



Government leadership

Non-fuel Operating Cost (OPEX) Tables

National Direction for Greenhouse Gas
Emissions from Industrial Process Heat

March 2024



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ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Acknowledgments

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Note

The non-energy operating costs guidance is advisory only. It has been prepared to provide an estimation of significant non-energy operating and maintenance costs by process heat technology and size range. This guidance should be read in conjunction with other relevant official guidance documents released by Ministry for the Environment, Ministry of Business, Innovation & Employment, EECA (the Energy Efficiency & Conservation Authority) and regionally specific guidance. It should also be read in conjunction with standards, recognised industry best practice, and other technical publications.

This guidance will be revised periodically, and readers should ensure they are using the latest version. The publication date of the guidance can be found on the cover page. Comments are welcome via email to technicalenquiries@eeca.govt.nz.

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Contents

Coal Boilers	2
Biomass Boilers	4
Electrode Boilers	6
Gas Boilers	8
Ambient Source Heat Pumps	10
High Temperature Heat Pumps	12

Coal Boilers

Thermal range	Indicative cost	Basis	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
1 - 5 MW	Maintenance costs (yearly)	\$2022/MW	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Total based on MW capacity =			5	\$167,000	\$167,000	\$167,000	\$167,000	\$317,000	\$167,000	\$167,000	\$167,000	\$167,000	\$467,000	\$167,000	\$167,000
>5 - 10 MW	Maintenance costs (yearly)	\$2022/MW	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total based on MW capacity =			10	\$303,000	\$303,000	\$303,000	\$303,000	\$603,000	\$303,000	\$303,000	\$303,000	\$303,000	\$903,000	\$303,000	\$303,000
>10 - 20MW	Maintenance costs (yearly)	\$2022/MW	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000
	Regulatory costs	\$2022	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
	Condition assessment cost	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Total based on MW capacity =			20	\$486,000	\$486,000	\$486,000	\$486,000	\$1,086,000	\$486,000	\$486,000	\$486,000	\$486,000	\$1,686,000	\$486,000	\$486,000
>20 - 30MW	Maintenance costs (yearly)	\$2022/MW	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000
	Regulatory costs	\$2022	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
	Condition assessment cost	\$2022	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Total based on MW capacity =			30	\$644,000	\$644,000	\$644,000	\$644,000	\$1,544,000	\$644,000	\$644,000	\$644,000	\$644,000	\$2,444,000	\$644,000	\$644,000

Notes

Condition assessment cost included in annual maintenance. Added allowance for quarterly checks.

Thermal range	Indicative cost	Basis	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
1 - 5 MW	Maintenance costs (yearly)	\$2022/MW	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400	\$19,400
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Total based on MW capacity =			5	\$167,000	\$317,000	\$167,000	\$167,000	\$167,000	\$467,000	\$167,000	\$167,000	\$167,000	\$167,000	\$167,000
>5 - 10 MW	Maintenance costs (yearly)	\$2022/MW	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800	\$16,800
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total based on MW capacity =			10	\$303,000	\$603,000	\$303,000	\$303,000	\$303,000	\$903,000	\$303,000	\$303,000	\$303,000	\$303,000	\$303,000
>10 - 20 MW	Maintenance costs (yearly)	\$2022/MW	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200	\$14,200
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000
	Regulatory costs	\$2022	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
	Condition assessment cost	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Total based on MW capacity =			20	\$486,000	\$1,086,000	\$486,000	\$486,000	\$486,000	\$1,686,000	\$486,000	\$486,000	\$486,000	\$486,000	\$486,000
>20 - 30 MW	Maintenance costs (yearly)	\$2022/MW	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900	\$12,900
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000
	Regulatory costs	\$2022	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
	Condition assessment cost	\$2022	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Total based on MW capacity =			30	\$644,000	\$1,544,000	\$644,000	\$644,000	\$644,000	\$2,444,000	\$644,000	\$644,000	\$644,000	\$644,000	\$644,000

Biomass Boilers

Thermal range	Indicative cost	Basis	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
1 - 5 MW	Maintenance costs (yearly)	\$2022/MW	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Total based on MW capacity =			5	\$169,000	\$169,000	\$169,000	\$169,000	\$319,000	\$169,000	\$169,000	\$169,000	\$169,000	\$469,000	\$169,000	\$169,000
>5 - 10 MW	Maintenance costs (yearly)	\$2022/MW	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total based on MW capacity =			10	\$307,000	\$307,000	\$307,000	\$307,000	\$607,000	\$307,000	\$307,000	\$307,000	\$307,000	\$907,000	\$307,000	\$307,000
>10 - 20 MW	Maintenance costs (yearly)	\$2022/MW	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000
	Regulatory costs	\$2022	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
	Condition assessment cost	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Total based on MW capacity =			20	\$492,000	\$492,000	\$492,000	\$492,000	\$1,092,000	\$492,000	\$492,000	\$492,000	\$492,000	\$1,692,000	\$492,000	\$492,000
>20 - 30 MW	Maintenance costs (yearly)	\$2022/MW	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000
	Regulatory costs	\$2022	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
	Condition assessment cost	\$2022	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Total based on MW capacity =			30	\$653,000	\$653,000	\$653,000	\$653,000	\$1,553,000	\$653,000	\$653,000	\$653,000	\$653,000	\$2,453,000	\$653,000	\$653,000

Notes

The majority of condition assessment costs are included in annual maintenance (covered by annual survey). Itemised condition assessment costs are an allowance for quarterly checks.

Thermal range	Indicative cost	Basis	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
1 - 5 MW	Maintenance costs (yearly)	\$2022/MW	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800	\$19,800
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Total based on MW capacity =			5	\$169,000	\$319,000	\$169,000	\$169,000	\$169,000	\$469,000	\$169,000	\$169,000	\$169,000	\$169,000	\$169,000
>5 - 10 MW	Maintenance costs (yearly)	\$2022/MW	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200	\$17,200
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000	\$120,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total based on MW capacity =			10	\$307,000	\$607,000	\$307,000	\$307,000	\$307,000	\$907,000	\$307,000	\$307,000	\$307,000	\$307,000	\$307,000
>10 - 20 MW	Maintenance costs (yearly)	\$2022/MW	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500	\$14,500
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000	\$180,000
	Regulatory costs	\$2022	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
	Condition assessment cost	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Total based on MW capacity =			20	\$492,000	\$1,092,000	\$492,000	\$492,000	\$492,000	\$1,692,000	\$492,000	\$492,000	\$492,000	\$492,000	\$492,000
>20 - 30 MW	Maintenance costs (yearly)	\$2022/MW	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200	\$13,200
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$30,000	\$-	\$-	\$-	\$-	\$60,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000	\$230,000
	Regulatory costs	\$2022	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000	\$7,000
	Condition assessment cost	\$2022	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000
Total based on MW capacity =			30	\$653,000	\$1,553,000	\$653,000	\$653,000	\$653,000	\$2,453,000	\$653,000	\$653,000	\$653,000	\$653,000	\$653,000

Electrode Boilers

Thermal range	Indicative cost	Basis	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
1 - 5 MW	Maintenance costs (yearly)	\$2022/MW	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000
	Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
	Condition assessment cost	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Total based on MW capacity =		5	\$93,398	\$93,398	\$93,398	\$93,398	\$168,398	\$93,398	\$93,398	\$93,398	\$93,398	\$168,398	\$93,398	\$93,398	\$93,398
>5 - 10 MW	Maintenance costs (yearly)	\$2022	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000
	Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
	Condition assessment cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total based on MW capacity =		10	\$140,140	\$140,140	\$140,140	\$140,140	\$290,140	\$140,140	\$140,140	\$140,140	\$140,140	\$290,140	\$140,140	\$140,140	\$140,140
>10 - 20 MW	Maintenance costs (yearly)	\$2022/MW	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000
	Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
	Condition assessment cost	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Total based on MW capacity =		20	\$157,600	\$157,600	\$157,600	\$157,600	\$457,600	\$157,600	\$157,600	\$157,600	\$157,600	\$457,600	\$157,600	\$157,600	\$157,600
>20 - 30 MW	Maintenance costs (yearly)	\$2022/MW	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000
	Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
	Condition assessment cost*	\$2022	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000
Total based on MW capacity =		30	\$193,500	\$193,500	\$193,500	\$193,500	\$643,500	\$193,500	\$193,500	\$193,500	\$193,500	\$643,500	\$193,500	\$193,500	\$193,500

Notes

Annual maintenance costs are primarily based on recent price for a 20MW Elpanneteknik from Windsor Engineering. 35k of this is for the annual survey.

Electrodes and insulators typically last between 5 and 10 years. Electrode replacements assumed every 5 years.

Operating labour based on unattended control scheme & full year operation 7 days/week. Also based on supplier feedback indicating 2 - 4 hours per day (depending on boiler size) and assumes contracted labour.

Labour rate used \$80 per hour.

The majority of condition assessment activities are included in the annual survey (fixed maintenance cost). The costs shown are an allowance for quarterly checks not covered by routine maintenance.

Thermal range	Indicative cost	Basis	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
1 - 5 MW	Maintenance costs (yearly)	\$2022/MW	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880	\$6,880
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000	\$54,000
	Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
	Condition assessment cost	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Total based on MW capacity =			5	\$93,398	\$168,398	\$93,398	\$93,398	\$93,398	\$168,398	\$93,398	\$93,398	\$93,398	\$93,398	\$93,398
>5 - 10 MW	Maintenance costs (yearly)	\$2022	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914	\$4,914
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000
	Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
	Condition assessment cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total based on MW capacity =			10	\$140,140	\$290,140	\$140,140	\$140,140	\$140,140	\$290,140	\$140,140	\$140,140	\$140,140	\$140,140	\$140,140
>10 - 20 MW	Maintenance costs (yearly)	\$2022/MW	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780	\$3,780
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000	\$67,000
	Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
	Condition assessment cost	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Total based on MW capacity =			20	\$157,600	\$457,600	\$157,600	\$157,600	\$157,600	\$457,600	\$157,600	\$157,600	\$157,600	\$157,600	\$157,600
>20 - 30 MW	Maintenance costs (yearly)	\$2022/MW	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150	\$3,150
	Maintenance costs (one-offs)	\$2022/MW	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$-
	Operational costs (without energy, including labour)	\$2022	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000	\$81,000
	Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
	Condition assessment cost*	\$2022	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000
Total based on MW capacity =			30	\$193,500	\$643,500	\$193,500	\$193,500	\$193,500	\$643,500	\$193,500	\$193,500	\$193,500	\$193,500	\$193,500

Gas Boilers

Thermal range	Indicative cost	Basis	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13
1 - 2 MW	Maintenance costs (yearly)	\$2022/MW	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500
	Maintenance costs (one-offs)	\$2022/MW	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750
	Operational costs (without energy, including labour)	\$2022	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000
	Regulatory costs	\$2022	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500
	Condition assessment cost	\$2022	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000
Total based on MW capacity =			2	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000
>2 - 5 MW	Maintenance costs (yearly)	\$2022/MW	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900
	Maintenance costs (one-offs)	\$2022/MW	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200
	Operational costs (without energy, including labour)	\$2022	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Total based on MW capacity =			5	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500
>5 - 10 MW	Maintenance costs (yearly)	\$2022/MW	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400
	Maintenance costs (one-offs)	\$2022/MW	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600
	Operational costs (without energy, including labour)	\$2022	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
	Regulatory costs	\$2022	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000
	Condition assessment cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total based on MW capacity =			10	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000
>10 - 30 MW	Maintenance costs (yearly)	\$2022/MW	\$5,800	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400
	Maintenance costs (one-offs)	\$2022/MW	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100
	Operational costs (without energy, including labour)	\$2022	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
	Regulatory costs	\$2022	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000
	Condition assessment cost	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Total based on MW capacity =			30	\$318,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000

Thermal range	Indicative cost	Basis	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
1 - 2 MW	Maintenance costs (yearly)	\$2022/MW	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500	\$10,500
	Maintenance costs (one-offs)	\$2022/MW	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750	\$3,750
	Operational costs (without energy, including labour)	\$2022	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000	\$18,000
	Regulatory costs	\$2022	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500	\$3,500
	Condition assessment cost	\$2022	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$3,000
Total based on MW capacity =			2	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000	\$53,000
>2 - 5 MW	Maintenance costs (yearly)	\$2022/MW	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900	\$8,900
	Maintenance costs (one-offs)	\$2022/MW	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200	\$3,200
	Operational costs (without energy, including labour)	\$2022	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
	Regulatory costs	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
Total based on MW capacity =			5	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500	\$95,500
>5 - 10 MW	Maintenance costs (yearly)	\$2022/MW	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400
	Maintenance costs (one-offs)	\$2022/MW	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600	\$2,600
	Operational costs (without energy, including labour)	\$2022	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
	Regulatory costs	\$2022	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000
	Condition assessment cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
Total based on MW capacity =			10	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000	\$176,000
>10 - 30 MW	Maintenance costs (yearly)	\$2022/MW	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400	\$7,400
	Maintenance costs (one-offs)	\$2022/MW	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100	\$2,100
	Operational costs (without energy, including labour)	\$2022	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
	Regulatory costs	\$2022	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000	\$6,000
	Condition assessment cost	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
Total based on MW capacity =			30	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000	\$366,000

Ambient Source Heat Pumps

Thermal range	Indicative cost	Basis	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
0 - 1 MW	Maintenance costs (yearly)	\$2022		\$17,500	\$17,500	\$17,500	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
	Maintenance costs (one-offs)											
	Operational costs (without energy, including labour)	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	Regulatory costs - primarily pressure vessel inspection cost.	\$2022		\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	\$2022		Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs
1- 2 MW	Maintenance costs (yearly)	\$2022		\$18,500	\$18,500	\$18,500	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000
	Maintenance costs (one-offs)											
	Operational costs (without energy, including labour)	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	Regulatory costs - primarily pressure vessel inspection cost.	\$2022		\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
	Condition assessment cost	\$2022		Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs
2 - 8 MW	Maintenance costs (yearly)	\$2022		\$23,000 +\$1000/MW	\$23,000 +\$1000/MW	\$23,000 +\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW
	Maintenance costs (one-offs)											
	Operational costs (without energy, including labour)	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	Regulatory costs - primarily pressure vessel inspection cost	\$2022		\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
	Condition assessment cost	\$2022		Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs

Thermal range	Indicative cost	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
0 - 1 MW	Maintenance costs (yearly)	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
	Maintenance costs (one-offs)										
	Operational costs (without energy, including labour)	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	Regulatory costs - primarily pressure vessel inspection cost.	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
	Condition assessment cost	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs
1- 2 MW	Maintenance costs (yearly)	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000	\$26,000
	Maintenance costs (one-offs)										
	Operational costs (without energy, including labour)	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	Regulatory costs - primarily pressure vessel inspection cost.	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
	Condition assessment cost	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs
2 - 8 MW	Maintenance costs (yearly)	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW	\$26000+\$1000/MW
	Maintenance costs (one-offs)										
	Operational costs (without energy, including labour)	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	Regulatory costs - primarily pressure vessel inspection cost	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
	Condition assessment cost	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs

High Temperature Heat Pumps

Thermal range	Indicative cost	Basis	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
0 - 1 MW				\$15,000 - \$20,000	\$15,000 - \$20,000	\$15,000 - \$20,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
	Maintenance costs (yearly)	\$2022		1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Replace shaft seal 2. Replace suction filter 3. Oil pump service 4. Oil Clean / Oil Change 5. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Replace shaft seal 4. Replace suction filter 5. Oil pump service 6. Safety device checks
	Maintenance costs (one-offs)	\$2022										
	Operational costs (without energy, including labour)	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	Regulatory costs - primarily pressure vessel inspection cost	\$2022		\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
1 - 2 MW	Condition assessment cost	\$2022		Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs
				\$25,000 - \$30,000	\$25,000 - \$30,000	\$25,000 - \$30,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
	Maintenance costs (yearly)	\$2022		1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Replace shaft seal 2. Replace suction filter 3. Oil pump service 4. Oil Clean / Oil Change 5. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Replace shaft seal 4. Replace suction filter 5. Oil pump service 6. Safety device checks
	Maintenance costs (one-offs)	\$2022										
	Operational costs (without energy, including labour)	\$2022	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000
2 - 5 MW	Regulatory costs - primarily pressure vessel inspection cost	\$2022		\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
	Condition assessment cost	\$2022		Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs
	Maintenance costs (yearly)	\$2022	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000
	Maintenance costs (one-offs)	\$2022										
	Operational costs (without energy, including labour)	\$2022	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000
	Regulatory costs - primarily pressure vessel inspection cost	\$2022		\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
	Condition assessment cost	\$2022		Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs

Thermal range	Indicative cost	Basis	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
0 - 1 MW		\$2022	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
	Maintenance costs (yearly)		1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Replace shaft seal 2. Replace suction filter 3. Oil pump service	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Replace shaft seal 4. Replace suction filter 5. Oil pump service
	Maintenance costs (one-offs)	\$2022										
	Operational costs (without energy, including labour)	\$2022	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000	\$15,000
	Regulatory costs - primarily pressure vessel inspection cost	\$2022	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000	\$5,000
1 - 2 MW	Condition assessment cost	\$2022	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs
		\$2022	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000	\$45,000
	Maintenance costs (yearly)		1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Replace shaft seal 2. Replace suction filter 3. Oil pump service	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Safety device checks	1. Oil Clean / Oil Change 2. Safety device checks	1. Chemical clean - plate heat exchangers 2. Oil Clean / Oil Change 3. Replace shaft seal 4. Replace suction filter 5. Oil pump service
	Maintenance costs (one-offs)	\$2022										
	Operational costs (without energy, including labour)	\$2022	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000	\$20,000 - \$25,000
2 - 5 MW	Regulatory costs - primarily pressure vessel inspection cost	\$2022	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000
	Condition assessment cost	\$2022	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs
	Maintenance costs (yearly)	\$2022	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000	\$55,000 - \$65,000
	Maintenance costs (one-offs)	\$2022										
	Operational costs (without energy, including labour)	\$2022	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000	\$35,000 - \$40,000
	Regulatory costs - primarily pressure vessel inspection cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000
	Condition assessment cost	\$2022	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs	Included in operational costs