



Microgeneration Installation  
Proposal for –

## Perins School & Community Sports College



### Natural Gas Condensing Boilers & Solar Thermal on Sports Hall



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### Appendices (separate documents)

- (i) Perins Condensing Boiler & Solar Thermal package Quote
- (ii) Solar Thermal only Quote

## 1. Introduction Summary

Portsmouth Sustainable Energy & Climate Change Centre (PSECC) is a locally based provider of turnkey solutions for onsite renewable energy (RE) systems, particularly Solar Thermal / photovoltaic (PV – i.e. solar electricity), Wind Turbines, Biomass and small to medium sized energy systems such as natural Gas Condensing Boilers.

We also offer advice, support and project management services for developments that incorporate other low carbon technologies such as solar water heating, micro -hydro turbines and heat pumps. As part of our design service we offer straightforward advice as to the most appropriate low carbon technologies to fulfil our clients' requirements.

The organisation was established in 2008, relocating its operations to Havant near Portsmouth in Hampshire. PSECC has a very strong heritage in the sustainable energy sector, with our parent company having almost two decades experience specifically in this field. PSECC have experience of writing City Energy Policy & Strategy together with a long established link with Hampshire County Council (HCC) in the Sustainable Energy field of coordination of County Natural Resources Initiatives. More recently PSECC have worked with HCC on "Sustainable Energy in Schools" and have facilitated renewable energy technology installations in over six schools so far in the County of Hampshire. PSECC work with fully accredited contractors under the Microgeneration Certification Scheme for design, supply, installation, set to work, commissioning and handover renewable energy systems.

Example of the quality-focused services that that can be expected from PSECC, we were responsible for the solar and wind systems installed at Hounslow School, Solar PV at both Ringwood & Mountbatten schools in Hampshire, together with Solar PV for the Minstead Study Centre, Perins and also Warren Park school in Hampshire. Funding options for our renewable energy projects have been met by the Low Carbon Building Programme, Community Sustainable Energy Programme and also British Gas partners.

PSECC were approached by Clive Surry the Senior Community Manager at Perins School & Community College on the 20<sup>th</sup> January 2012 to discuss potential options for a more energy efficient solution to our existing oil fuelled boiler in Stephenson block. A full system breakdown and quote can be seen in Appendices (i) & (II) – separate documents.



Perins already demonstrate commitment to Solar PV Renewable Energy technology at another block at the school as seen here and also a second Solar PV system near the Tennis courts further West.

## 2. Background

This document has been prepared by PSECC, based on correspondence and observations from site visits undertaken by PSECC from the 20<sup>th</sup> January to the 27<sup>th</sup> February 2012.

This document, with separate appendices (i) & (ii) forms PSECC's tender to the project, and details the proposed system for project One – Natural Gas Condensing Boilers with Solar Thermal technologies.

Investigate options for on-site renewable energy generation; there were no specific energy generation or carbon reduction targets set, however the management team is enthusiastic about the potential for innovative initiatives that serve to and have already implemented a number of innovations (e.g. a solar PV system s for other school blocks). There is interest in a broad range of onsite renewable energy systems, particularly those that have a strong demonstration component (such as Solar PV and geothermal systems). The school has recently benefited from the installation of a small solar photovoltaic system arranged by PSECC.

No target yield or carbon reduction was given by the School. As such, we are proposing a system to maximise yield at a reasonable cost and provide a strong visual demonstration of renewable energy technology in practical operation. The favoured option, a modular Condensing Boiler system with Solar Thermal arrays on the Sports Hall roof area, is initially summarised in pages 7, 8 & 9 and Table 1 and in more detail from page 9 onwards.

### **Stephenson Block & sports Hall at Perins School**



## Sports Hall



**Stephenson Block** – looking West – a total of 24 showers within the hall mainly used from 6pm to 9pm each evening and for sports at the school.



**This is a view of one of the technology areas of the school – The Stephenson Block to be heated by the new system.**

**Sports Hall & Stephenson Block – another view looking West**



The new gas line will be put in and run beneath the grass area of the picture to the left and then up in between the Sports Hall and along the roof of the Stephenson block to the Boiler House.

**Current Natural Gas input to the school**



New natural Gas line to be installed for the new Condensing Boilers and run from the Gas Housing Unit to the north of the car park.

The route of the gas line will then pass beneath the grassed areas in the picture and then up the side of the Stephenson Block, along its roof between the Sports Hall and the school block to the Boiler House, indicated to the south of the picture at the end of the line.



Install new pipework within the meter cupboard to allow connection to the gas meter when required. This will contain an Additional Emergency Control Valve.

### 3. Current Oil Fired Boiler System

Please see below information on boiler at Stephenson Block that's serves the block & Sports Hall.

1 HOVAL TKDR275 0 324kW OIL 1972 HTG/HWS C  
Oil costs are:  
2009 14,652  
2010 19,661  
2011 15,551ytd so predict 25,000



Current Pipe Work for Oil Fired Boiler



Current Electrical Controls



## 4. Replacement Technology choice for Project One

### Condensing Boilers – Natural Gas – Broag Remeha

#### Boiler description

The Remeha Gas 110 Eco 115 / 65 are floor standing, condensing boilers. The one piece, cast aluminium heat exchanger and other major components are contained within a sealed air box. This forms the main boiler casing with a removable front section for maintenance purposes. All electrical and electronic controls are contained within the boiler casing.



#### Declaration of compliance

We hereby certify that the series of appliances specified hereinafter is in compliance with the standard model described in the EC declaration of compliance, and that it is manufactured and marketed in compliance with the requirements and standards of the following European Directives.

Manufacturer: Broag-Remeha Ltd, Remeha House,  
Molly Millars Lane RG41 2QP WOKINGHAM, Berks

Product type: Gas fired condensing boiler

Formats: Remeha Gas 110 Eco 115 / 65

Standards Et rules: - 90/396/EEC Gas Appliance Directive  
Reference Standards: EN 437; EN 483;  
EN 625; EN 677

- 2006/95/EC Low Voltage Directive  
Reference Standard: EN 60.335.1

- 2004/108/EC Electromagnetic Compatibility Directive  
Generic standards: EN1000-6-3 ; EN 61000-6-1

- 92/42/EEC Efficiency Directive \*\*\*\*

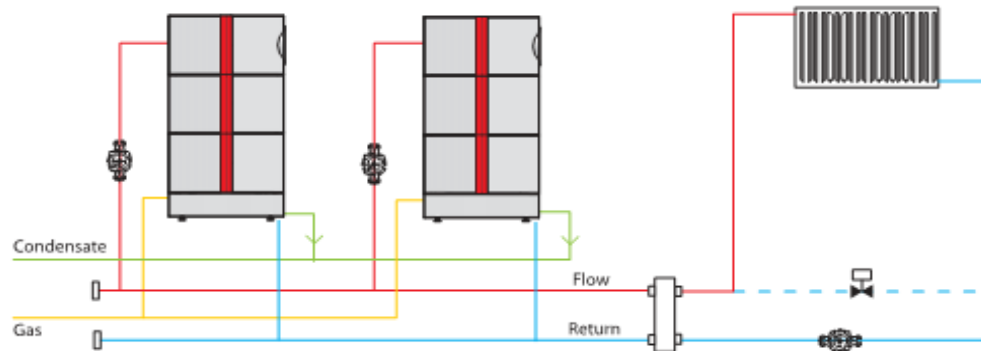
Inspecting  
organisation: Gastec

Values: NOx (mg/kWh) dry @ 0% O2  
Gas 110 Eco 65 25 21 - DIN 4702 Teil 8  
Gas 110 Eco 115 30 31 - EN 297A3  
CE-0063BS3826



## New Condensing Gas fired Boiler system

### Modular/cascade boiler configuration



**Note 1:** These layouts do not constitute a design. Calculations must be carried out to ensure pipework and pumps are sized to match boiler nominal flows against system design flow requirements.

**Note 2:** All connections are to the back of the boiler

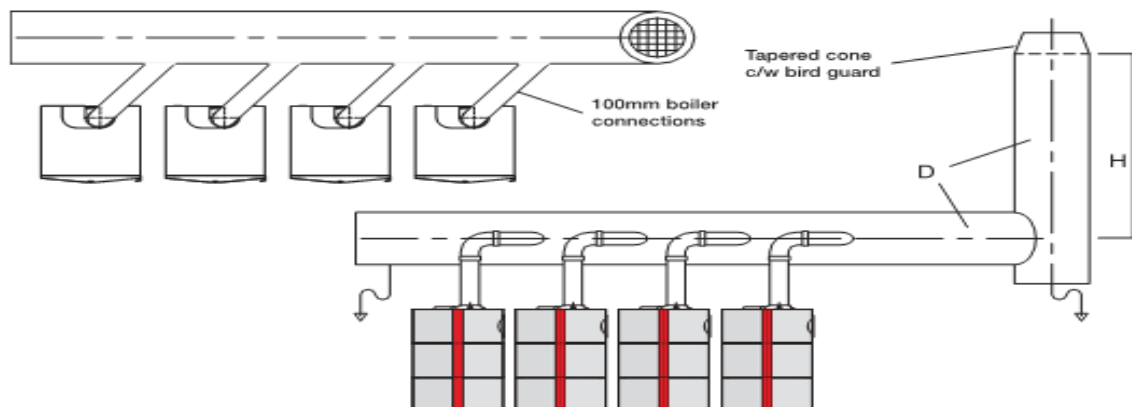
## Modular flue systems

The flue damper kit allows for safe and efficient operation of multiple Gas 110 Eco boilers when used on a common flue system. The following table offers flue system sizing guidance, based upon the total heat output and the available chimney height. Please consult a flue specialist and Broag technical department for any further assistance.

Table 1. Heat Output

Heat output P kW	Boiler types	Ød-ØD(mm)			
		H-2-5m	H-5-9m	H-9-13m	H-13-17m
122	2x65	155	145	145	145
183	3x65	220	200	195	190
244	4x65	265	240	230	225
305	5x65	305	275	255	250
366	6x65	340	300	280	275
214	2x115	200	185	180	180
321	3x115	285	255	240	235
428	4x115	345	305	285	275
535	5x115	395	345	323	315
642	6x115	440	385	355	345

**Note:** Connect the boilers to the horizontal header using swept connections.



## Installation of new Gas line for new Condensing Boilers

- Install a new gas supply rising vertically outside of the sports building.
- Install new gas supply across the roof of the single storey building to above the plant room.
- Install a roof penetration into the plant room to enable the gas pipe to enter the plant room.
- Install an additional emergency control valve in accessible location within the plant room.
- Install an electrical solenoid valve to allow the gas to be shut off if a fire was to occur within the plant room when connected to appropriate fire sensors.
- Install new gas pipework from the gas solenoid to create a gas header below the boilers.
- Install a purge point to the end of the gas header to allow the correct purging of the gas supply.
- Install new gas pipework from the gas header to the boilers this pipework will contain individual gas isolation for each boiler.

**The price to complete the above works is £16,272.56 plus VAT**

## Energy & CO<sub>2</sub> savings

We have estimated the CO<sub>2</sub> savings that Perins School would make by converting from Oil to Natural Gas. The following figures have been calculated using information from The Carbon Trust.

We have used an estimated expenditure of £25,000.00 on heating oil for the year of 2010/2011, the average cost of heating oil in this period was £0.60 per litre this equates to an estimated 41,500 litres of oil used in this period. This equates to 415,000 Kw/h this would produce 110,987.60 kg/CO<sub>2</sub>. The same quantity of Kw/h's using Natural Gas would see an estimated reduction in CO<sub>2</sub> to 76,194 kg/CO<sub>2</sub> equalling a saving of 34,793.60 kg/CO<sub>2</sub>. I hope this information will be of help to yourselves in making an informed decision with regards to the boiler replacement.

## Condensing Boiler Eco - 115

The Remeha Gas 110 Eco-115 are floor standing, condensing boilers.

- High efficiency: 110% NCV at 40/30°C (99% GCV)
- Boiler Modulates between 18-100% depending upon demand
- Conventional or "room sealed" flue options
- The boiler is particularly suitable for retro-fit applications, having a small footprint
- Low NOx <35mg/kWh (O<sub>2</sub>=0%, dry)
- Quiet operation <48 dBA
- Cast aluminum heat exchanger
- Easy maintenance

**The price to complete the above works is £87,475.15 plus VAT**

This price is valid for 30 days

A more detailed quote of the total system works required can be seen in the Appendices (i) & (ii) – separate documents.

## Solar Thermal Hot Water system



The Solar Thermal Hot Water Panels will be placed on the Sports Hall roof, which has a slightly West of South orientation.

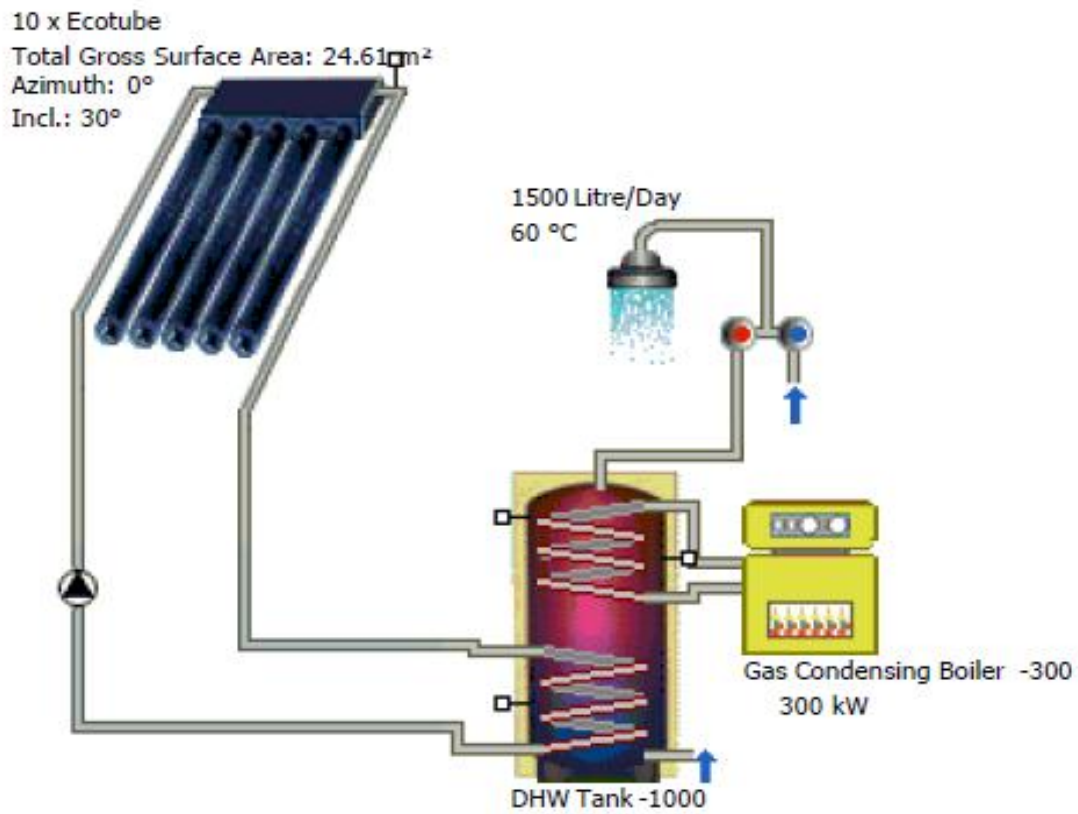
### **System Overview:**

The following equipment will be installed:

- N° 10 of Riomay Solar Panels DF120 connect to 1,000 litre pre-feed installed and commissioned by others.
- 15kW Fan Coil Heat Sink for use in summer recess on flat roof next to sports hall
- Flow and Return Riser Solar pipe-work will be Copper Tube, brazed to BS EN 13133
- Insulation for external roof solar pipe-work (Mineral Wool - Metal Cladding) by Riomay
- Insulation for riser (Rockwool Foil Wrapped) by Riomay
- Insulation for plant room (Rockwool Foil Wrapped) by Riomay
- Location of solar panels (see suggested drawing)
- Associated solar expansion vessel 100 litres
- Pitched roof mounting installation kit
- Supply and install solar control panel. (Single phase 13 amp fused spur by others) Differential Temperature Control (DTC) provided will send fault signal only (BMS controls by others if required).
- Solar Fluid (Solaris PG20)
- Supply and Installation pump sets by Riomay. Standby and duty pump set sized to enable the flow and return circulation within the solar system.
- Thermostatic Blending valve (as advised by boiler manufacturer)
- Supply sensor cable from panel arrays, within riser and across plant-room to DTC.
- AAV and isolation valves
- Supply – Installation - Commissioning

**Cost including Builders Discount of 2.5%**

**£29,950.00 + Vat**



### Control System proposed – example



The actual controls for the Solar Thermal and Condensing Boilers will be similar to that above but will be specifically designed for Perins School.

END