Government leadership

Non-fuel **Operating Cost** (OPEX) Tables

National Direction for Greenhouse Gas Emissions from Industrial Process Heat

March 2024



TE TARI TIAKI PŪNGAO ENERGY EFFICIENCY & CONSERVATION AUTHORITY

Acknowledgments

Authors

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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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Coal Boilers

Themesel															
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
	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	\$-	\$-	\$-
1-5 MW	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	\$167,000
	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	\$-	\$-	\$-
>5 - 10 MW	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	\$303,000
	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	\$-	\$-	\$-
>10 - 20MW	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	\$486,000
	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	\$-	\$-	\$-
>20 - 30MW	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	\$644,000

Notes

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

_1														
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
	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	\$-	\$-	\$-	\$-	\$-
- 5 MW	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	\$167,000	\$467,000	\$167,000	\$167,000	\$167,000	\$167,000	\$167,000
	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	\$-	\$-	\$-	\$-	\$-
5 - 10 MW	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	\$303,000	\$903,000	\$303,000	\$303,000	\$303,000	\$303,000	\$303,000
	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	\$-	\$-	\$-	\$-	\$-
10 - 20 IW	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	\$486,000	\$1,686,000	\$486,000	\$486,000	\$486,000	\$486,000	\$486,000
	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	\$-	\$-	\$-	\$-	\$-
20 - 30 1W	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	\$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
	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	\$-	\$-	\$-
1 - 5 MW	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	\$169,000
	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	\$-	\$-	\$-
>5 - 10 MW	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	\$307,000
	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	\$-	\$-	\$-
>10 - 20 MW	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	\$492,000
	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	\$-	\$-	\$-
>20 - 30 MW	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	\$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
	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	\$-	\$-	\$-	\$-	\$-
- 5 MW	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	\$169,000	\$469,000	\$169,000	\$169,000	\$169,000	\$169,000	\$169,000
	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	\$-	\$-	\$-	\$-	\$-
5 - 10 MW	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	\$307,000	\$907,000	\$307,000	\$307,000	\$307,000	\$307,000	\$307,000
	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	\$-	\$-	\$-	\$-	\$-
10 - 20 IW	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	\$492,000	\$1,692,000	\$492,000	\$492,000	\$492,000	\$492,000	\$492,000
	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	\$-	\$-	\$-	\$-	\$-
20 - 30 1W	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	\$653,000	\$2,453,000	\$653,000	\$653,000	\$653,000	\$653,000	\$653,000

Electrode Boilers

Parage IndiCatily cost Basis Voar1 Voar2 Voar3 Voar4 Voar5 Voar6 Voar7 Voar3 Voar10 Voar11 Voar12 Voar13 1	Thermal															
$ \frac{1}{1} + 1$		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
1-5-5M Operational costs (without energy, including labour) 5202 54,000 555,000 555,000<		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
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-
Andition assessment cost S2002 S5.000 S5.000 S5.000 S5.000	1 - 5 MW	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
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
$\frac{1}{10^{-70}} + \frac{1}{10^{-70}} + \frac{1}$		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
Maintenance costs (one-offs) \$2002/MW \$ \$ \$ \$15,000 \$ \$ \$15,000 \$		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
>b - 10 MM Operational costs (without energy, including labour) \$2002 \$31,000 \$3		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
Regulatory costs \$2022 \$		Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-
Condition assessment cost \$2022 \$10,000	>5 - 10 MW	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
Total based on MW capacity = 10 \$140,140 \$140,1		Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Maintenance costs (yearly) \$2022/MW \$3,780 <td></td> <td>Condition assessment cost</td> <td>\$2022</td> <td>\$10,000</td>		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
Maintenance costs (one-offs) \$2022/MW \$ \$ \$ \$\$ <		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 WW Operational costs (without energy, including labour) \$2022 \$67,000 \$67		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
MW Operational costs (without energy, including labour) \$2022 \$6,000		Maintenance costs (one-offs)	\$2022/MW	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-	\$-	\$15,000	\$-	\$-	\$-
Condition assessment cost \$2022 \$15,000 \$10,000 \$10,000 \$10,000 \$10,000 \$10,000 \$10,000 <t< td=""><td></td><td>Operational costs (without energy, including labour)</td><td>\$2022</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td><td>\$67,000</td></t<>		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
Total based on MW capacity = 20 \$157,600 \$157,600 \$457,600 \$157,600 \$157,600 \$157,600 \$457,600		Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
$\frac{Maintenance costs (yearly)}{Maintenance costs (one-offs)} \frac{\$2022/MW}{\$2022/MW} \frac{\$3,150}{\$3,150} $		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
Maintenance costs (one-offs) \$2022/MW \$- \$- \$- \$15,000 \$- <t< td=""><td></td><td>Total based on MW capacity =</td><td>20</td><td>\$157,600</td><td>\$157,600</td><td>\$157,600</td><td>\$157,600</td><td>\$457,600</td><td>\$157,600</td><td>\$157,600</td><td>\$157,600</td><td>\$157,600</td><td>\$457,600</td><td>\$157,600</td><td>\$157,600</td><td>\$157,600</td></t<>		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		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	\$-	\$-	\$-
$MW \qquad \qquad$	>20 - 30 MW	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 \$- <td></td> <td>Regulatory costs</td> <td>\$2022</td> <td>\$-</td>		Regulatory costs	\$2022	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-	\$-
Condition assessment cost* \$2022 \$18,000 \$10,000 \$10,000 \$10,000 \$10,000 \$10,000 \$10,000 \$10,000 \$10,000 \$10,000 \$10,0		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 \$193,500 \$193,500 \$193,500 \$193,500 \$193,500 \$193,500 \$193,500 \$193,500 \$193,500		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
	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	\$-	\$-	\$-	\$-	\$-
1-5 MW	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	\$93,398	\$168,398	\$93,398	\$93,398	\$93,398	\$93,398	\$93,398
	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	\$-	\$-	\$-	\$-	\$-
>5 - 10 MW	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	\$140,140	\$290,140	\$140,140	\$140,140	\$140,140	\$140,140	\$140,140
	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	\$-	\$-	\$-	\$-	\$-
>10 - 20 MW	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	\$157,600	\$457,600	\$157,600	\$157,600	\$157,600	\$157,600	\$157,600
	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	\$-	\$-	\$-	\$-	\$-
>20 - 30 MW	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	\$193,500	\$643,500	\$193,500	\$193,500	\$193,500	\$193,500	\$193,500

Gas Boilers

Indicative cost Basis Var.1 Var.2 Var.3 Var.4 Var.5 Var.6 Var.7 Var.8 Var.9 Var.10 Var.11 Var.12 Var.13 Maintarea cets (space) \$2000/W \$10.00																
Matrix not conts (ne-off) B000/HW B1/00	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 MV Operational costs/without energy, including labout 922 \$18,000 <td></td> <td>Maintenance costs (yearly)</td> <td>\$2022/MW</td> <td>\$10,500</td>		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
Homelatory costs Biolog		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
Condition serventment net: STORE SLORE S	1 - 2 MW	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
Total based on MW capacity - 2 \$53,000 \$50,00 <th< td=""><td></td><td>Regulatory costs</td><td>\$2022</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td><td>\$3,500</td></th<>		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
Materiance certs (yearly) 50002/MW 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,900 58,200 <td></td> <td>Condition assessment cost</td> <td>\$2022</td> <td>\$3,000</td>		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
$\frac{1}{10000000000000000000000000000000000$		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	\$53,000
2-5-5W Operational nates (without energy, including labour) 5000 595,000		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
Regulatory costs S2002 S5,000 <		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
Condition assessment cost \$2002 \$5,000	>2 - 5 MW	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
Total based on MW capacity = 5 \$95,500		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
Maintenance costs (yearly) \$2022/MW \$7,400 <td></td> <td>Condition assessment cost</td> <td>\$2022</td> <td>\$5,000</td>		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
$ \begin{array}{c} \\ & & & & & & & & & & & & & & & & & & $		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	\$95,500
$ = 5 \pm 10 \text{ M} $		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
Regulatory costs \$2022 \$6,000 <		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
Number line Stand	>5 - 10 MW	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
Total based on MW capacity = 10 \$776,00		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
Number Notation State		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
Maintenance costs (one-offs) \$2022/MW \$2,100<		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	\$176,000
>10 - 30 MW Operational costs (without energy, including labour) \$2022 \$60,000		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
MW Operational costs (without energy, including tabour) \$2022 \$60,000 <td></td> <td>Maintenance costs (one-offs)</td> <td>\$2022/MW</td> <td>\$2,100</td>		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
Condition assessment cost \$2022 \$15,000 <t< td=""><td></td><td>Operational costs (without energy, including labour)</td><td>\$2022</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td><td>\$60,000</td></t<>		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
Total based on MW capacity = 30 \$318,000 \$366,000 \$360,000 \$360,000 \$360,000 \$366,000 \$360,00		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	\$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
	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
1-2 MW	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	\$53,000
	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
>2 - 5 MW	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	\$95,500
	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
>5 - 10 MW	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	\$176,000
	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
>10 - 30 MW	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	\$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
	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)											
0 - 1 MW	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								
	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)											
1- 2 MW	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								
	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)											
2 - 8 MW	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								

Thermal range	Indicative cost	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
	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)										
0 - 1 MW	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									
	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)										
1- 2 MW	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									
	Maintenance costs (yearly)	\$26000+\$1000/ MW									
	Maintenance costs (one-offs)										
2 - 8 MW	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									

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
				\$15,000 - \$20,000	\$15,000 - \$20,000	\$15,000 - \$20,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
				1. Chemical clean - plate heat exchangers	 Oil Clean / Oil Change Safety device 	 Chemical clean plate heat exchangers 	 Replace shaft seal Replace suction 	 Chemical clean plate heat exchangers 	 Oil Clean / Oil Change Safety device 	 Chemical clean plate heat exchangers 	 Oil Clean / Oil Change Safety device 	1. Chemical clean - plate heat exchangers
				2. Oil Clean / Oil Change	checks	2. Oil Clean / Oil Change	filter 3. Oil pump	2. Oil Clean / Oil Change	checks	2. Oil Clean / Oil Change	checks	2. Oil Clean / Oil Change
	Maintenance costs (yearly)	\$2022		3. Safety device checks		 Safety device checks 	service	 Safety device checks 		3. Safety device checks		3. Replace shaft seal
				CHECKS		CHECKS	 4. Oil Clean / Oil Change 5. Safety device 	GIEGKS		CHECKS		4. Replace suction filter
0 - 1 MW							checks					5. Oil pump service
												6. Safety device checks
	Maintenance costs (one-offs)	\$2022										

	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
	Condition assessment cost	\$2022		ncluded 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
				. Chemical clean - plate heat exchangers	 Oil Clean / Oil Change Safety device 	 Chemical clean plate heat exchangers 	 Replace shaft seal Replace suction 	 Chemical clean plate heat exchangers 	 Oil Clean / Oil Change Safety device 	 Chemical clean plate heat exchangers 	 Oil Clean / Oil Change Safety device 	1. Chemical clean - plate heat exchangers
	Maintenance costs (yearly)	\$2022		2. Oil Clean / Oil Change	checks	2. Oil Clean / Oil Change	filter 3. Oil pump	2. Oil Clean / Oil Change 3. Safety device checks	checks	 Oil Clean / Oil Change Safety device checks 	checks	2. Oil Clean / Oil Change
				8. Safety device checks		3. Safety device checks	service 4. Oil Clean / Oil					3. Replace shaft seal
							Change 5. Safety device					4. Replace suction filter
1 - 2 MW							checks					5. Oil pump service
												6. Safety device checks
	Maintenance costs (one-offs)	\$2022										

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 - \$25,0
Regulatory costs - primarily pressure vessel inspection cost	\$2022	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,000	\$8,0
Condition assessment cost	\$2022	Included in operational costs	Included in operational cos							
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,
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 - \$40,0
Regulatory costs - primarily pressure vessel inspection cost	\$2022	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,000	\$10,0
Condition assessment cost	\$2022	Included in operational costs	Included in operational cos							
		operational costs	C							

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
		\$2022	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000	\$25,000
			 Oil Clean / Oil Change Safety device abaela 	 Chemical clean plate heat exchangers Oil Clean (Oil) 	 Oil Clean / Oil Change Safety device chaolice 	 Chemical clean plate heat exchangers oil clean (oil) 	 Replace shaft seal Replace suction filter 	 Chemical clean plate heat exchangers oil clean (oil) 	 Oil Clean / Oil Change Safety device change 	 Chemical clean plate heat exchangers Oil Clean (Oil 	 Oil Clean / Oil Change Safety device change 	 Chemical clean plate heat exchangers Oil Clean (Oil
	Maintenance costs (yearly)		checks	2. Oil Clean / Oil Change	checks	2. Oil Clean / Oil Change	filter 3. Oil pump	2. Oil Clean / Oil Change	checks	2. Oil Clean / Oil Change	checks	2. Oil Clean / Oil Change
				3. Safety device checks		 Safety device checks 	service	3. Safety device checks		3. Safety device checks		3. Replace shaft seal
0 - 1 MW												4. Replace suction filter
												5. Oil pump service

												5. On 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	
	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	
			1. Oil Clean / Oil Change	\$45,000	1. Oil Clean / Oil Change	1. Chemical clean - plate heat	1. Replace shaft seal	1. Chemical clean - plate heat	1. Oil Clean / Oil Change	1. Chemical clean - plate heat	1. Oil Clean / Oil Change	1. Chemical clean - plate heat	
			2. Safety device	 Chemical clean plate heat 	2. Safety device	exchangers	2. Replace suction	exchangers	2. Safety device	exchangers	2. Safety device	exchangers	
	Maintenance costs (yearly)		checks	checks	exchangers	checks	2. Oil Clean / Oil Change		2. Oil Clean / Oil Change		2. Oil Clean / Oil Change	checks	2. Oil Clean / Oil Change
				2. Oil Clean / Oil Change		3. Safety device checks	service	3. Safety device checks		3. Safety device checks		3. Replace shaft seal	
				3. Safety device		eneene		Uniconc				4. Replace suction	
MW				checks								filter	
												5. Oil pump service	

1-2 MW

												1 1
	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 - \$25,00
	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	\$8,00
	Condition assessment cost	\$2022	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 - \$65,0
	Maintenance costs (one-offs)	\$2022										
MW	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 - \$40,0
	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	\$10,0
	Condition assessment cost	\$2022	Included in operational costs									