

Chapter 4.11

Temperature

Option 1

The UKTAG highlights that there was one failure of temperature standards in England (in 2001 and 2003), such that it is assumed that there is one failure that has to be addressed. However, this may be increased if a standard for the maximum rise and fall in temperature is added to regulate the operation of thermal discharges.

The industry working group gives costs of measures for eliminating thermal effects of between £20 million and £80 million (annualised over 25 years) for four sites where there are abstraction/thermal issues. Based on MWth produced per year and time over which the power station would have to be out of action, the cost-effectiveness of the measures ranges from £23,000 per MWth to £1.2 million per MWth. Total compliance costs across four power stations where there may be an issue with thermal emissions are estimated at £186 million (annualised costs). Note, the measures required to address thermal emissions would also reduce the volume abstracted such that there may be benefits to more than one pressure. There may also be other costs, e.g. in terms of security of electricity supply and price, which may have knock-on effects on the economy.

The costs are based on 'indicative pricing for switch from direct-cooling to tower-cooling and from tower-cooling to air-cooled condensers (in many cases this would result in early closure of the plant rather than retrofit of new cooling technique - choice of cooling technique is fundamental to power station siting choices). Technical feasibility issues (space & layout) & efficiency issues may also affect options appraisal. The differences in thermal efficiency vary from site to site and through time with ambient meteorological (air temperature, humidity and wind) and sea (temperature) conditions and with the detailed design of the technology (e.g. sizing of tower, packing efficiency etc) - the difference indications provided are 'broad brush' 'typical' condition only - specific analysis is required for specific cases. The performance of air cooled condensers can decline dramatically over a few hours in hot summer conditions causing operational difficulties' (from pCEA Industry Working Group Thermal Power cost data spreadsheet).

There would be no additional monitoring costs under Option 1, since temperature has to be measured when recording pH, for example.

It may be necessary to undertake investigations to determine whether action is required at all sites. This could include point source investigation and consent reviews at a unit cost of £1,000. Given the very significant compliance costs that may be incurred, there may be a high risk that a consent is appealed. Potentially, all four sites may appeal increasing the costs to £4,000 per site. The overall costs of investigations, consent reviews and appeals would therefore be £4,000 per site across all four sites giving total costs of £16,000.

Option 2

Option 2 would take into consideration those plants that are programmed for closure/decommissioning such that measures would not be undertaken and to allow site specific factors to be taken into account. It is assumed under Option 2 that only one site would need action to be taken in line with the expected number of failures reported in the UKTAG standards report (June 2005). This reduces the annualised costs to between £20 million and £80 million (depending on which site is affected), with a mean value of £46 million (annualised over 25 years).

Investigations may still be required at all four sites, particularly where maximum rise and fall in temperature is included within the standard as this may make all four 'probably at risk'. The cost per investigation is assumed to be £1,000 and would apply to all four sites, giving a total of £4,000. It is assumed that the consent would only be changed for one site, such that only one appeal takes place at a cost of £3,000. Thus, the total investigation costs are £7,000.

Table 1: Costs of meeting the Temperature Standards

Cost	Option 1		Option 2	
	Assumptions	Costs	Assumptions	Costs
Compliance costs	All four sites require action to be taken	£186 million (annualised)	Only one site requires action to be taken, in line with current failures	£46 million (mean; annualised)
Monitoring	No additional action required	-	No additional action required	-
Investigations	Investigations and reviews on all four sites	£4,000 (once-off)	Investigations and reviews on all four sites	£4,000 (once-off)
	Consent appeals from all four sites	£12,000 (once-off)	Consent appeals from one site (that required to take action to reduce impacts)	£3,000 (once-off)