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Creating a Carbon Free Footprint for City School, Sheffield

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Aims

- Work out the current and ideal energy requirements for the School
- Identify short term energy saving possibilities
- Measure the energy arriving at the School from the sun and the wind
- Look at the range of renewable resources available
- Choose those which are both cost effective and viable

Room Energy Use

- Room dimensions: length, height and width
- Window data: width, height, orientation, and whether it was double glazed
- Radiator data: type and dimensions
- Lighting data: type and number of sources
- Electrical devices: type and power rating

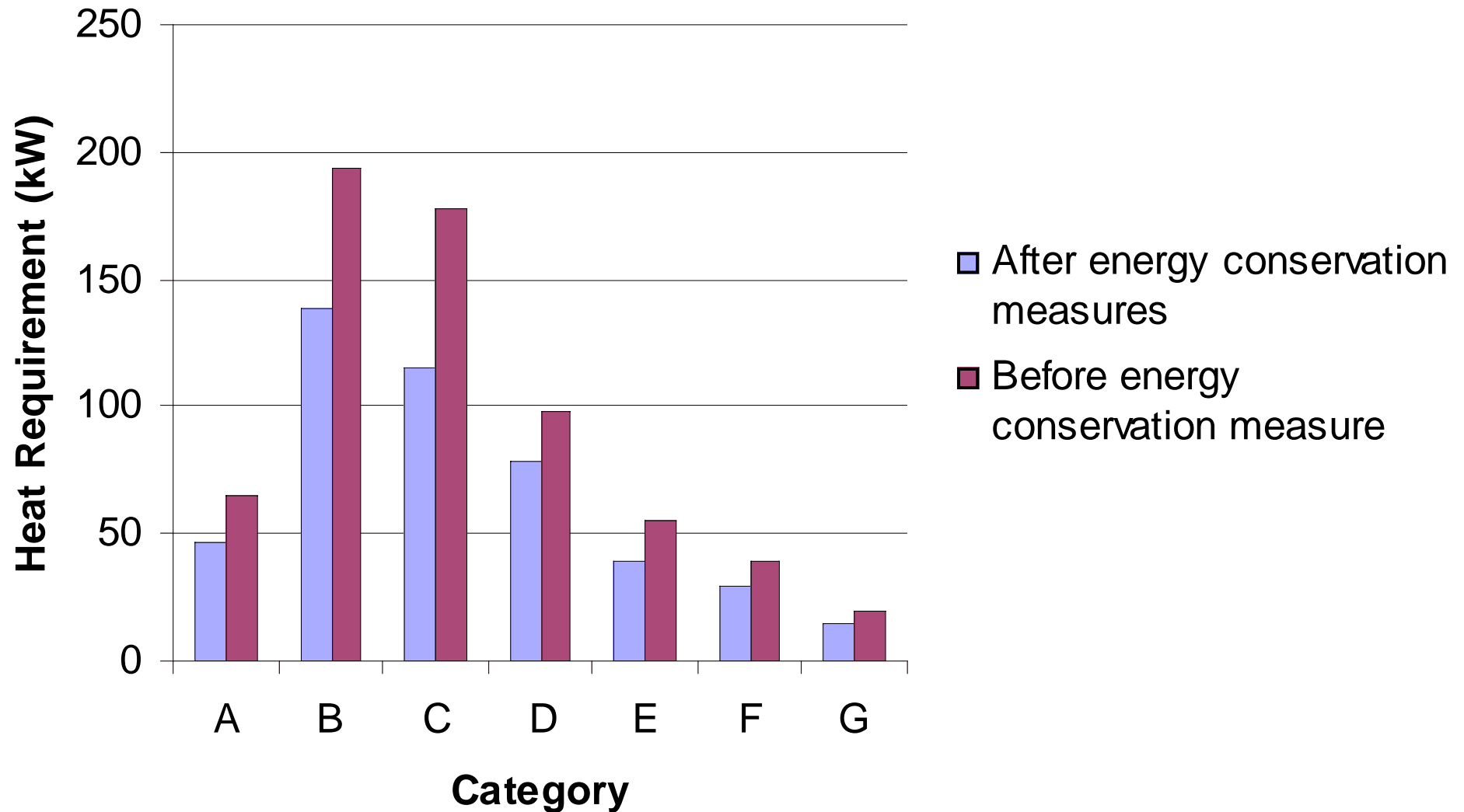
Type of room (heating)



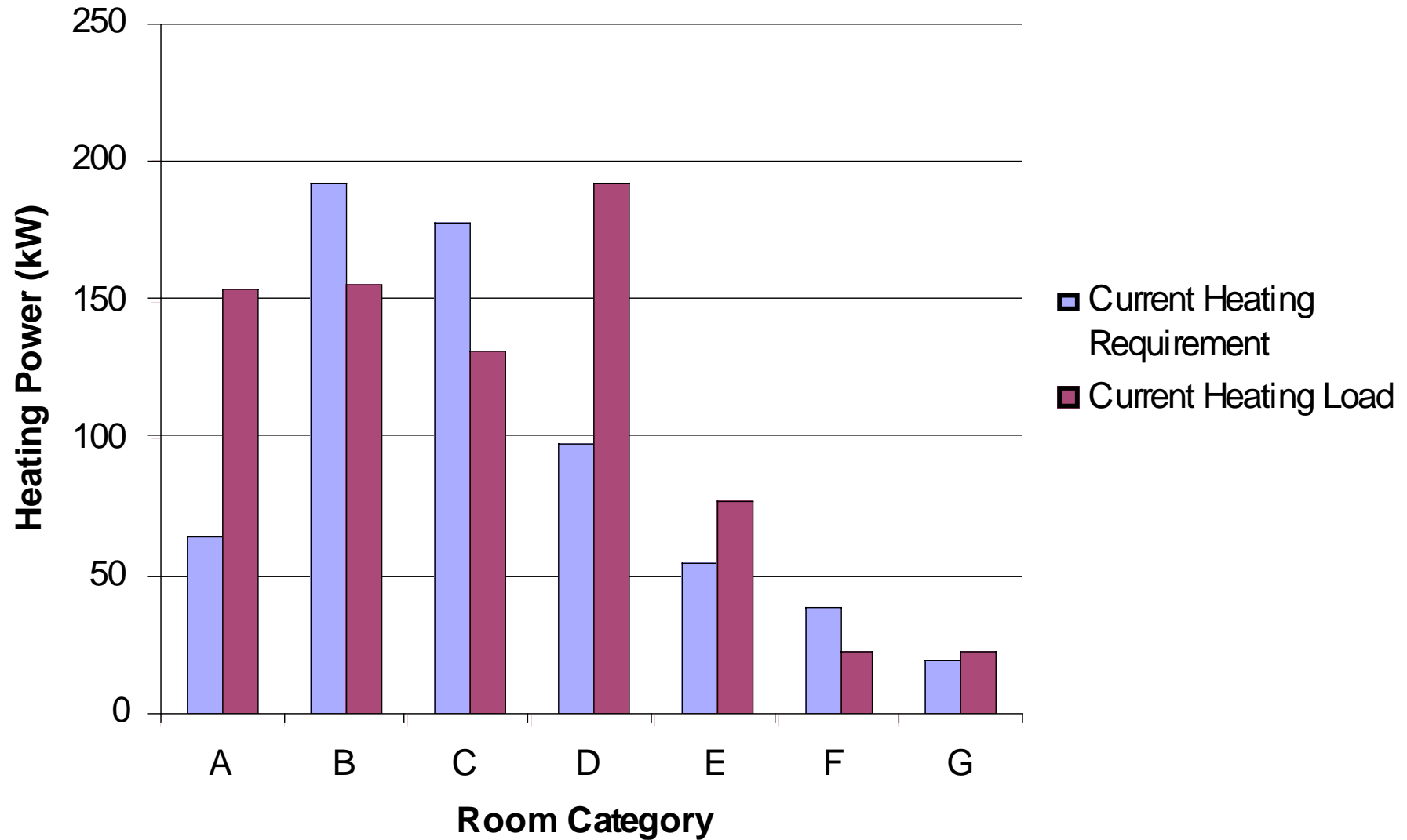
THE CITY SCHOOL



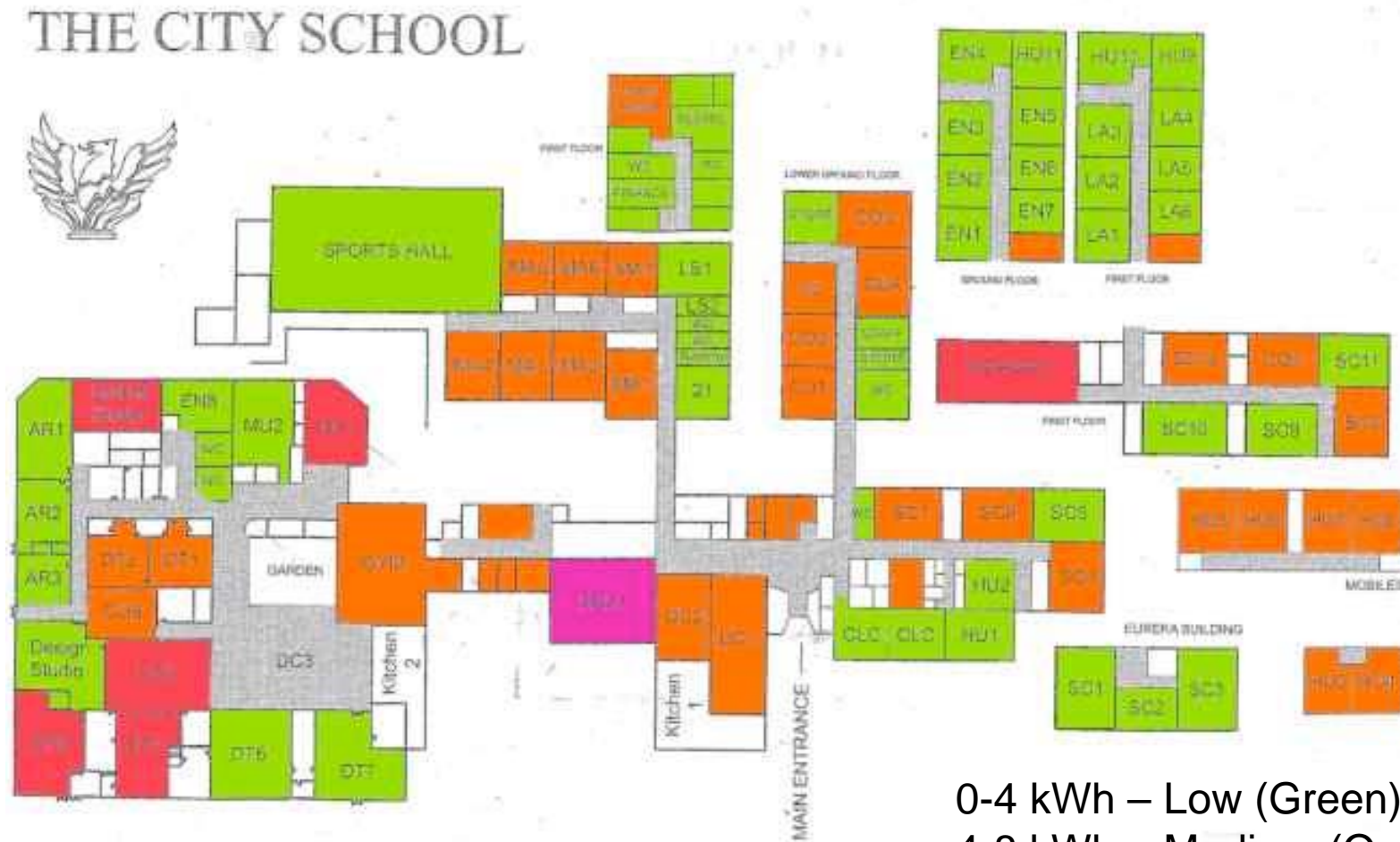
Potential to save energy (heating)



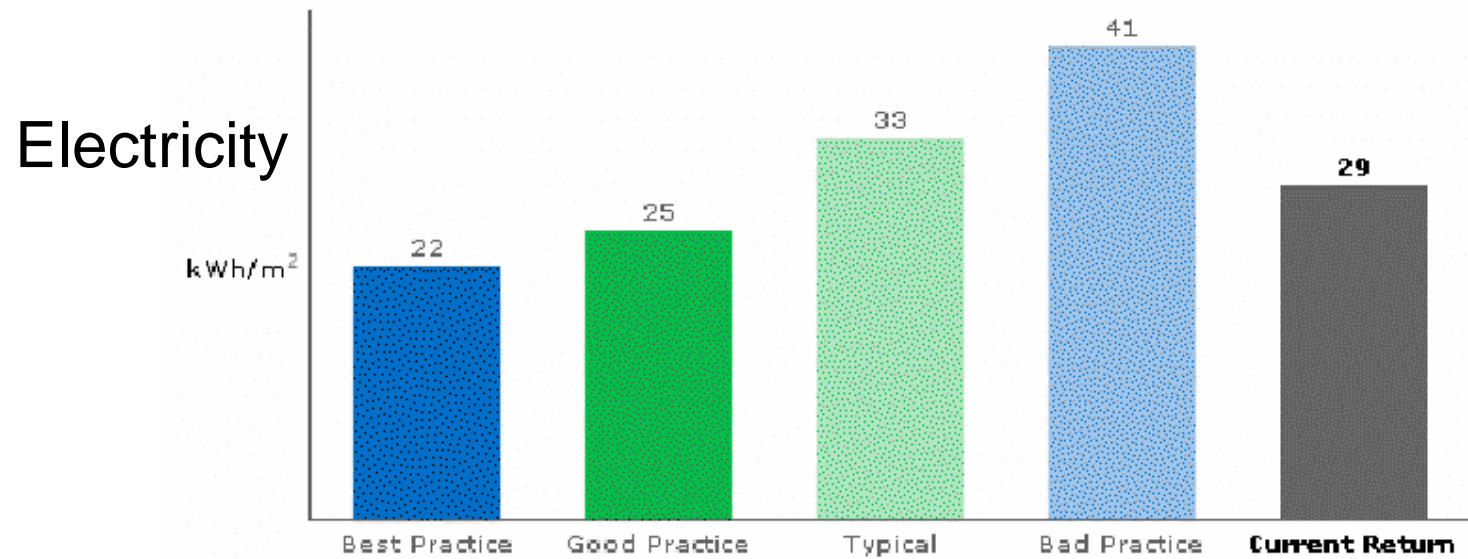
Heating supply doesn't match the load



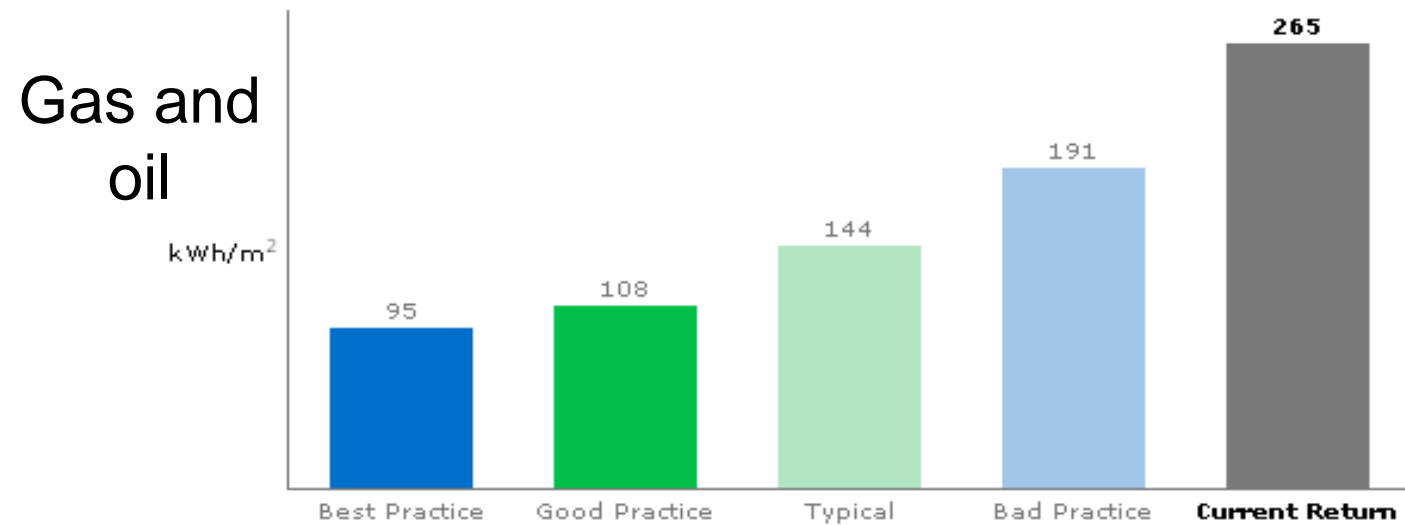
Electricity supply



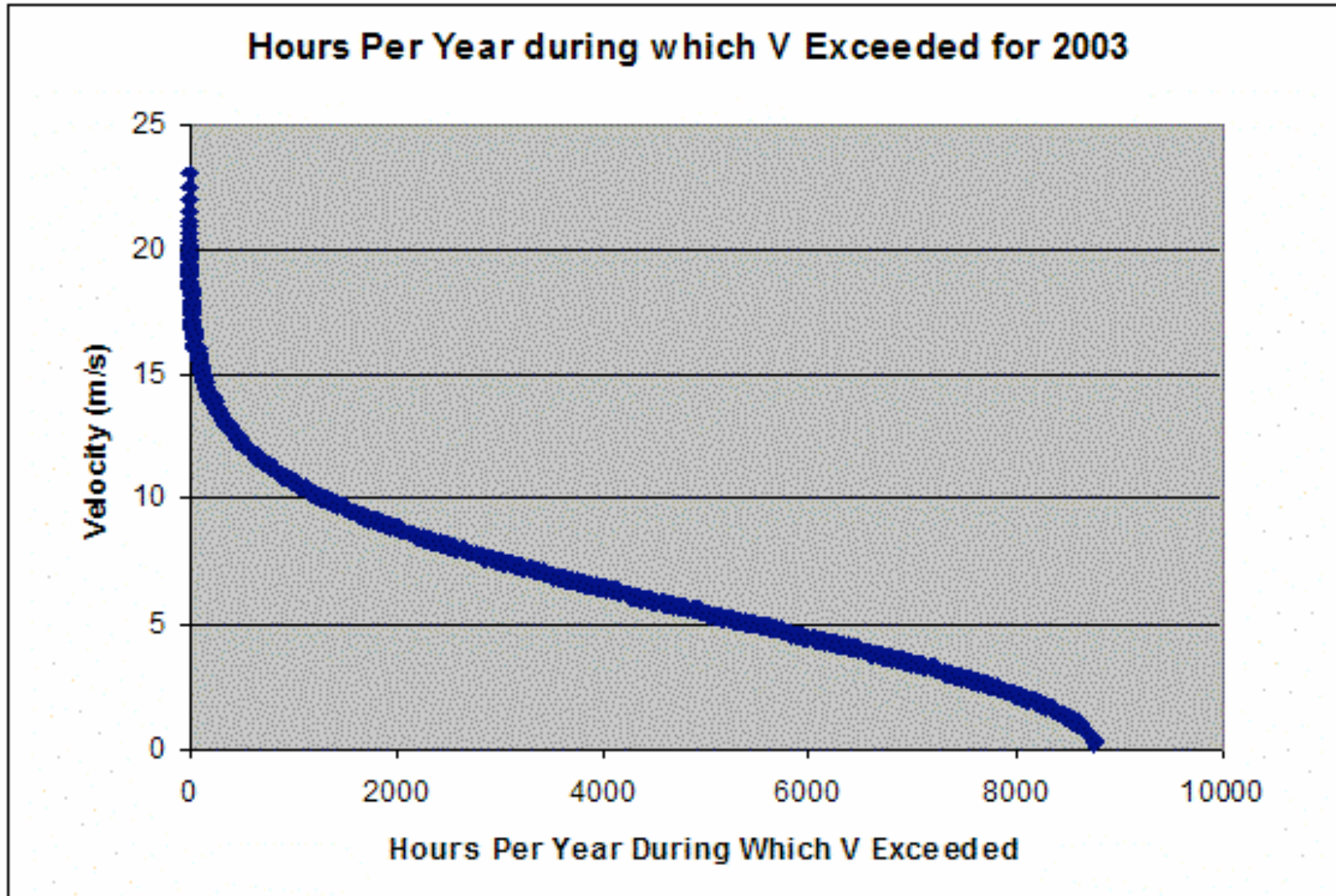
- 0-4 kWh – Low (Green)
- 4-8 kWh – Medium (Orange)
- 8-12 kWh – High (Red)
- >12 kWh – Very High (Purple)



Benchmarking



Wind data



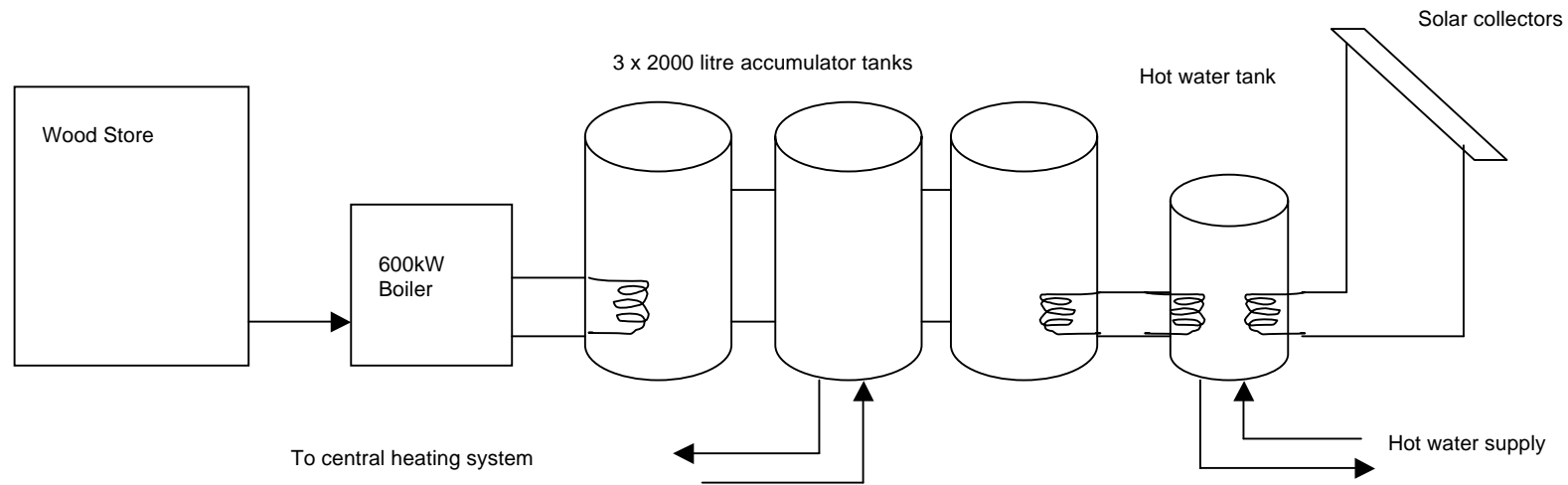
Main Efficiency Recommendations

- Reduce the energy ratings of the boilers as they are far too large for the heating requirements of the school.
- Install thermostatically controlled radiators where there is a substantial amount of over heating.
- Install secondary double glazing in the hall.
- Find alternative heating sources for the school hall.

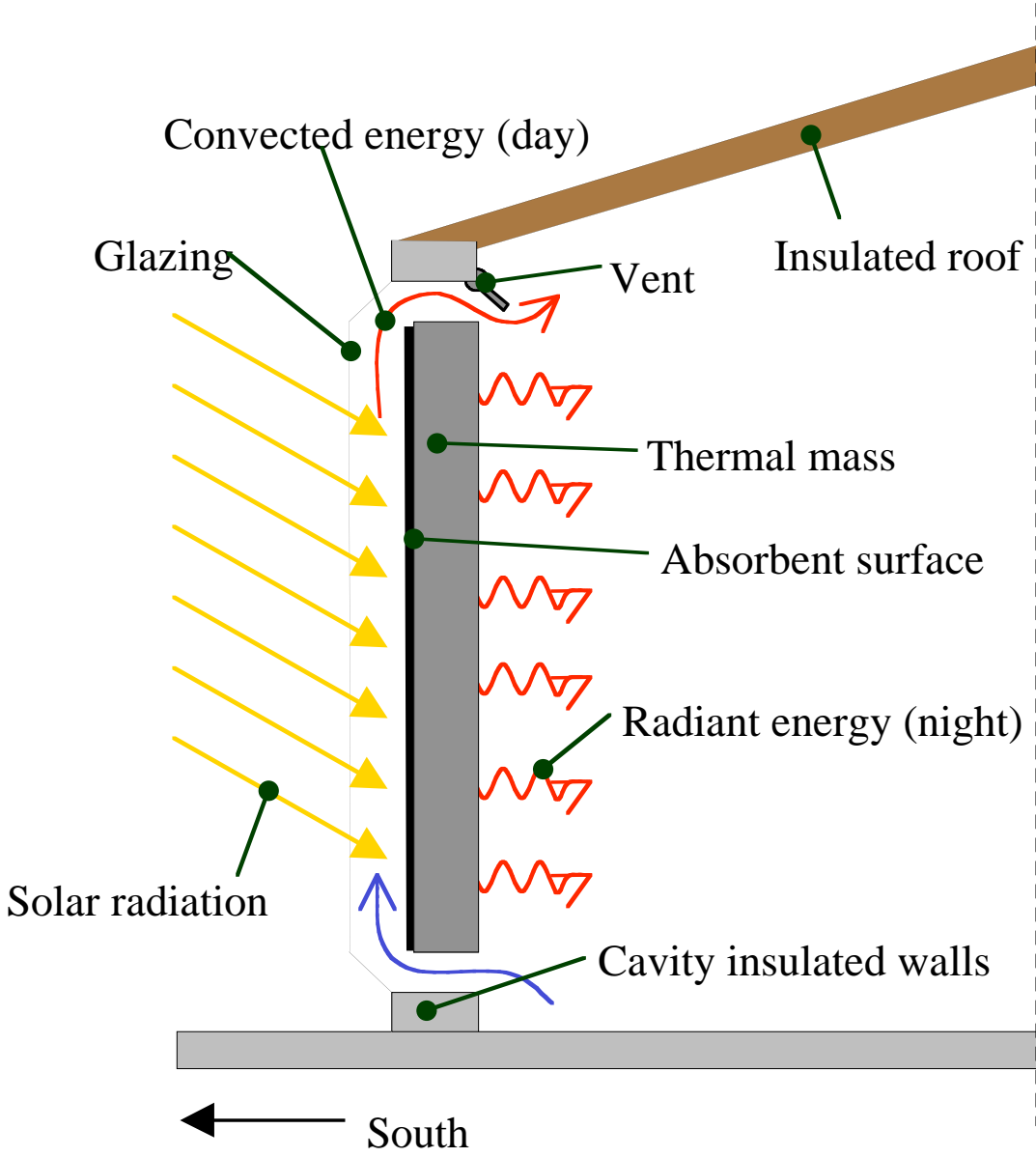
Renewable energy supply

- Wood chip / pellet fuelled boiler
- Solar heaters
- Trombe thermal wall
- Wind turbine units
- PhotoVoltaic cells

Preheating Water with Solar Collectors

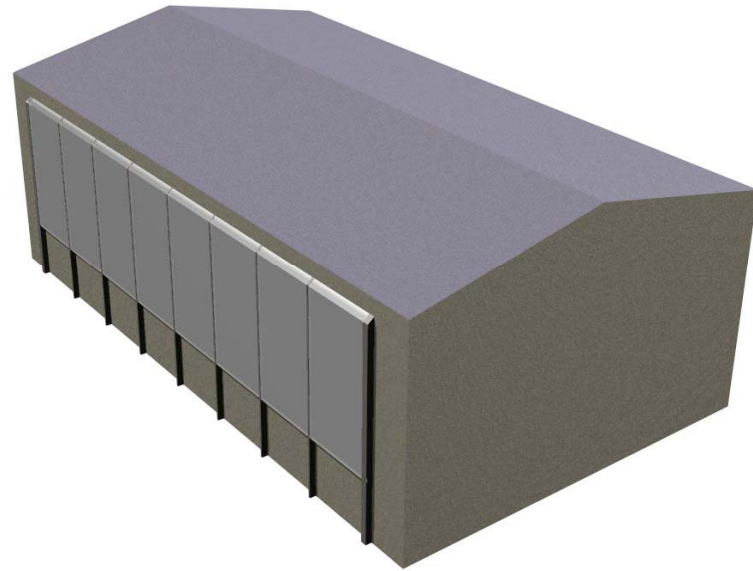


Thermal Storage Wall for Sports Hall



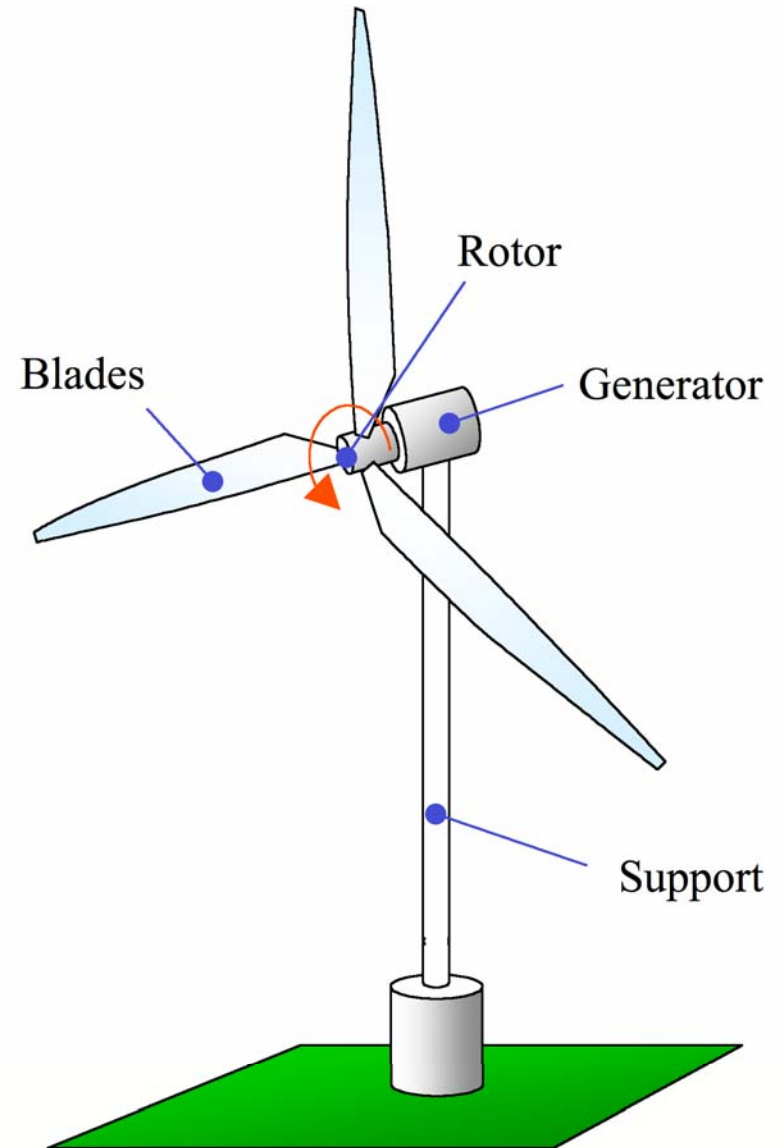
Installation

- Wall (needs insulation removing)
- Glazing (Glass or Plastic)
- Movable insulation (In air gap)
- Installation cost £30-40k



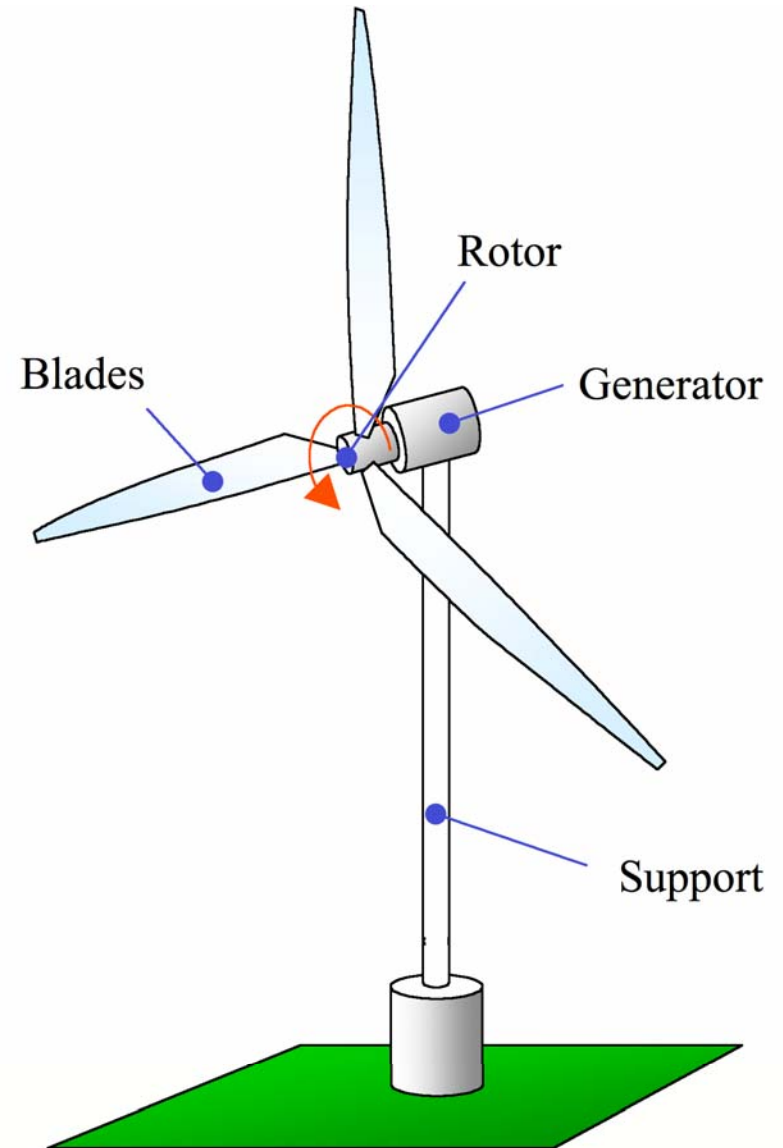
Wind Power

- One or two turbines, rated between 15 and 20 kW are required



Possible pos

- Car park area next to the Phoenix building
- Edge of terrace on upper playground
- Above upper playground
- Edge of terrace on lower playground
- Lower field facing downr. valley



Photovoltaics

- Turn sunlight into electricity.
- Expensive, and only useful when the sun is strong



Where to use them

- Use of photo-voltaic cells to generate power for general use within the school is not really viable due to the high set up costs and limited output.
- Use of small units to generate power for the pumps and blowers used in the solar collectors and possibly air conditioning units would be justified as the two technologies are 'phase locked' to the received radiation.

Where to use them

- The higher the intensity of the sunlight, the hotter the collectors will become and greater flow rate (and therefore pump power) will be required.
- Correct sizing of the solar cells to the collectors would provide a system generating just the right amount of electricity for the pump at a given radiation intensity.

A viable plan!

- Wood chip / pellet fuelled boiler
- Solar heaters
- Trombe thermal wall
- Wind turbine units
- PhotoVoltaic cells for specific purposes
- All for about £300k

If you think you are too small
to be effective,
then you have obviously
never been in bed with a mosquito!

