

10.3.4 Avoided Costs

The avoided power capacity costs are reflective of the estimated replacement capital and fixed operations and maintenance cost. For this avoided cost analysis, a 1x F-class simple cycle gas turbine was used as the comparison due to the low capital and fixed O&M costs. The operating and capital costs are assumed to escalate with inflation throughout the study period. Transmission and distribution capacity are accounted for within the transmission and distribution avoided cost. Avoided capacity costs should only be considered avoidable when there is a planning reserve margin deficit that would otherwise need to be met through a new capacity resource.

The marginal operating energy costs were based off the modeled Vectren system marginal energy cost from the base optimized scenario under base assumptions. This included emission cost for CO₂ starting in 2024, estimated capital, variable operation and maintenance, and fuel costs. The marginal system cost reflects the modeled spinning reserve requirement and adjusted sales forecasts accounting for transmission and distribution losses. The table below shows avoided costs.

Figure 10.13 – Avoided Costs⁵⁴

	Natural Gas Forecast \$/MMBTu	CO ₂ Forecast \$/Short Ton	Economic Carrying Charge ⁵⁵ \$/kW	Transmission/Distribution Avoided Cost \$/kW (10% of Carrying Charge)	Total Capacity Avoided Cost \$/kW	System Marginal Cost \$/MWh	System Marginal Cost \$/kWh
2017	\$2.94		\$91.82	\$9.18	\$101.00	\$28.62	\$0.02862
2018	\$3.13		\$92.55	\$9.25	\$101.80	\$30.93	\$0.03093
2019	\$3.65		\$93.41	\$9.34	\$102.76	\$33.95	\$0.03395
2020	\$3.90		\$94.99	\$9.50	\$104.49	\$35.90	\$0.03590
2021	\$4.05		\$96.77	\$9.68	\$106.45	\$36.09	\$0.03609
2022	\$4.23		\$98.30	\$9.83	\$108.13	\$36.61	\$0.03661
2023	\$4.40		\$100.00	\$10.00	\$110.00	\$36.73	\$0.03673
2024	\$4.63	\$2.29	\$100.85	\$10.09	\$110.94	\$40.78	\$0.04078
2025	\$4.77	\$3.70	\$102.19	\$10.22	\$112.41	\$42.19	\$0.04219
2026	\$4.97	\$5.87	\$103.89	\$10.39	\$114.27	\$44.98	\$0.04498
2027	\$5.22	\$9.83	\$106.32	\$10.63	\$116.95	\$49.09	\$0.04909
2028	\$5.45	\$12.71	\$107.73	\$10.77	\$118.51	\$52.58	\$0.05258
2029	\$5.68	\$17.54	\$109.23	\$10.92	\$120.15	\$57.65	\$0.05765
2030	\$5.90	\$19.50	\$110.56	\$11.06	\$121.62	\$60.23	\$0.06023
2031	\$6.07	\$21.11	\$112.38	\$11.24	\$123.62	\$62.27	\$0.06227
2032	\$6.32	\$23.60	\$114.21	\$11.42	\$125.64	\$65.42	\$0.06542
2033	\$6.46	\$23.63	\$115.76	\$11.58	\$127.33	\$66.61	\$0.06661
2034	\$6.67	\$24.58	\$117.42	\$11.74	\$129.17	\$68.66	\$0.06866
2035	\$6.89	\$26.34	\$119.98	\$12.00	\$131.98	\$71.30	\$0.07130
2036	\$7.13	\$28.14	\$122.37	\$12.24	\$134.60	\$73.90	\$0.07390

10.4 RESOURCE SCREENING APPENDIX

10.4.1 Busbar Analysis

⁵⁴ Reflective of the 2016 IRP Base Scenario Optimized Case B as of September 20, 2016

⁵⁵ Economic Carrying Charge is not an avoidable cost if there is no capacity requirement

Figure 10.14 – New Construction Alternatives

Resource⁵⁶	Net Operating Capacity (MW)	Fuel Type	Accepted or Rejected as Resource Alternative	Reason to Accept or Reject
LM6000 Simple Cycle Gas Turbine	43.4	Natural Gas	Rejected	Not cost effective compared to alternatives
LMS100 Simple Cycle Gas Turbine	99.5	Natural Gas	Rejected	Not cost effective compared to alternatives
E-Class Simple Cycle Gas Turbine	90.1	Natural Gas	Rejected	Not cost effective compared to alternatives
F-Class Simple Cycle Gas Turbine	220	Natural Gas	Accepted	Cost effective
1x1 7EA CCGT	170	Natural Gas	Rejected	Not cost effective compared to alternatives
1x1 7FA.05 CCGT	442	Natural Gas	Accepted	Cost effective for size
2x1 7FA.04	745	Natural Gas	Accepted (select scenarios)	Not cost effective compared to alternatives
2x1 7FA.05	889	Natural Gas	Accepted	Cost effective for size
3x1 7FA.05	1337	Natural Gas	Rejected	Exceeds capacity needs
1 MW Microturbine	1.0	CHP-Natural Gas	Rejected	Not cost effective compared to alternatives
3 MW Combustion Turbine	3.2	CHP-Natural Gas	Rejected	Not cost effective compared to alternatives
5 MW Combustion Turbine	5.1	CHP-Natural Gas	Rejected	Not cost effective compared to alternatives
10 MW Combustion Turbine	10.3	CHP-Natural Gas	Rejected	Not cost effective compared to alternatives
14 MW Combustion Turbine	13.6	CHP-Natural Gas	Accepted	Cost effective CHP
Supercritical Pulverized Coal 500 MW with Carbon Capture	430	Coal	Rejected	Not cost effective compared to alternatives
Supercritical Pulverized Coal 750 MW with Carbon Capture	640	Coal	Rejected	Not cost effective compared to alternatives
2x1 Integrated Gasification Combined Cycle with Carbon Capture	480	Coal	Rejected	Not cost effective compared to alternatives
Wood Stoker Fired	50	Wood Biomass	Rejected	Not cost effective

⁵⁶ Combined cycle gas turbines are shown as duct fired configuration for this table.