Relating concerns to recommendations and National Curriculum documents

	Often energy discussions:	Recommendation	National Curriculum (KS3) and GCSE criteria
1)	are remote or disconnected from calculations	i. Avoid suggestiung that energy is a substance that can exist on its own ii. Relate energy to calculations and terms that can be quantified	• comparing energy values of different foods (from labels) (kJ) • domestic fuel bills, fuel use and costs • calculate the amounts of energy associated with a moving body, a stretched spring, and an object raised above ground level • describe and calculate the changes in energy involved when a system is changed by heating (in terms of temperature change and specific heat capacity), by work done by forces and by work done when a current flows
2)	explain away useful and beautiful ideas	Use physical processes, not energy, to investigate & explain phenomena	• using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.
3)	are ambiguous and inconsistent	i. Always define a start and end point (or states); - don't get tied up with chains. ii. Look for a real cause of change – it won't be energy or 'transformations'	• comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field, in elastic distortions and in chemical compositions
4)	employ spurious types	i. Avoid spurious, invented 'forms' of energy ii. Look for active 'ing' words to link the states (pathways)	• work done and energy changes on deformation • use the relationship between work done, force, and distance moved along the line of action of the force and describe the energy transfer involved. • describe and calculate the changes in energy involved when a system is changed by heating (in terms of temperature change and specific heat capacity), by work done by forces and by work done when a current flows
5)	use heat in a caloric way	Take care using terms from thermodynamics: - it is safer to use heat as a verb and heating for the process	• heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation;
6)	give causal powers to energy	Differences cause change	• such transfers tending to reduce the temperature difference: use of insulators • that differences, for example between pressures or temperatures or electrical potentials, are the drivers of change
7)	ignore the second law	i. Energy is not the capacity to do work ii. Introduce ideas around the second law, dissipation and waste	• describe, with examples, how in all system changes, energy is dissipated, so that it is stored in less useful ways • explain ways of reducing unwanted energy transfer e.g. through lubrication, thermal insulation; describe the effects, on the rate of cooling of a building, of thickness and thermal conductivity of its walls (qualitative only)