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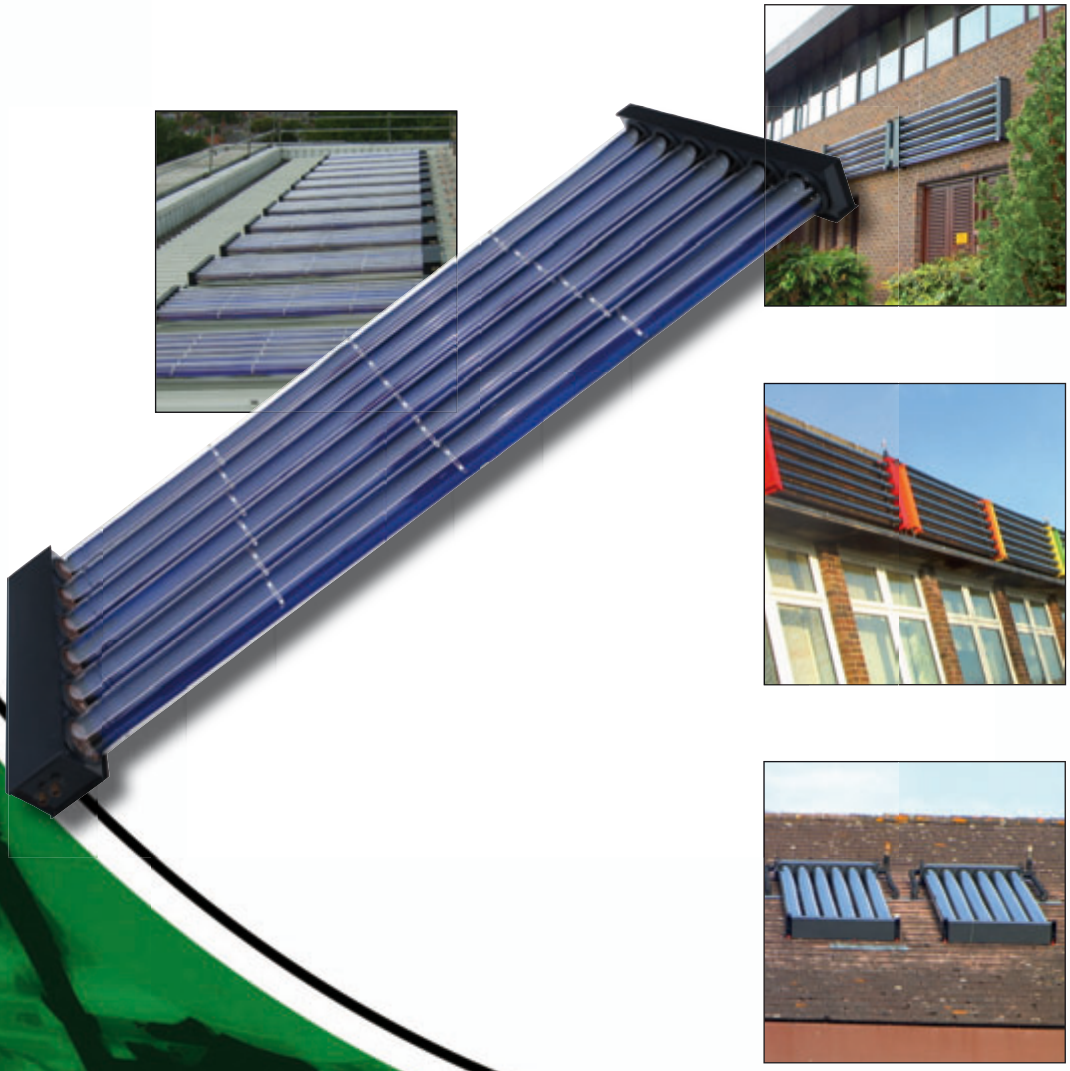
# STOKVIS ENERGY SYSTEMS



*"The Sun's Energy is the fuel of life - and it's Free"*

# STOKVIS-Ecotube

## SOLAR THERMAL SYSTEMS

STOKVIS
ENERGY SYSTEMS

For three decades the Ecotube has been providing the ultimate in solar thermal solutions to the commercial sector. Many schools - offices - hospitals - throughout the UK have benefited from the excellent performance. Throughout the same time frame STOKVIS Energy Systems have been providing the ultimate in high efficiency water heating systems to the same market sector with their state of the art packaged plate heat exchangers and ultra high efficiency commercial boilers. A 'marriage' of these two exceptional systems provides the epitome in solar thermal water heating and minimises the use of fossil fuels - a very exciting cost effective sustainable solution for hot water generation for all commercial applications.

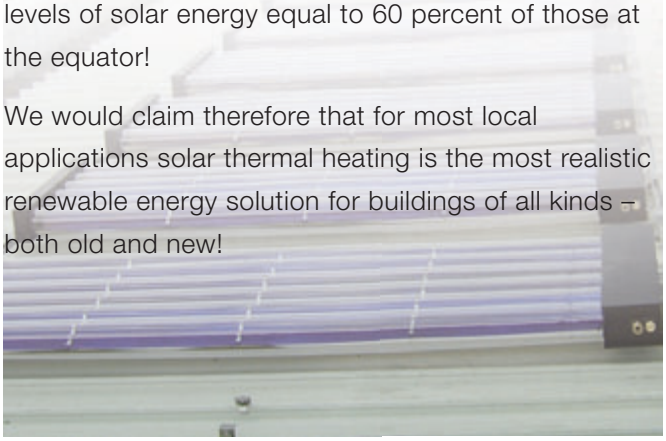
## Why Solar in the UK?

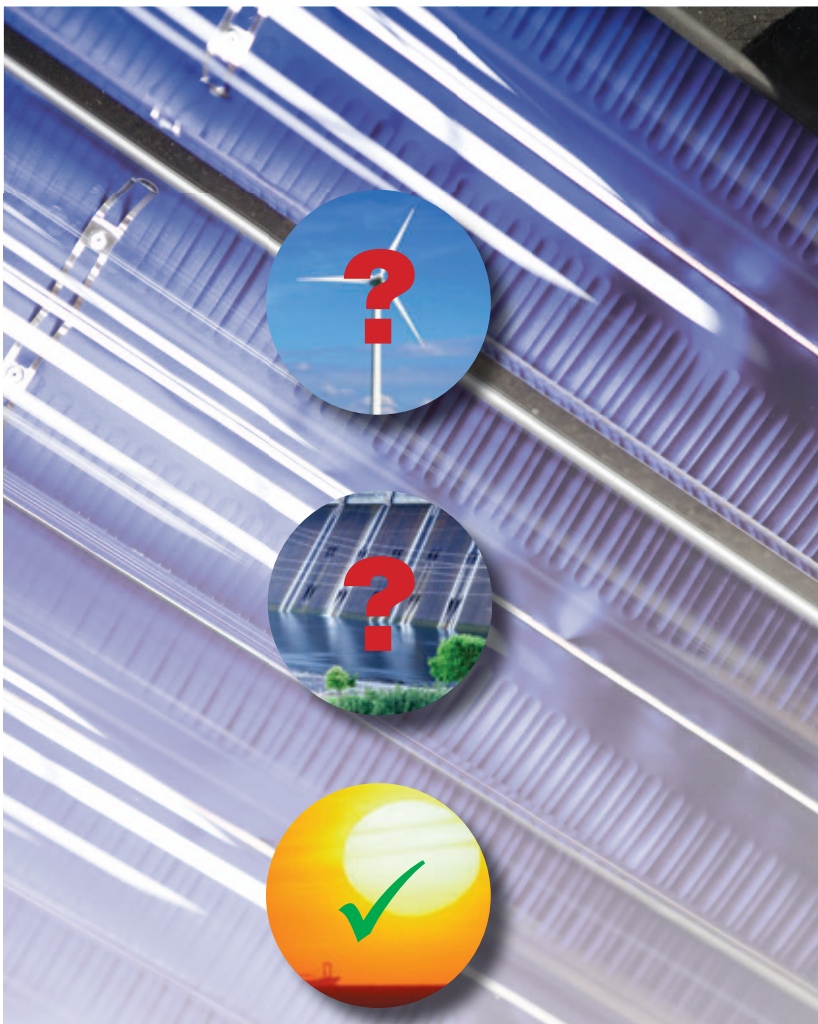
It can be argued that - the capital investment involved in hydro electric energy usually makes it impractical for small-scale installations – ground source (geothermal) energy requires large amounts of real estate – wind turbines have a negative impact on the landscape – the cost of photo voltaic panels is prohibitive making pay back times unacceptable - even biomass, which is carbon dioxide neutral, has to be sustainabley sourced and requires regular deliveries and large storage space.

The solar energy received by the earth in just 30 minutes is equivalent to the energy used by the entire human population in one year – and it's free and available.

In our northern climate solar power is still a very viable option. On a sunny day parts of the UK experience levels of solar energy equal to 60 percent of those at the equator!

We would claim therefore that for most local applications solar thermal heating is the most realistic renewable energy solution for buildings of all kinds – both old and new!






## Why Choose this Solar Thermal System?

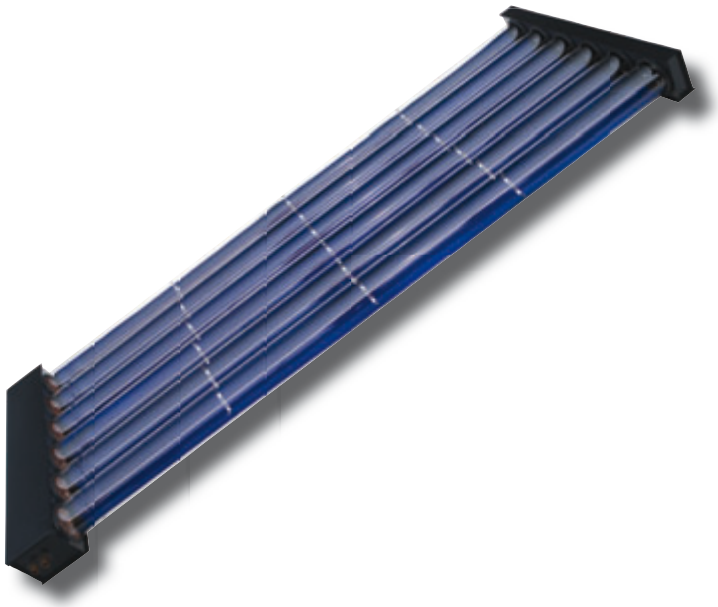
For over thirty years the Ecotube solar thermal system has gained an unrivalled reputation for excellence with architects, property developers, facilities managers and engineers.

The secret of the success – which has been achieved in all sectors of the commercial heating market – is the very heart of the systems – the patented 'ECOTUBE' which revolutionises carbon reduction. Like all solar thermal systems, the Ecotube uses solar energy to heat water. Unlike its contemporaries, its energy efficiency is far in advance of the 528kWh per square meter quoted as an industry standard – in fact the Ecotube achieves over 850kWh per square meter per year - an extra 61%.

## STOKVIS-Ecotube is the future of solar heating

# ...revolutionising carbon reduction

The Ecotube is an advanced form of evacuated tube solar collector which is designed to maximize the solar energy absorbed and minimise heat loss through radiation. The revolutionary Ecotube has substantially reduced the amount of 'parasitic' energy lost by most evacuated tube systems (energy used up by the system itself during the process of converting solar energy to heat). As a result, the Ecotube system requires smaller pumps to circulate the fluid in the evacuated tube collector which means that there are fewer drops in pressure through the system, giving a more sustained level of heat than almost any other system.
In fact, independent laboratory tests prove that the Ecotube produces over 750kWh per square metre per year in direct heating mode and a staggering 850kWh per square metre per year in pre-heat mode.



## For architects

The Ecotube's flexibility is outstanding: it can be installed flat on a roof, at an angle or horizontally on flank walls. Thanks to the creative approach of the STOKVIS team, the panels have been used as attractive architectural features on homes, schools, leisure buildings and pergolas.

## For facilities managers

STOKVIS-Ecotube systems reduce the cost of heating water for changing rooms, laundries, kitchens, swimming pools, baths and showers. Converting to renewable energy is not just a matter of environmental responsibility – it is sound financial management.

## For developers

Government legislation means that installing renewable energy systems is a must. Be confident that you are giving your customers the best with Ecotube and STOKVIS, the company responsible for some of the biggest, most prestigious and best-performing installations in the UK.

# how the ecotube works

There are two main types of solar panel.
Some convert sunlight into electricity, others convert it into heat. The Ecotube absorbs solar radiation, and uses that energy to raise the initial temperature of a hot water system.

Simple solar panels designed for this purpose have been around for many years.
The most basic are glazed flat plate collectors, which resemble domestic radiators, and are made from black-coated metals or black plastics such as polypropylene.

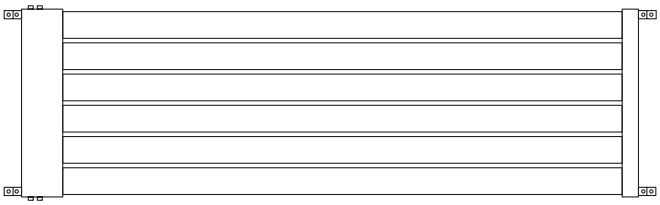
The disadvantage of a basic flat plate collector is that it also radiates heat. So as the fluid within it gets warmer, it can lose up to 90 per cent of that energy to the air. The hotter it gets, the worse the problem, so the efficiency of the system falls off rapidly.
Performance can be improved by using a selective coating, which does not radiate so much heat as an ordinary coating like black paint.
But heat is still lost by convection and conduction, so the system is relatively inefficient compared to the technology used in the Ecotube.

# ECOTUBE

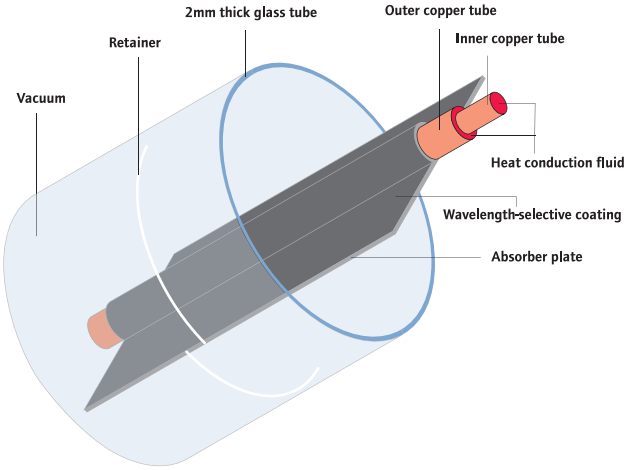
The Ecotube is an advanced form of evacuated tube collector.
The energy absorber is reduced to a strip of aluminium treated with a selective Tinox coating. This absorber strip is bonded to a copper pipe, and fluid is passed through the pipe to collect the heat. The whole assembly is sealed within an evacuated glass tube. The vacuum virtually eliminates heat losses by convection or conduction.
Ecotube performance exceeds that of flat plate systems and competing evacuated tube systems.
It uses:

- high transmittance glass, which is virtually transparent to solar energy
- a super-efficient selective coating on the absorber plate, which maximises the solar energy absorbed and minimises the heat energy lost by radiation
- a uniquely durable glass-to-metal seal at the end of each tube, to maintain the high vacuum that prevents energy losses by convection and conduction
- glass and metal components that expand and contract at the same rate in response to temperature changes, resulting in a reliable system, winter or summer
- The Ecotube benefits from a unique concentric pipe direct flow design which allows the panel to be placed in any orientation.

An Ecotube panel has an array of six of these tubes, illustrated below.



The Ecotube has been designed to the highest performance specifications. It is the best system of its kind produced anywhere in the world, and will give you many years of reliable service.




# how the panels are used

Ecotube panels form part of a simple, yet highly efficient, energy transfer system that can heat water throughout the year. Automatic sensors prevent energy losses at night and during the darkest days of winter, and the use of a special heat transfer fluid eliminates any risk of freezing.

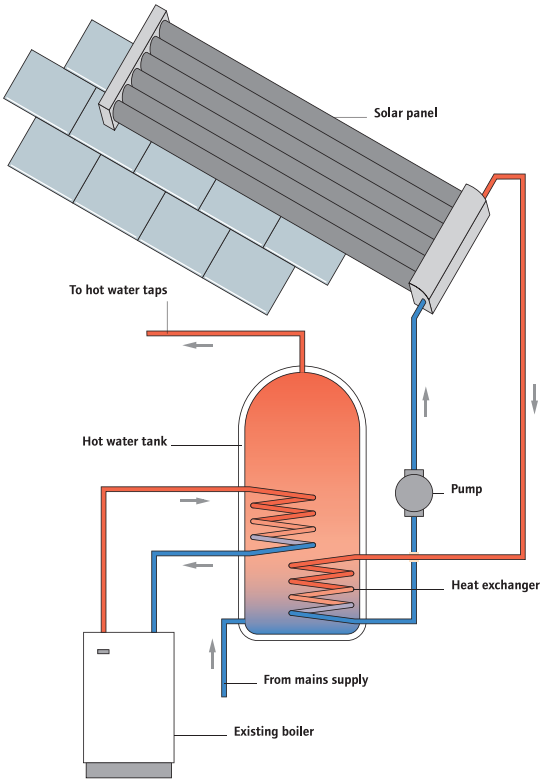
Whether your system is commercial, small or large, the principle is the same. Like a giant kettle with two elements, the hot water tank is heated by two energy sources.

Ecotube panels use an indirect system to heat water. The heat transfer fluid passing through each panel is a solution of water and non-toxic antifreeze, which allows great performance even on clear frosty days in winter.

This fluid absorbs heat from the Ecotube array and is pumped to a heat exchanger (coil) in the hot water tank. The heat then passes into the water, and the cooled fluid is pumped back to the solar panel.

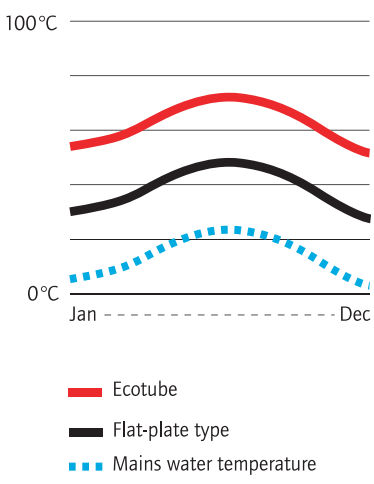
The pump is controlled by an electronic device that detects the temperature difference between the solar panel and the hot water tank. When the temperature in the panel is lower than the temperature in the tank, such as on cloudy days or at night, the system remains on standby. But when the sun raises the temperature in the panel to 4°C above the temperature in the tank, the differential temperature controller switches on the pump.

**SIMPLIFIED INDIRECT PRESSURIZED SOLAR SYSTEM WITH TWIN COIL SOLAR CYLINDER**




**The complete solar panel and heat exchanger system is remarkably efficient.**

- On a sunny day a single Ecotube panel can match the performance of an average domestic immersion heater, winter or summer.
- The conventional heating system (oil, gas or immersion heater) will use far less energy – if any – to raise the water temperature to the level set on the thermostat.
- The less conventional energy that you use, the smaller your energy bills will be – savings that increase as the price of energy rises over the lifetime of the panel.
- Because of their sophisticated vacuum tube design, Ecotube panels are air temperature independent, so they work extremely well on cold, clear, frosty days.
- The indirect system used by the Ecotube eliminates problems caused by the build-up of limescale, and also ensures that the system cannot freeze in winter. Glance at this simple chart opposite, and you'll see just how effectively the Ecotube raises the temperature of the mains water supply throughout the year.




# LARGER PROJECTS

**Housing associations**

Solar water heating is now a very attractive option for housing associations, thanks partly to government grants which can cover half the investment cost. Many housing associations have already made STOKVIS-Ecotube systems their first choice, on the grounds of their versatility, dependability, long life and installation quality. STOKVIS-Ecotube solar panels can now be seen on housing association roofs throughout the UK.

**Schools**

STOKVIS-Ecotube systems have been providing hot water for schools throughout the UK since the mid-1990s, and they are the preferred choice of many London boroughs. Recently many schools and colleges have taken advantage of government grants, installing Ecotube systems to heat school swimming pools and provide hot water for use throughout the school premises, summer and winter. If you would like to know more about our work with schools, visit our website or contact us for specific case studies.

**Businesses**

If you are a running a business, small or large, installing the adaptable STOKVIS-Ecotube system is the perfect way to help you achieve your green energy goal. The Climate Change Levy is likely to increase, and investing in solar energy is clearly a cost effective exercise. Help is provided by government grants or Enhanced Capital Allowance tax relief. From a public relations viewpoint, your investment in renewable energy is something to emphasise, and will raise your profile as a forward thinking organisation.

**Seasonal businesses**

Solar thermal heating is ideal for seasonal businesses such as hotels, bed-and-breakfast and caravan parks, where the demand for constant hot water peaks in the summer. The cost of providing the hot water required by en-suite bathrooms, shower blocks and laundries can be prohibitive, particularly for smaller businesses and those which operate for only a few months each year.

A caravan park in Devon is just one of the many seasonal businesses that is now benefiting from a STOKVIS-Ecotube solar thermal installation. The low-maintenance solar panels, which are discreetly positioned on the roof of a shower block, are supplying hot water for laundry, washing and catering facilities throughout the summer season.

# SYSTEM INSTALLATIONS

Against the background of climate change it is difficult to justify the expense – or sheer wastefulness – of using a conventional heating system for a swimming pool. An array of Ecotube solar panels can heat your pool using energy from the sun.

A swimming pool is an ideal application for solar water heating. Most outdoor pools are used only in the warmer months, when there is enough solar energy to heat the water without any back-up system. You will need several panels, but they can be be roof-mounted, raised on pergolas, or displayed as an architectural feature.

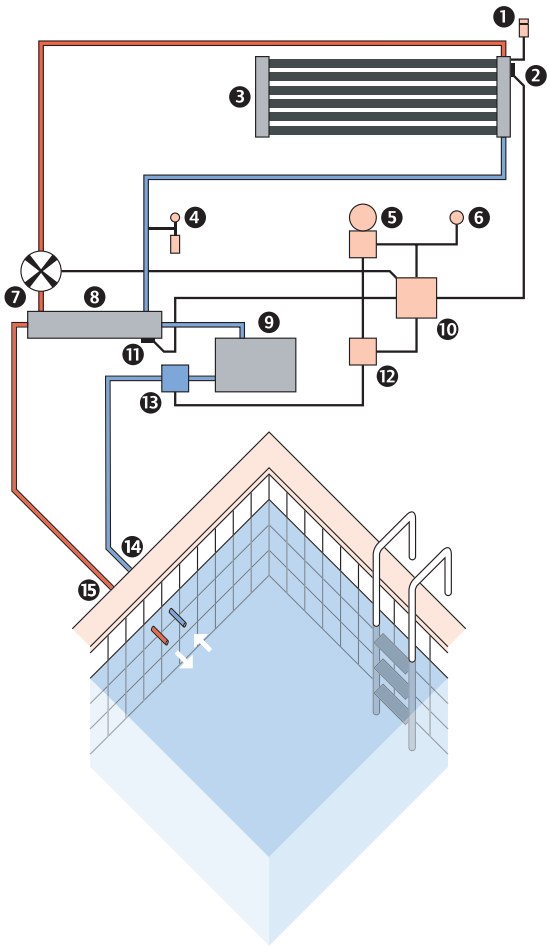
Solar panels can also be used to heat the water of an indoor pool used throughout the year. A typical system will supply virtually all the energy you need between Easter and September, but it will need a supplementary system to reach the required temperature in the winter months.

Since pools and their users have a wide range of requirements, each system is custom designed by STOKVIS to provide you with the optimum level of heating while respecting the aesthetics of the site. STOKVIS can design an integrated system which will heat both the water in the house and the swimming pool.

**Indirect Solar Heating System to Swimming Pool Using Existing Filtration Plant**

1 Automatic air vent
2 High sensor
3 Solar collector
4 Pressure vessel, relief valve and gauge
5 Time clock
6 Power supply
7 Solar circulating pump
8 Heat exchanger
9 Filtration
10 Solar controller
11 Low sensor
12 Relay
13 Filtration pump
14 From pool
15 Return to pool

NB: One solar panel is shown here for diagramatic purposes. More than one panel would be required to heat an average swimming pool.



# Performance Guide

| No of panels | Gross Collector Area (M2) | kWh Produced (pa) | Recommended Storage Vessel Size (L) | Recommended Flow Rate (L/m) | Expansion Vessel Capacity (L) | Pipe Size (mm) | Pump Size (See note below) |
|---|---|---|---|---|---|---|---|
| 1 | 2.461 | 1500 | 200 | 2 | 18 | 15 | 15/50 |
| 2 | 4.922 | 3000 | 400 | 3.5 | 35 | 15 | 15/50 |
| 3 | 7.383 | 4500 | 600 | 5 | 50 | 22 | 15/50 |
| 4 | 9.844 | 6000 | 800 | 7 | 60 | 22 | 15/50 |
| 6 | 14.766 | 9000 | 1200 | 10 | 80 | 22 | 15/50 |
| 8 | 19.688 | 12000 | 1600 | 14 | 120 | 22 | 15/50 |
| 10 | 24.610 | 15000 | 2000 | 17 | 150 | 28 | 25/80 |
| 12 | 29.532 | 18000 | 2500 | 20 | 200 | 28 | 25/80 |
| 20 | 49.220 | 30000 | 4000 | 35 | 500 | 35 | 25/80 |
| 50 | 123.050 | 75000 | 10000 | 85 | 1200 | 54 | See STOKVIS |
| 100 | 246.100 | 150000 | 20000 | 170 | 2000 | 67 | See STOKVIS |

- Maximum no of panels to be connected in series: 8
- Minimum distance between panels connected in series: 150mm
- Weight of collector (dry): 60KG
- Panel dimensions: 2905mm (incl aluminium channel) x 865mm x 150mm (175mm including aluminium channels)
- Collector area in m2
  - Gross area 2.461
  - Aperture area 1.799
  - Net absorber area 1.715
- Capacity of collector: 1.7 litres
- Pressure drop through a single panel is approximately 3Kpa at the normal flow rate of 2 litres per minute
- Pump sizing is a guide only and assumes a pipe run of no more than 20 metres, a rise of no more than 2 floors and a maximum of 10 bends/elbows. A pump station may be more appropriate for smaller installations. Please ring STOKVIS for guidance if unsure
- The kWh figure quoted above assumes a collector inclination of 30 degrees and a south orientation. It assumes a twin coil cylinder with the solar system in pre-heat mode for a significant part of the year
- The peak power available from a panel at G = 1000W/m2 is 1429W

# Recent Installations

**Leicester High Cross Development** - 80 solar panels - water heating - four apartment blocks

**Brill Primary School Bucks** - 6 solar panels- pool summer- kitchen winter.

**Severn Leisure Centre** - 60 solar panels - outdoor swimming pool. 200kw peak.

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