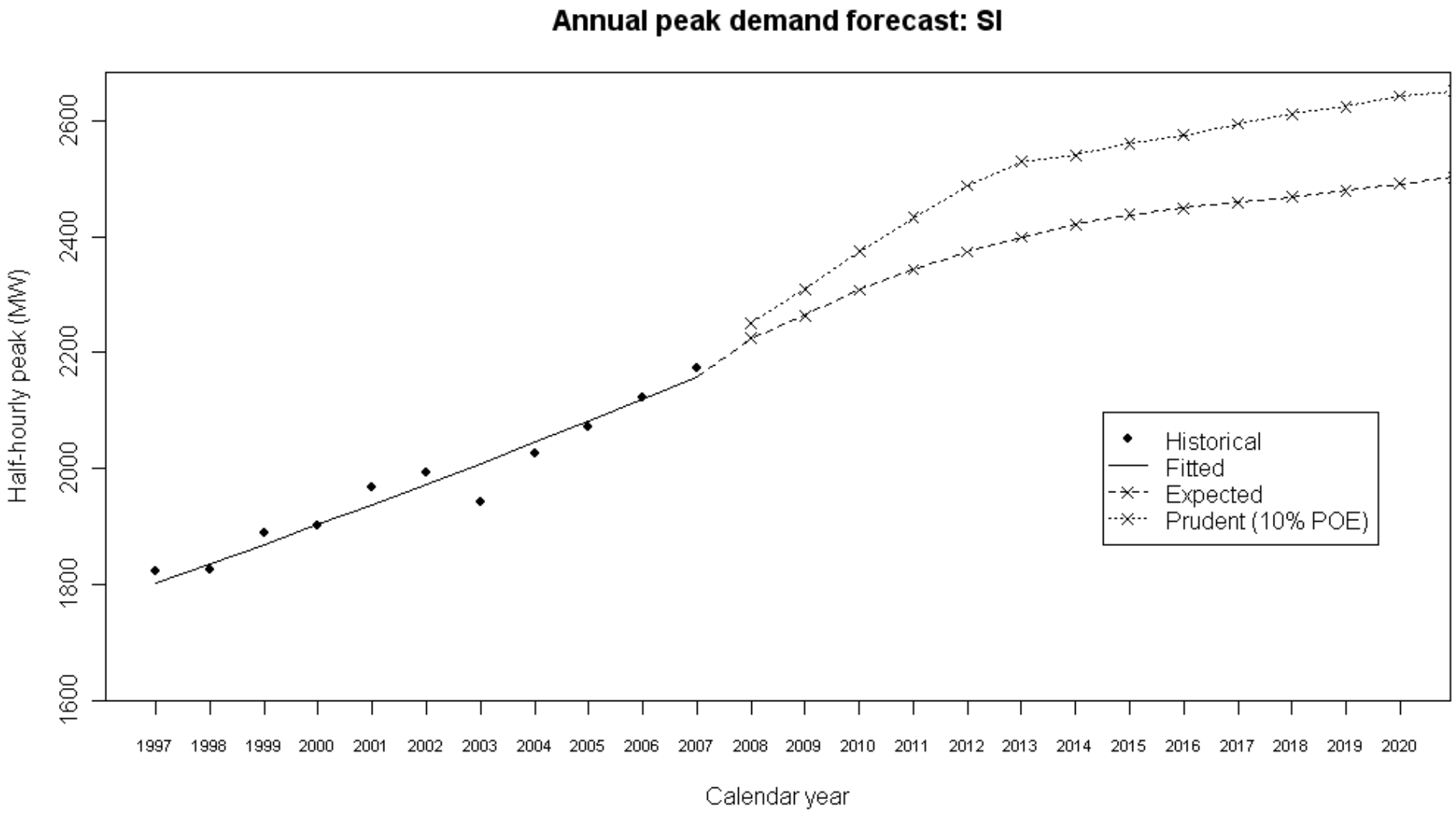
3.2 Forecasts (as plots)

The national forecast is as follows:



Island forecasts follow:




Annual peak demand forecast: SI
Half-hourly peak (MW)
1600
1800
2000
2200
2400
2600
1997
1998
1999
2000
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2012
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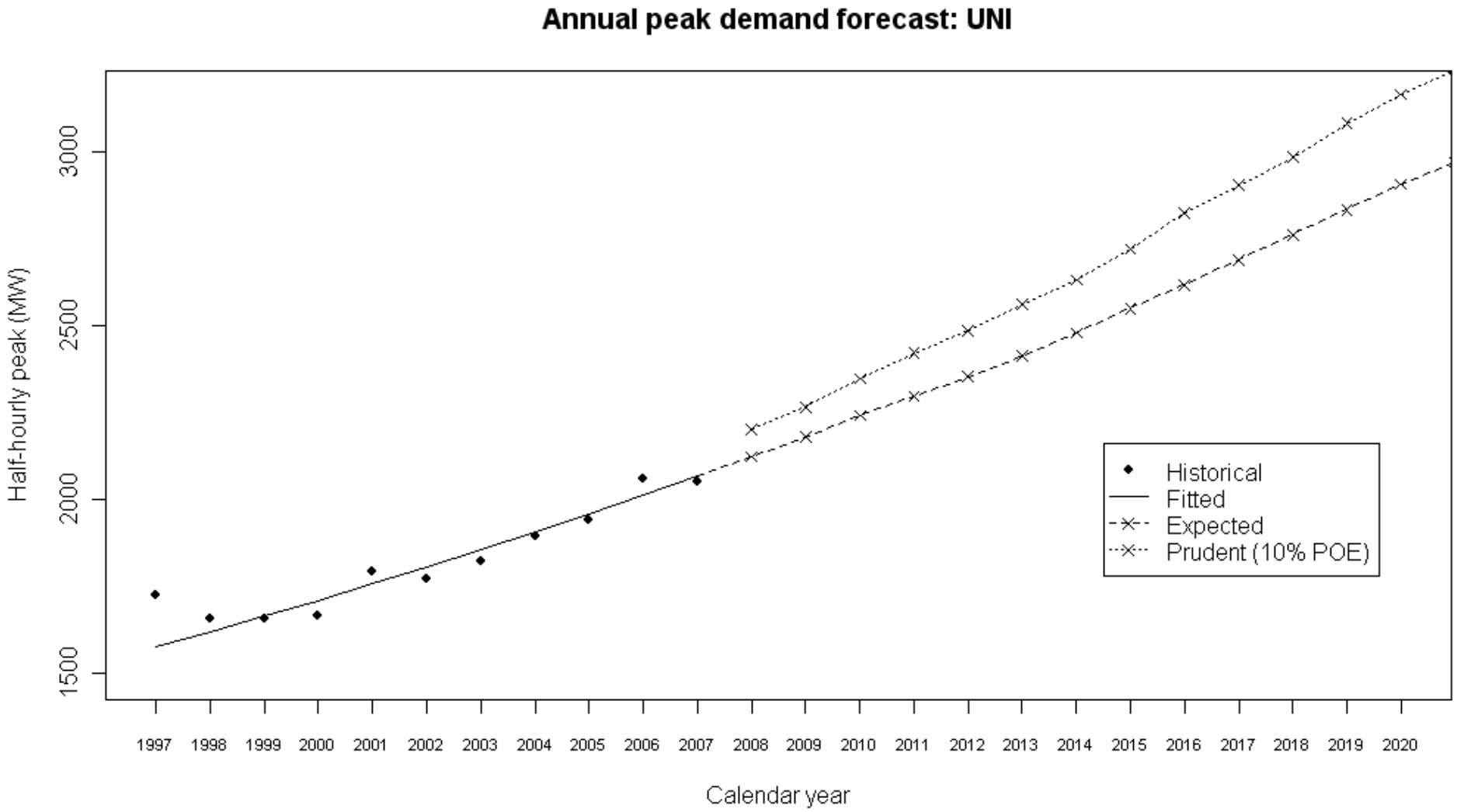
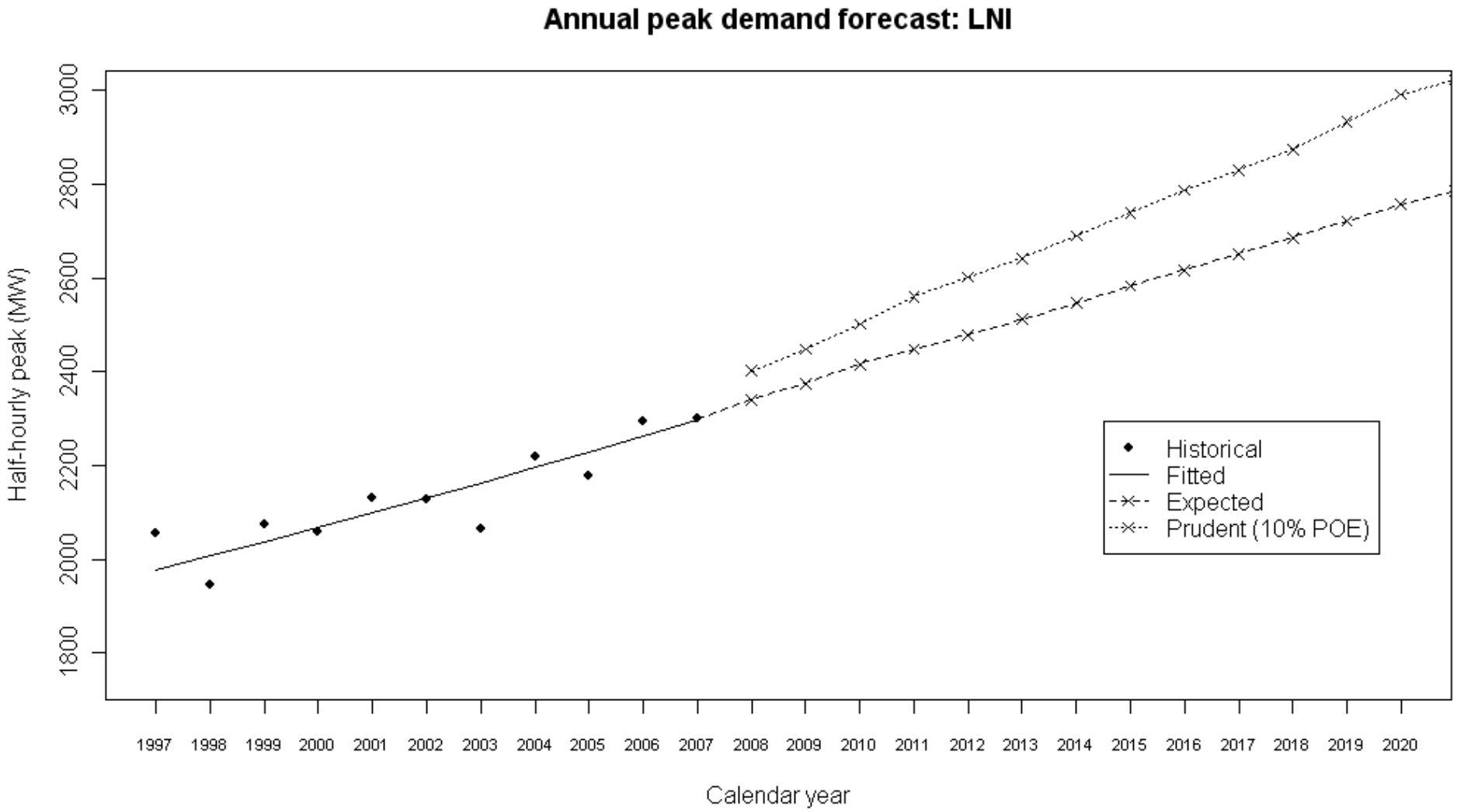
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)

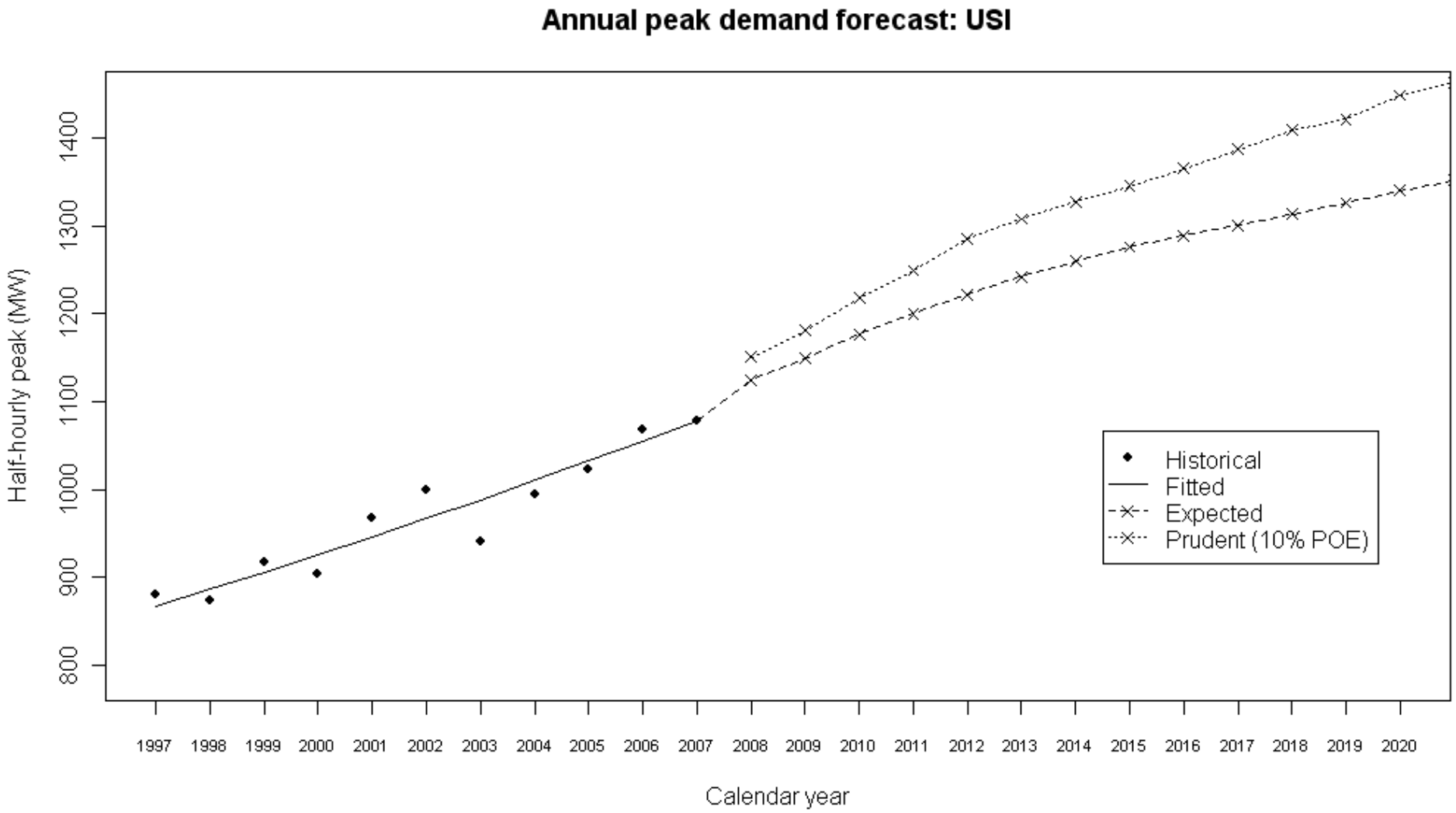
The upper North Island forecast:



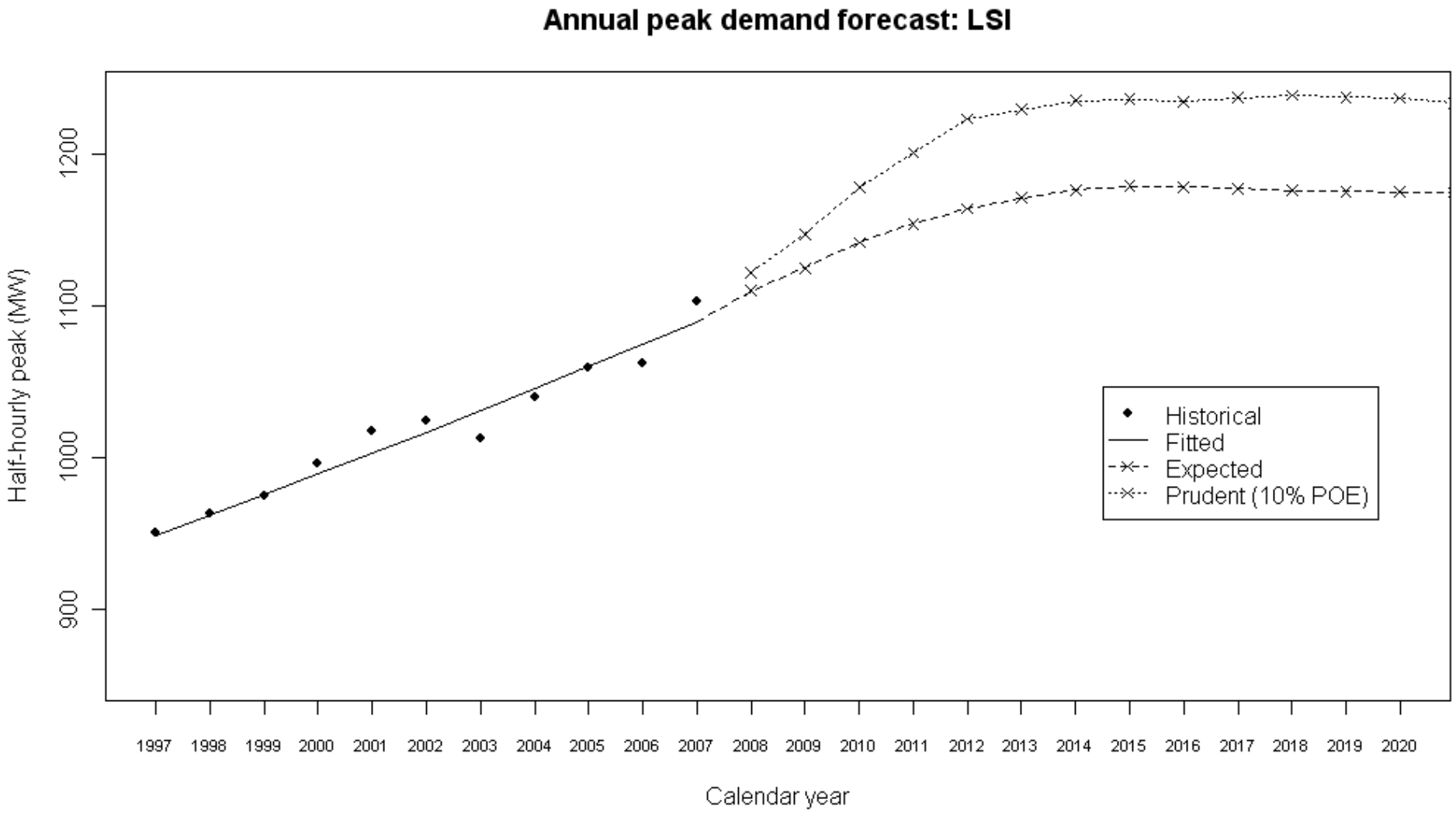
The forecast for the remainder of the North Island:



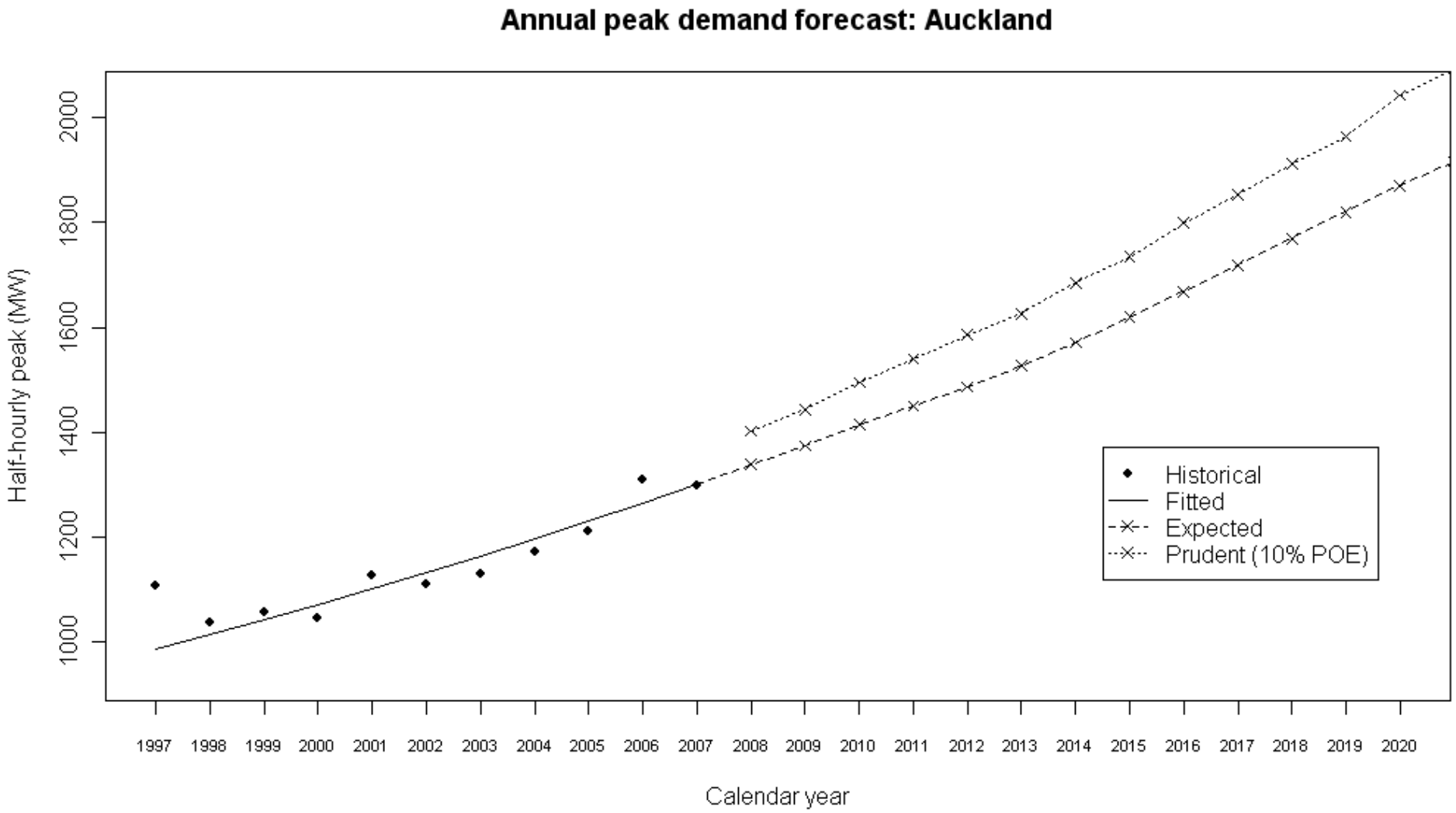
The upper South Island forecast:

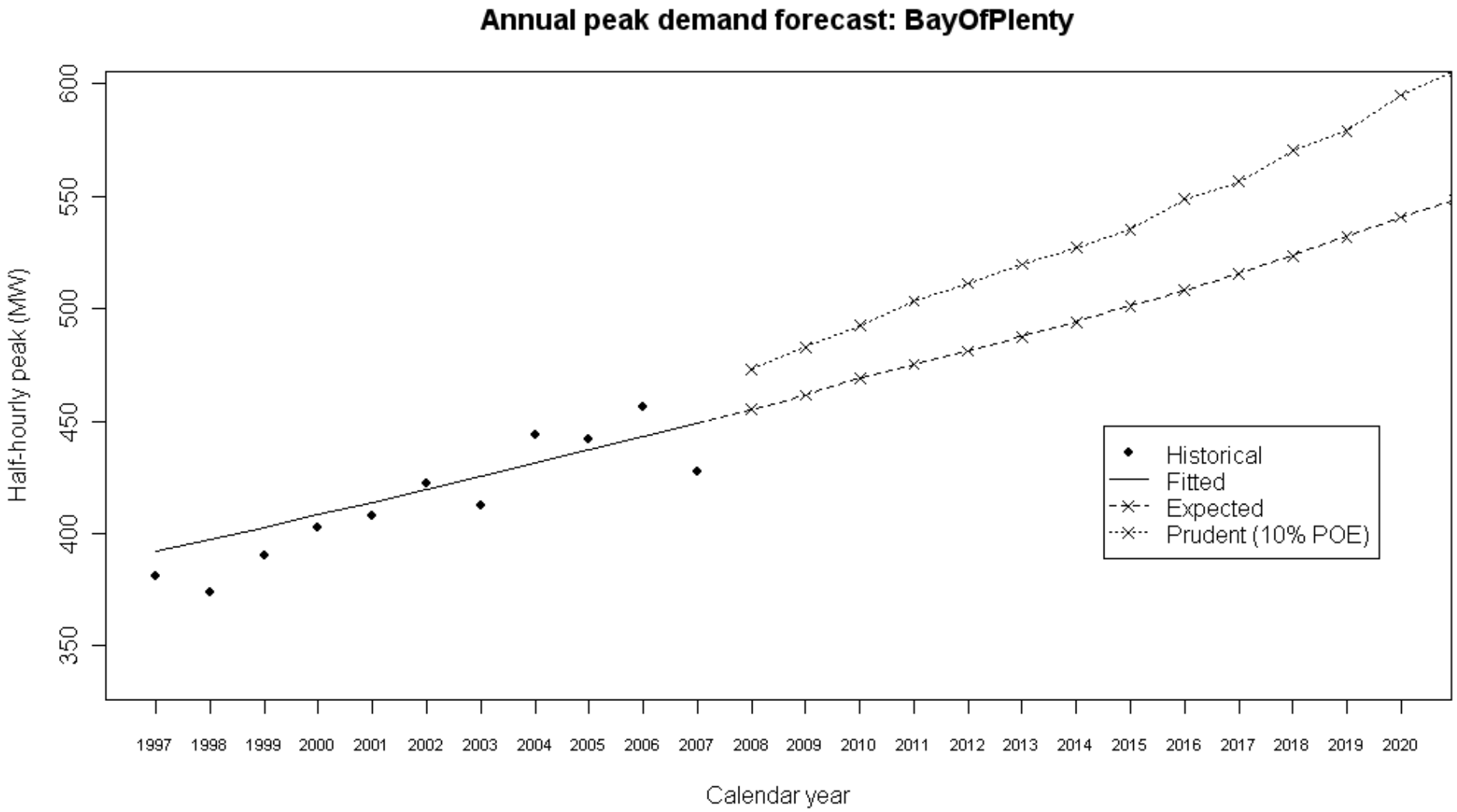


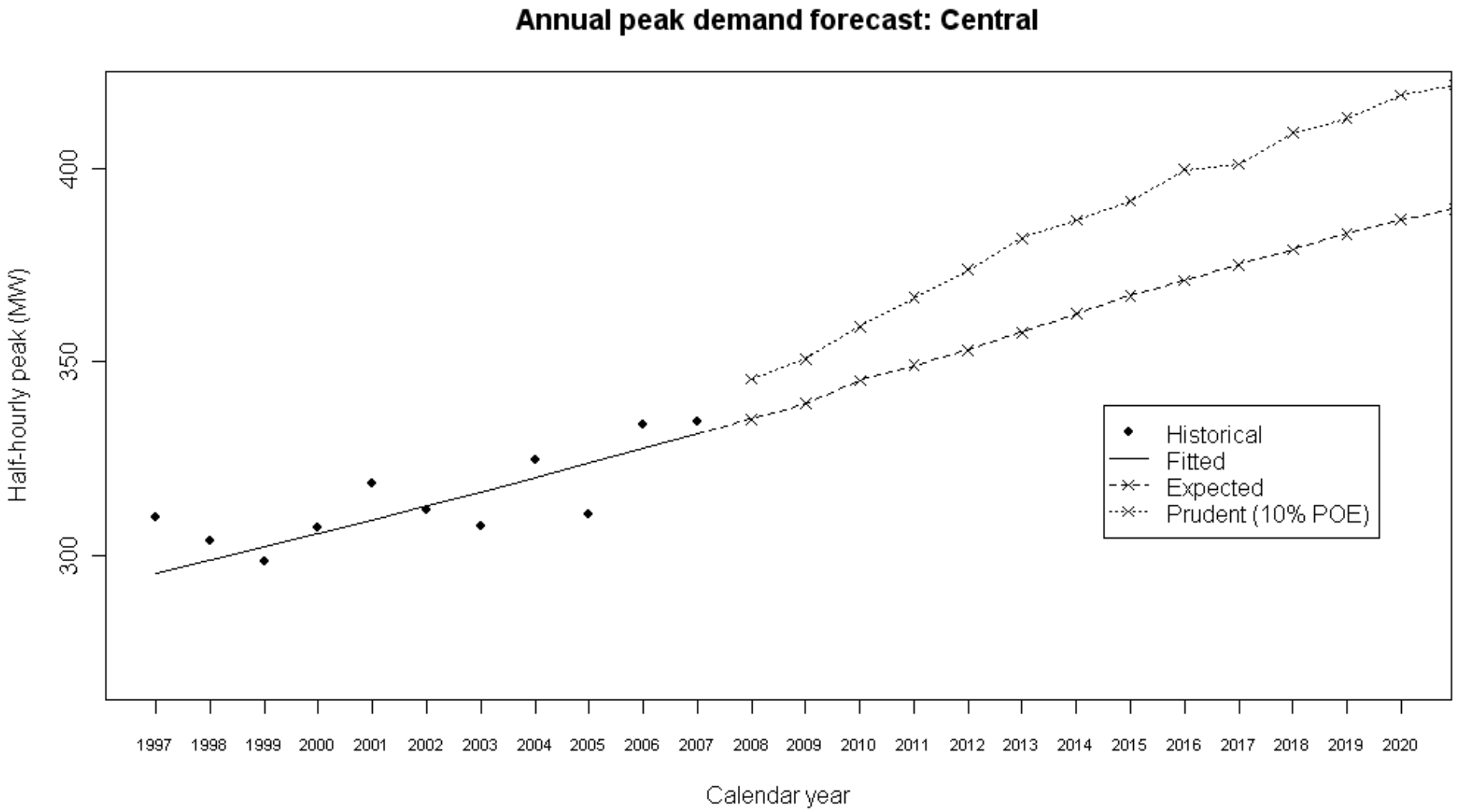
The forecast for the lower South Island:

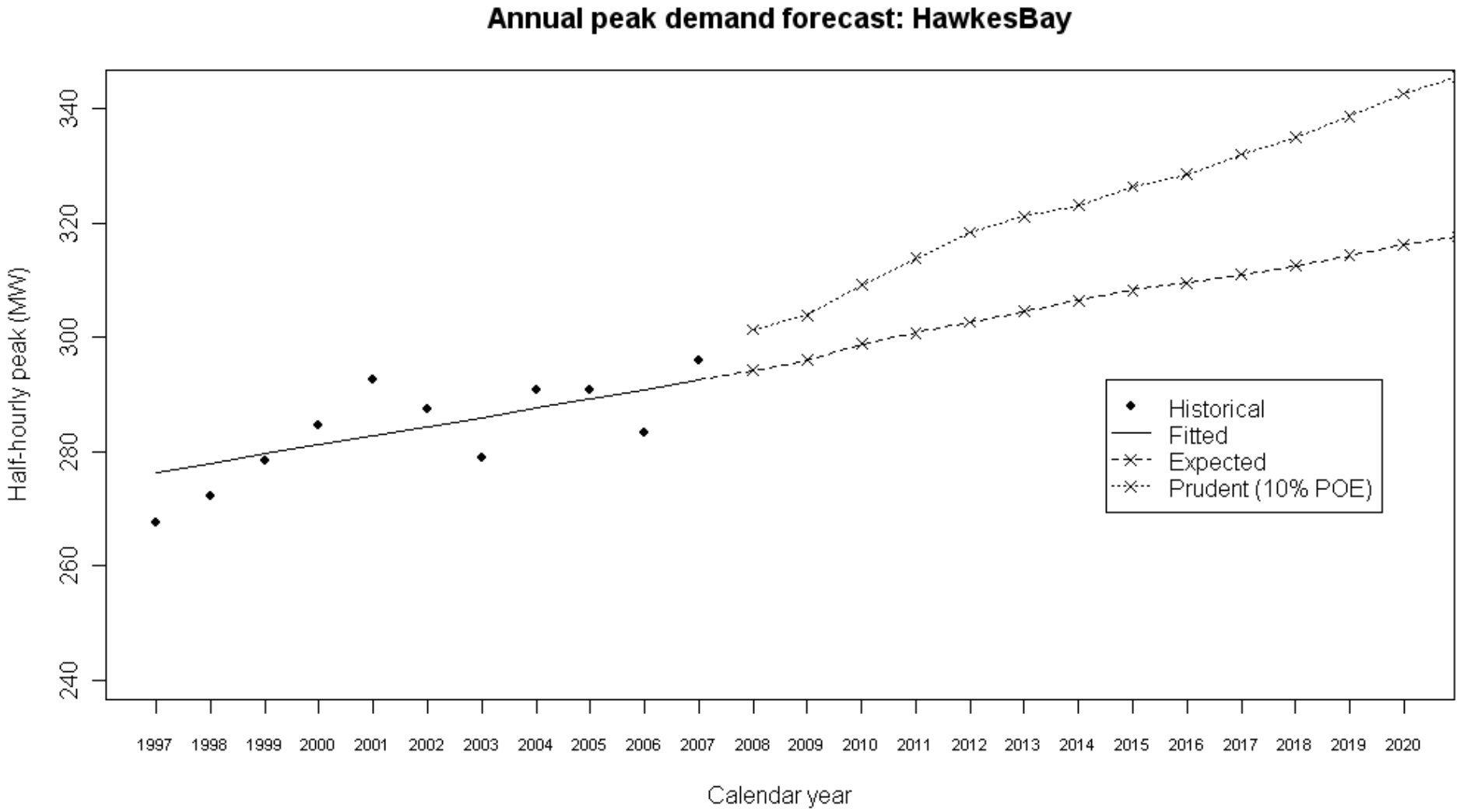


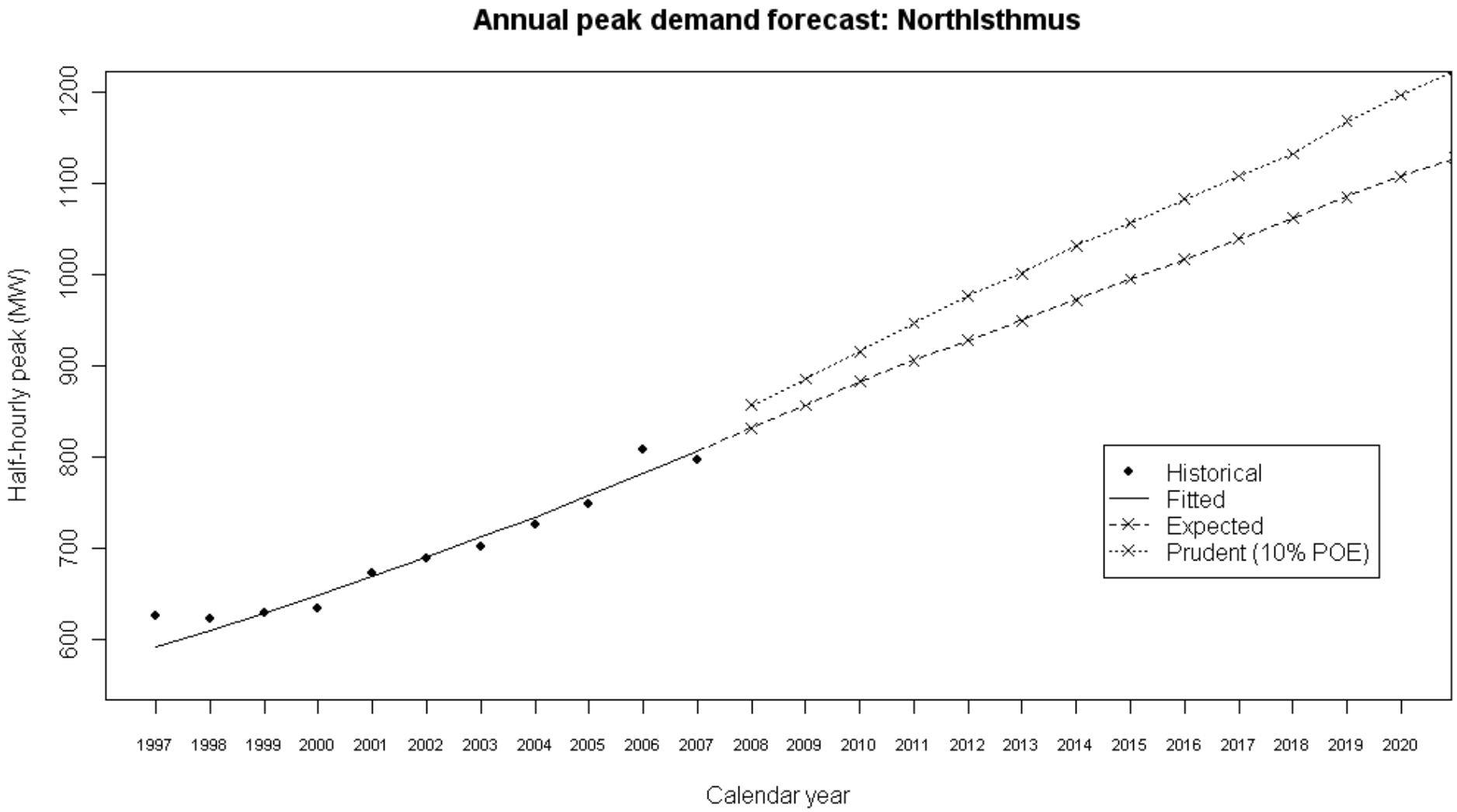
North Island regional forecasts:



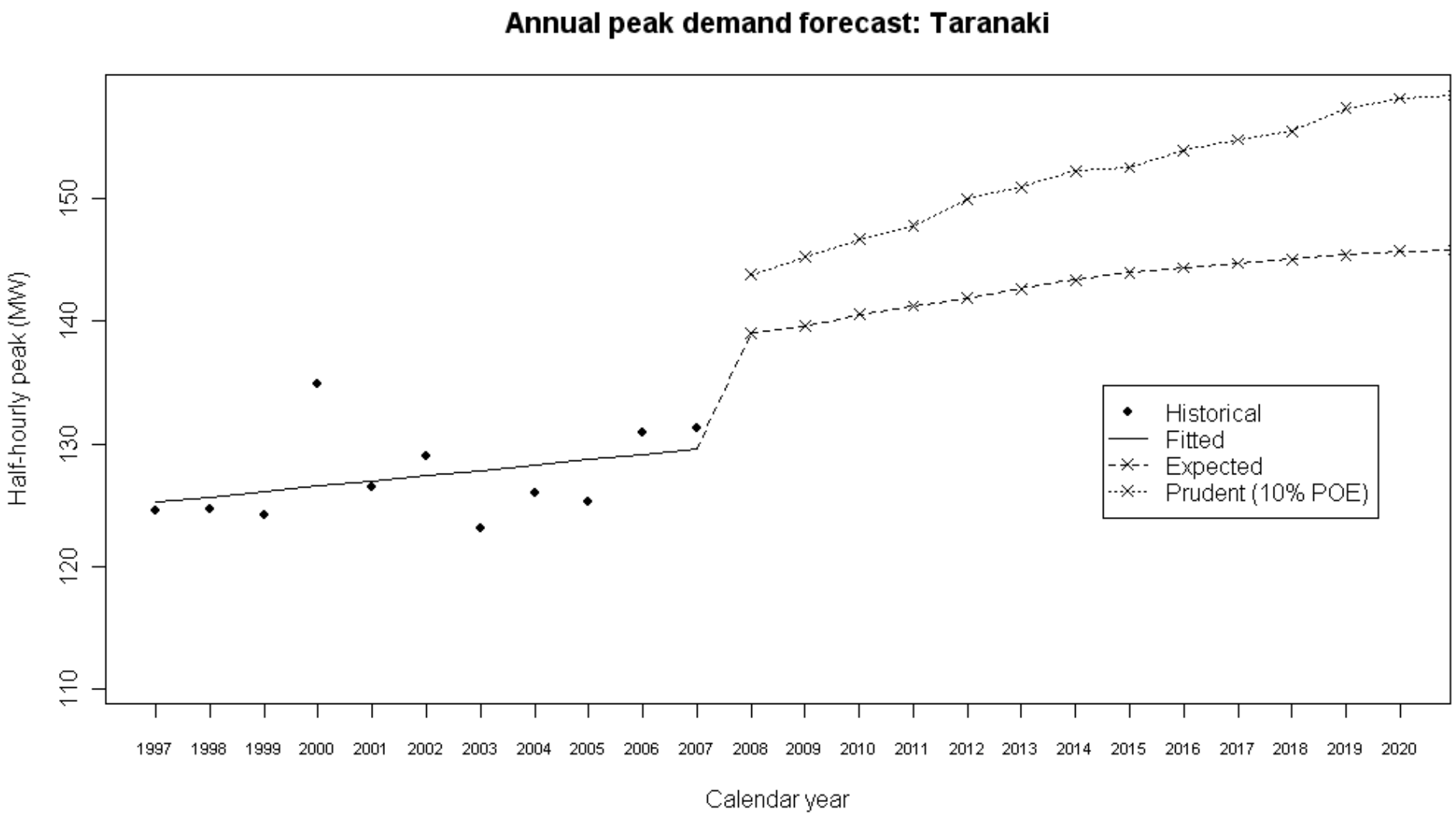

Annual peak demand forecast: BayOfPlenty
Half-hourly peak (MW)
350
400
450
500
550
600
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)

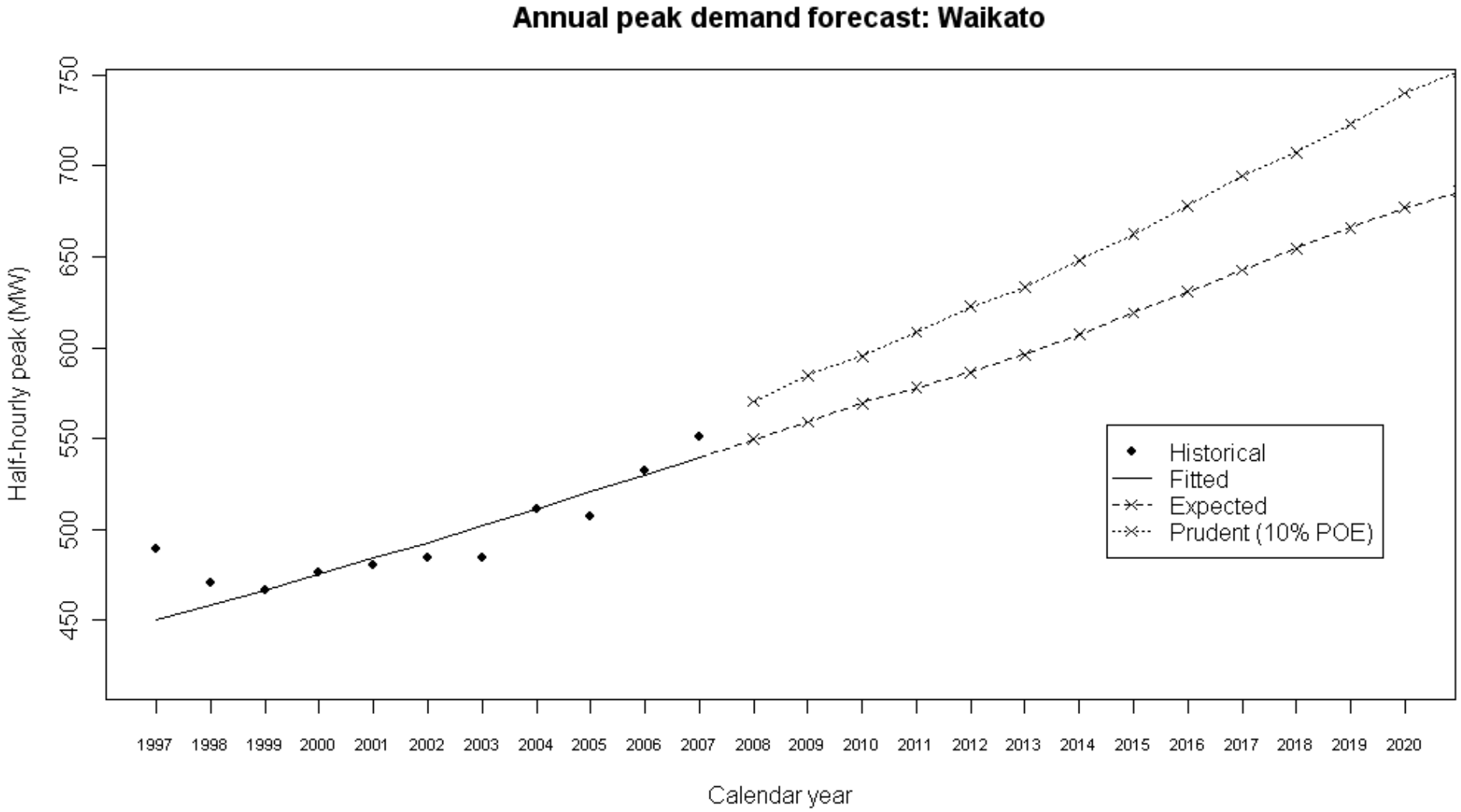

Annual peak demand forecast: Central
Half-hourly peak (MW)
300
350
400
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)

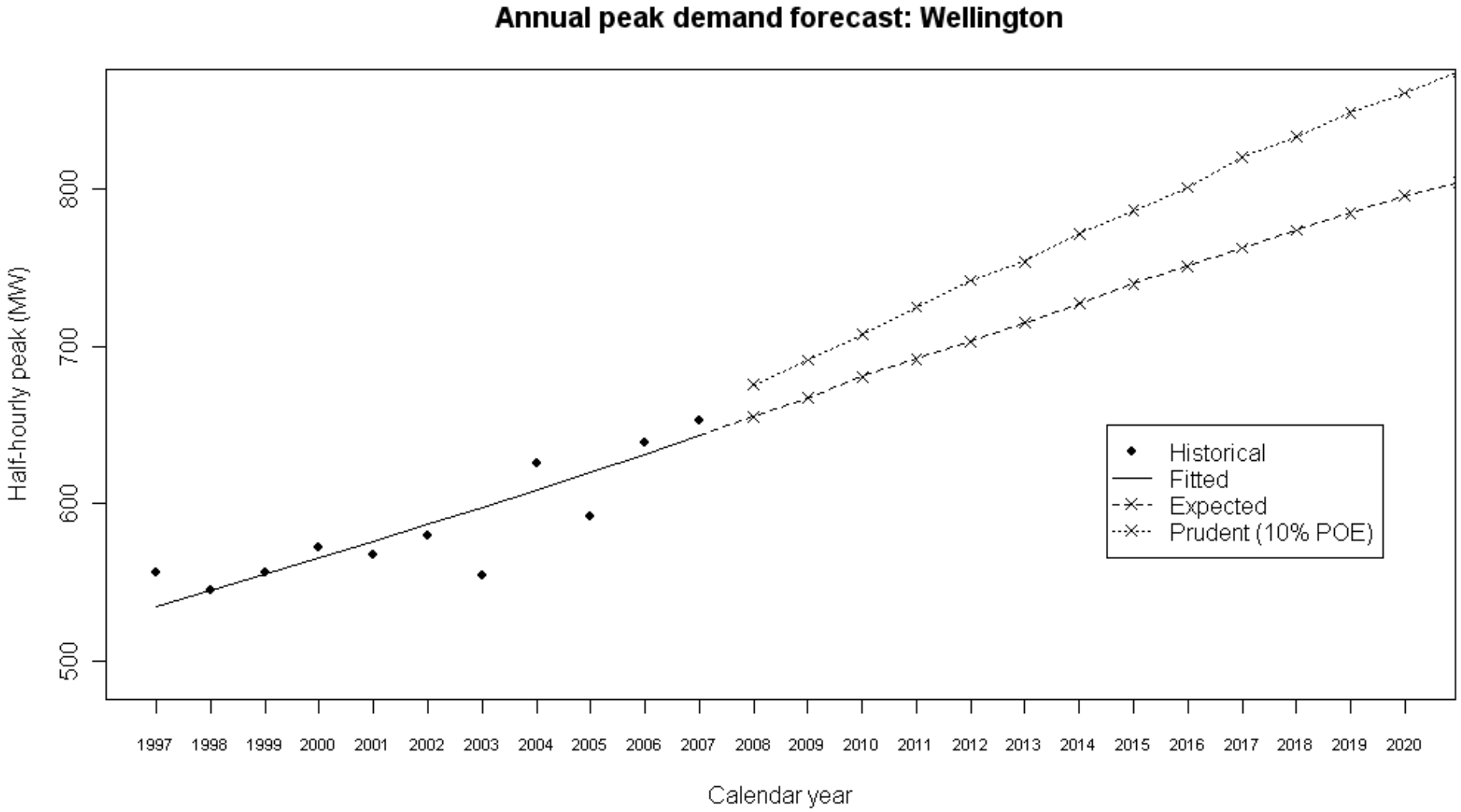

Annual peak demand forecast: HawkesBay
Half-hourly peak (MW)
240
260
280
300
320
340
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)


Annual peak demand forecast: NorthIsthmus
Half-hourly peak (MW)
600
700
800
900
1000
1100
1200
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)

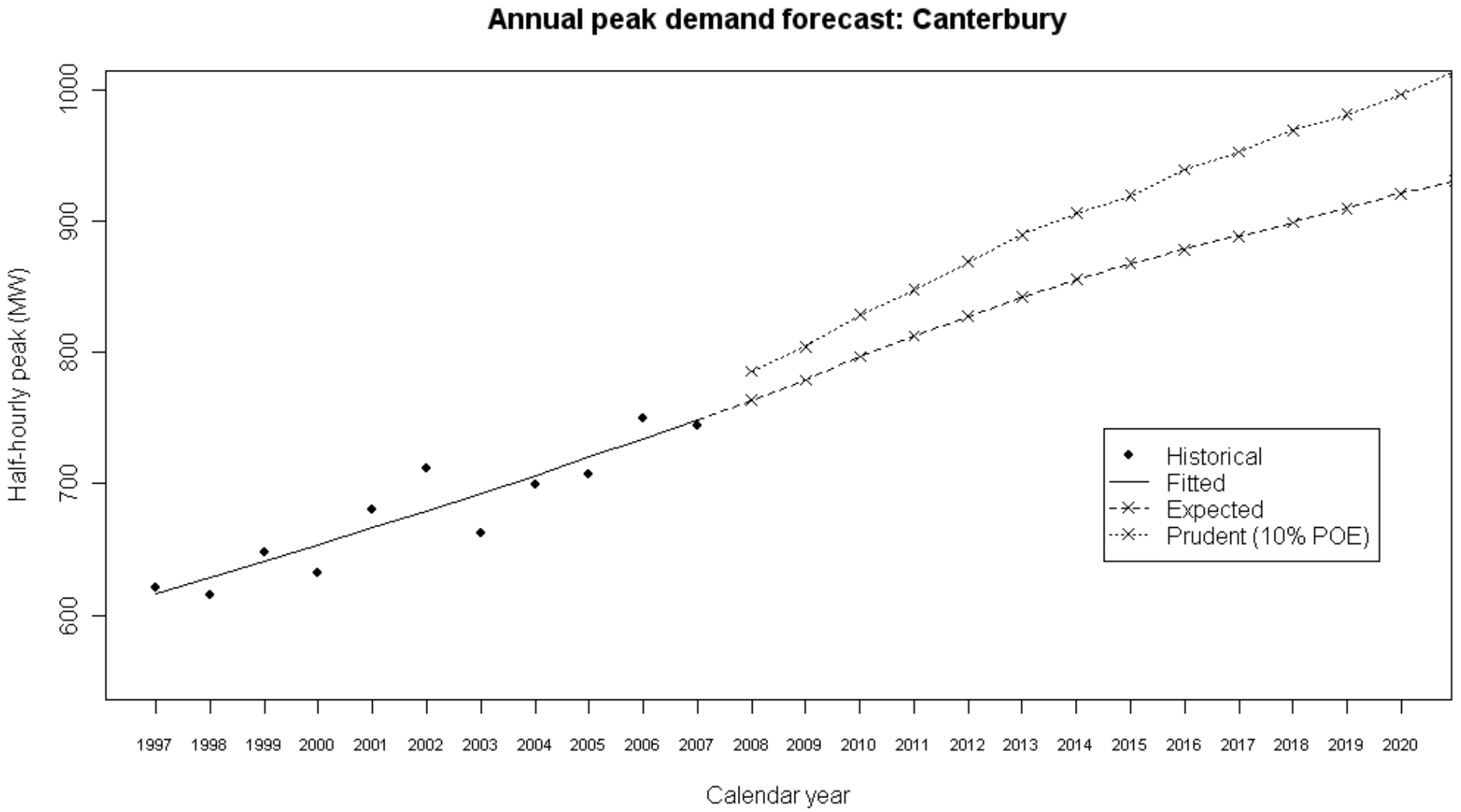
(Note: Taranaki forecast is net of Methanex plant)

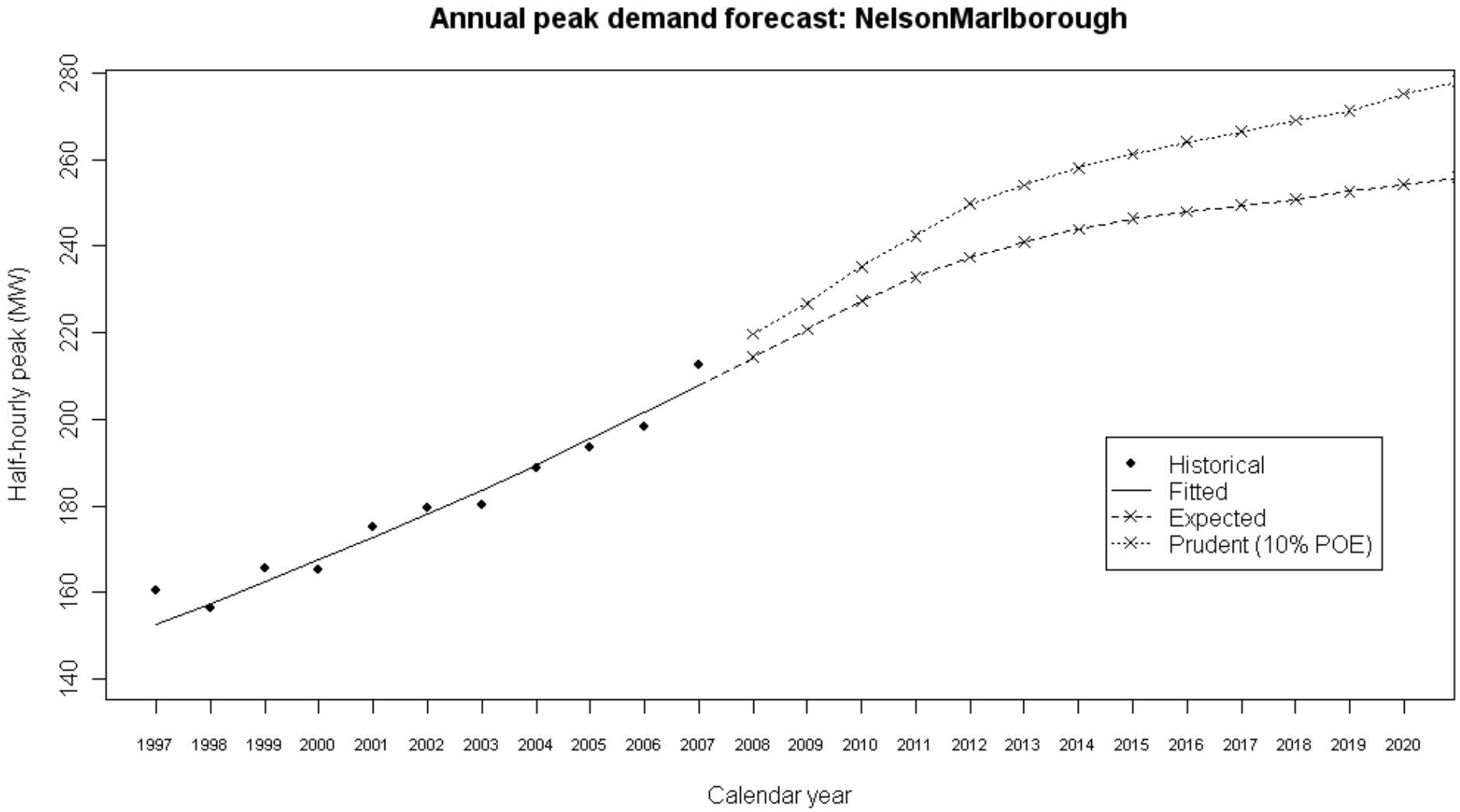


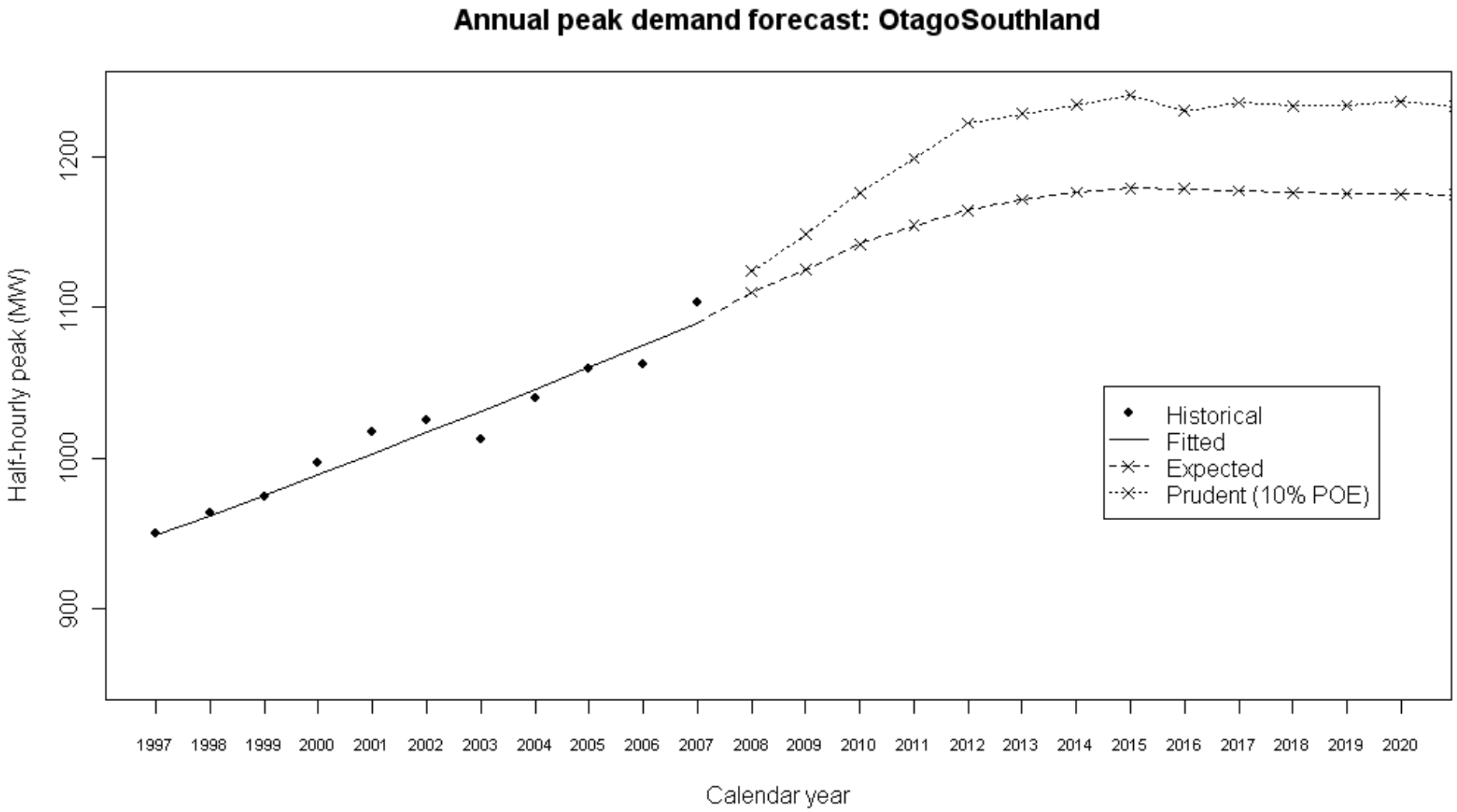

Annual peak demand forecast: Waikato
Half-hourly peak (MW)
450
500
550
600
650
700
750
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)


Annual peak demand forecast: Wellington
Half-hourly peak (MW)
500
600
700
800
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)

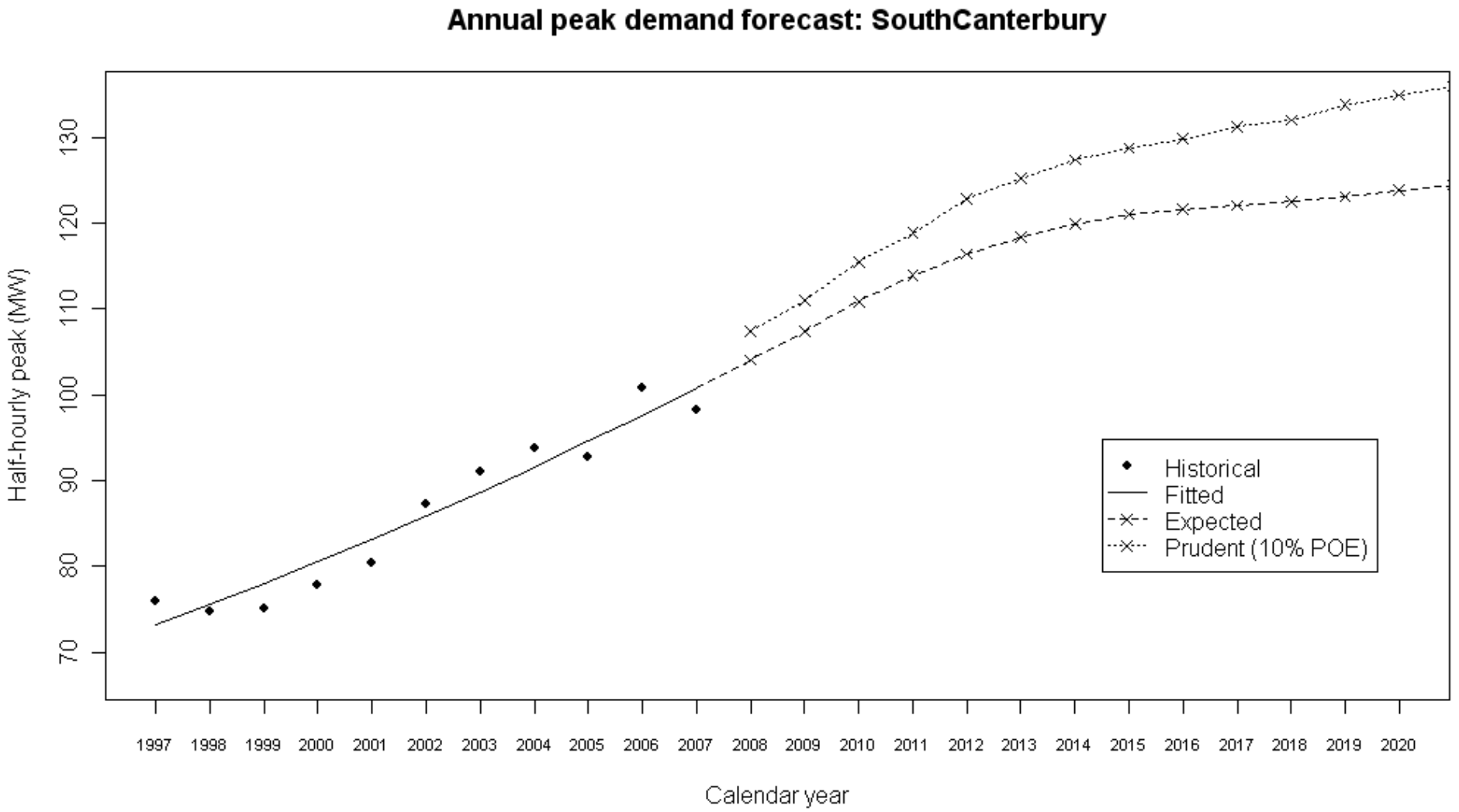
South Island regional forecasts:

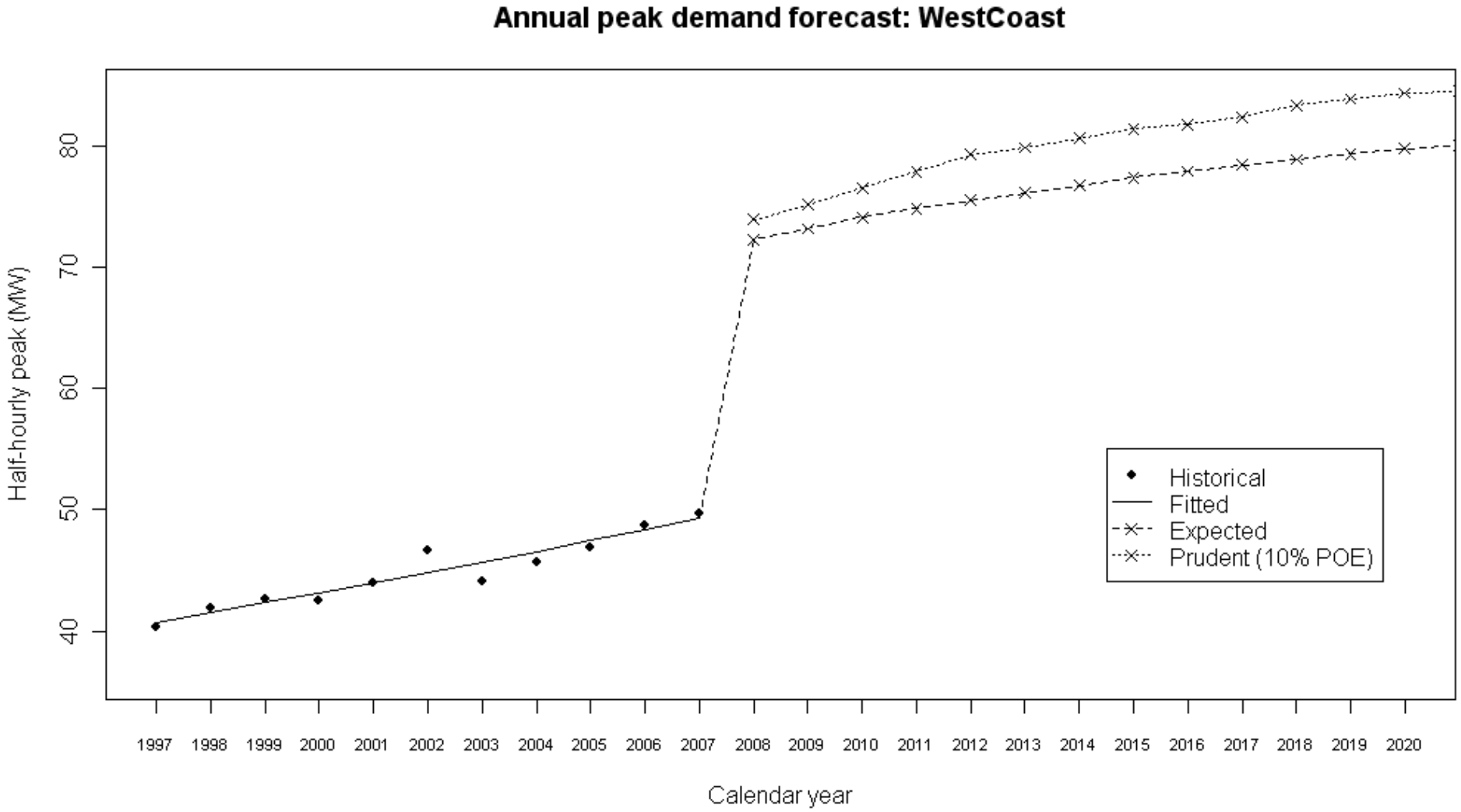



Annual peak demand forecast: NelsonMarlborough
Half-hourly peak (MW)
140
160
180
200
220
240
260
280
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)


Annual peak demand forecast: OtagoSouthland
Half-hourly peak (MW)
900
1000
1100
1200
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)

(Note: Value used for 2006 is artificial – real value was affected by outages)




Annual peak demand forecast: WestCoast
Half-hourly peak (MW)
40
50
60
70
80
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
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2014
2015
2016
2017
2018
2019
2020
Calendar year
Historical
Fitted
Expected
Prudent (10% POE)

5. Conclusions

5.1 Summary of forecast growth rates

The expected forecast predicts approximately 1.9% annual growth in national peak from 2007 to 2012, 1.5% growth from 2012 to 2020, and 1.2% from 2020 to 2030.

The prudent (P10) forecast of national peak is initially 135 MW higher than the expected forecast (about 2% higher) and grows at a faster rate from that point on: 2.5% from 2007 to 2012, 1.8% from 2012 to 2012, and 1.4% from 2020 to 2030.

For the North Island, the expected forecast predicts approximately 2.0% annual growth from 2007 to 2012, continuing at 2.0% until 2020, and 1.5% from 2020 to 2030.

The prudent (P10) forecast of North Island peak is initially 120 MW higher than the expected forecast (or 2.8% higher) and grows at a faster rate from that point on: 2.6% from 2007 to 2012, then 2.3% until 2020, and 1.8% from 2020 to 2030.

For the South Island, the expected forecast predicts approximately 1.8% annual growth from 2007 to 2012, down to 0.6% from 2012 until 2020, and continuing at 0.6% from 2020 to 2030.

The prudent (P10) forecast of South Island peak is initially just 25 MW higher than the expected forecast (or 1.2% higher) and grows at a faster rate from that point on: 2.5% from 2007 to 2012, down to 0.8% from 2012 until 2020, and continuing at 0.7% from 2020 to 2030.

5.2 Observed 2007 peak demands

Unexpectedly high or low demand peaks occurred in some regions in 2007:

- the Bay of Plenty peak was about 40 MW lower than expected (due to reduced demand at Norske Skog's pulp and paper plant at Kawerau);
- the Otago/Southland peak was about 30 MW higher than expected (due to a higher coincident peak at the NZAS smelter and various other GXPs in the region, and despite the introduction of the new White Hill wind farm); and
- the Nelson/Marlborough peak was about 20 MW higher than expected (apparently due to high organic growth in Nelson and Blenheim).

5.3 West Coast forecast

West Coast demand growth over the next few years is expected to be high, driven primarily by new industrial loads from the mining and dairy industries. An attempt has been made to reflect these changes in the forecast. However, uncertainty as to the timing, size and diversity of the new loads is not really represented adequately.

The Commission understands that Transpower has proposed a different forecast for their West Coast Grid Upgrade proposal.

5.4 Comparison with the May 2007 regional peak demand forecast

The Commission released a long-term regional peak demand forecast in May 2007[4], as part of the draft Grid Planning Assumptions. The forecasts in this document are updates of the May 2007 forecasts. Key differences are:

- the December 2007 forecast includes data from winter 2007;
- the December 2007 forecast is based on a revised regional energy demand forecast[5];
- the December 2007 forecast uses a different method for trending between historical growth rates and energy-based growth rates.

In terms of predicted growth rates, the key differences are driven mainly by 2007 data:

- forecast growth in the Bay of Plenty is slower than before;
- forecast growth in Nelson/Marlborough is faster than before;
- forecast growth in Otago/Southland is faster than before;

5.5 Comparison with the 2007 Security of Supply medium-term peak demand forecast

The Commission released a medium-term demand forecast in October 2007[6], for use in the Security of Supply workstream's annual Reserve Energy Needs Assessment. This forecast included both peak and energy projections, covering the period to 2012.

The Security of Supply forecast has a number of methodological differences:

- it uses historical temperature data to normalise the historical peak demand series;
- it is based on historical trends and expected step changes, whereas the forecasts in this document also incorporate energy growth rates which are driven by projections of population and GDP growth;
- the Security of Supply prudent forecasts are P5 rather than P10;
- it treats embedded generation differently, with some grid-connected generation netted off and some embedded generation grossed on – so the absolute forecast numbers presented are *not directly comparable* with those in this forecast.

Nonetheless, the expected growth rates in peak demand are quite similar to those presented in this forecast, over the period from 2008 to 2012. The Security of Supply expected growth rates are slightly lower (1.8% nationally, as opposed to 1.9% in this forecast).

[4] http://www.electricitycommission.govt.nz/opdev/modelling/gpas/May2007/Demand/index.html
[5] http://www.electricitycommission.govt.nz/pdfs/opdev/modelling/pdfconsultation/GPA/Demand-Forecast-Review.pdf
[6] http://www.electricitycommission.govt.nz/opdev/modelling/demand/security/index.html