Appendix F. Load resource balance

This appendix includes information on projected capacity and energy needs in the 2023 IRP before new IRP resources are added (contracted resources that have not been constructed yet, like Clearwater, are included in some cases). In some instances, like the capacity load-resource balance, the data are not used in the IRP and are included for informational purposes only.

F.1 Projected capacity load – resource balance

For the 2023 IRP PGE uses a stochastic model (Sequoia) that targets a seasonal adequacy metric of 2.4 hour of lost load per season to determine resource adequacy need. PGE does not create a traditional load/resource balance capacity assessment as part of the IRP. **Table 111** and **Table 112** present an illustrative view of PGE's capacity need during the summer and winter. The resource values are approximations and should be interpreted directionally rather than as absolutes. This table and methodology are not used for power planning by PGE; for power planning the capacity need value directly from Sequoia is used.

Load and resource approximations are as follows:

- Thermal resources are derated 5 percent for outages and other contingencies (actual outage rates in Sequoia differ by unit and are calculated stochastically). Some thermal resources have different levels of peak generation between winter/summer due to temperatures.
- Wind, solar, DERs, other resources (representing biomass/biogas), and storage resources are estimated used proxy resource unturned ELCC values for year 2026 at the 100 MW increment (for wind and solar the average ELCC of the three proxy sites is used). Actual wind and solar performance will vary since the untuned ELCC values are based on new technology rather than existing resources. Hybrid resources are approximated in the disaggregate. Committed resources, like Clearwater Wind, and 2021 RFP proxy resources, are included in the table.
- Hydro values are approximate, include hydro contracts, and are a combination of nameplate/net values with a derate based on average hydro performance during an outage in the Sequoia model. Actual hydro performance will vary based on water conditions, the hours leading up to the peak event, and other factors.
- Contracts and market are at 100 percent nameplate value.
- Loads represent Reference Case 1-in-2 seasonal peak loads and include the impact of energy efficiency and vehicle and building electrification.

As noted earlier, these tables are an illustrative representation of capacity needs on the PGE system. The capacity need value used in IRP modeling is calculated using the Sequoia model which stochastically simulates millions of possible resource and load combinations and takes portfolio impacts, hourly generation and load profiles, temperature, water year, and other factors into consideration. For more information on Sequoia please see **Section H.3 of Appendix H, 2023 IRP modeling details**.

Lastly, the planning margin shown is back-calculated based on 1-in-2 peak load estimates, the resource estimates as defined above, and the capacity need out of Sequoia. Planning margins vary based on resource assumptions. For example, if we assume lower hydro generation (or lower generation from any resource) that would lead to a lower planning margin. The planning margins from these tables are not directly comparable to planning margins used in other reports and are not used in the 2023 IRP.

F.2 Estimated annual capacity need, MW[452]

Table 111. Estimated load resource balance, summer peak capacity need

All values apprx. MW	2024	2025	2026	2027	2028	2029	2030	2035	2040	2043
Natural gas	1,698	1,698	1,698	1,698	1,698	1,698	1,698	1,698	-	-
Coal	281	281	281	281	281	281	-	-	-	-
Hydro	970	970	623	623	623	579	579	577	541	406
Solar and wind	658	773	775	777	780	775	777	744	532	531
DERs and DSG	180	197	214	226	240	251	268	337	257	281
Storage	35	311	311	311	311	311	311	297	297	297
Contracts and other	15	15	15	15	11	11	11	4	-	-
HLH Market	-	-	-	-	-	-	-	-	-	-
Total resource	3,838	4,246	3,918	3,933	3,944	3,906	3,645	3,656	1,626	1,515

[452] This table is provided in compliance with IRP guideline 4c "For electric utilities, a determination of the levels of peaking capacity and energy capability expected for each year of the plan, given existing resources; identification of capacity and energy needed to bridge the gap between expected loads and resources; modeling of all existing transmission rights, as well as future transmission additions associated with the resource portfolios tested."

All values apprx. MW	2024	2025	2026	2027	2028	2029	2030	2035	2040	2043
Median peak load	3,776	3,828	3,888	3,948	4,001	4,061	4,124	4,535	5,027	5,316
Sequoia capacity need	344	51	506	568	624	791	1,136	1,647	4,173	4,488
Implied margin	11%	12%	14%	14%	14%	16%	16%	17%	15%	13%

Table 112. Estimated load resource balance, winter peak capacity need

All values apprx. MW	2024	2025	2026	2027	2028	2029	2030	2035	2040	2043
Natural gas	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	-	-
Coal	281	281	281	281	281	281	-	-	-	-
Hydro	1,063	1,063	683	683	683	634	634	633	593	445
Solar and wind	664	693	693	694	695	685	686	674	595	595
DERs and DSG	134	141	149	155	160	165	171	198	99	104
Storage	22	198	198	198	198	198	198	189	189	189
Contracts and other	117	17	17	17	12	12	12	4	-	-
HLH Market	200	200	150	150	150	150	150	150	150	150
Total resource	4,267	4,379	3,957	3,963	3,964	3,911	3,636	3,633	1,626	1,484
Median peak load	3,580	3,635	3,699	3,766	3,831	3,885	3,954	4,389	4,904	5,197
Sequoia capacity need	55	-	430	502	614	683	1,004	1,461	3,912	3,885
Implied margin	21%	20%	19%	19%	19%	18%	17%	16%	13%	3%

F.3 Seasonal capacity need by Need Future, MW[453]

Table 113. Summer capacity need by Need Future (MW)

	2024	2025	2026	2027	2028	2029	2030	2035	2040	2043
Low	224	0	364	402	435	579	894	1197	3526	3869
Reference	344	51	506	568	624	791	1136	1647	4173	4488
High	395	136	617	704	786	982	1357	2065	4753	4670

Table 114. Winter capacity need by future (MW)

	2024	2025	2026	2027	2028	2029	2030	2035	2040	2043
Low	0	0	213	285	359	404	708	952	3173	3524
Reference	55	0	430	502	614	683	1004	1461	3912	3885
High	106	0	628	745	864	949	1302	1986	4618	4217

F.4 Projected annual average energy load-resource balance, MWa

Table 115 presents PGE's energy load-resource balance (LRB) given no incremental resource actions (except for energy efficiency) in a linear carbon reduction glidepath. As with the LRB presented in **Section 6.5, Energy need**, the availability of energy from GHG-emitting sources declines through time as a result of GHG constraints. The 'Other PPA + market purchases' category represents market purchases and PPAs with associated GHG emissions. Energy efficiency (EE) actions are included as a resource and reflect cumulative savings beginning in 2023 with adjustments for intra-year deployment and line losses. Forecasted load is the annual average load before incremental EE actions.

[453] This table is provided in compliance with IRP guideline 4c "For electric utilities, a determination of the levels of peaking capacity and energy capability expected for each year of the plan, given existing resources; identification of capacity and energy needed to bridge the gap between expected loads and resources; modeling of all existing transmission rights, as well as future transmission additions associated with the resource portfolios tested."

Table 115. Projected annual average energy load-resource balance, MWa

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Gas	699	697	648	562	498	428	333	287	258	223	194	163	136
Coal	147	134	130	115	91	66	50	0	0	0	0	0	0
Hydropower	180	180	180	180	180	180	180	180	180	180	180	180	180
Hydropower Contracts	338	347	337	244	241	228	183	183	183	181	177	177	177
Wind	348	487	487	487	487	486	479	479	479	479	479	479	479
Solar	103	128	242	241	241	240	239	248	248	247	246	246	245
Other PPA + Market Purchases	659	535	524	413	331	254	197	173	157	145	128	114	95
Energy Efficiency	31	61	91	121	151	181	214	247	282	316	348	379	408
Qualified Facilities (online)	81	81	81	81	80	75	75	75	74	59	51	46	29
Qualified Facilities (not online)	49	70	73	73	73	73	73	73	73	73	73	73	73
Total Resources	2,636	2,722	2,792	2,517	2,373	2,212	2,024	1,947	1,933	1,903	1,877	1,857	1,823
Load	2,352	2,428	2,498	2,576	2,651	2,716	2,781	2,852	2,932	3,012	3,095	3,183	3,268
Energy Surplus/ (Deficit)	-284	-293	-295	59	278	504	757	905	999	1,109	1,218	1,326	1,446