

Low Cost, Net Zero Carbon Energy

Most new homes are reliant on gas and electricity networks for heating and power. Use of Gas boilers minimises initial capital cost. However, investment in on-site generation, using zero carbon technologies enables lower cost, as well as greener energy, over the long term.

This principle, combined with long term ownership and management of all our developments, underpins our investment strategy. Tirion takes a 50-year value-managed view of energy infrastructure, rather than seeking a short term least cost solution.

Current increases in energy costs are accelerating the availability of commercial loans for Site Generated Zero Carbon (SGZC), hitherto unattractive due to lengthy pay back periods.

The designs of our projects in Cardiff and Newport have been modified to create a 'pathway' to zero-carbon performance with planned installation of new technologies as soon as possible.

Our development at Parc Eirin in partnership with Welsh Government, Pobl and Sero Energy, is an exemplar of leading edge SGZC energy technology, delivered through a combination of:

- Efficient fabric design
- PV roof panels
- Ground source heat pumps
- Battery storage, and
- Automated Smart Management Systems.

Lower U values and heat loss is achieved through additional insulation and enhanced back stop detailing to weak points at build junctions.

Solar PV's, Ground-Source Heat Pumps, and Battery storage interact, taking heat from the ground to run home space heating and hot water systems, with minimal top up from the national electricity grid in cold weather.



PV's harvest energy 365 days of the year, for home electricity, hot water storage, and charging the battery, for use at peak times when electricity costs and demand are at their highest. The battery also stores energy from the grid overnight when costs drop to their lowest levels.



The management system optimises export and import from the National Grid. Power imported into a battery overnight has the highest renewable proportion of grid energy as well as least cost. Currently around 70% of energy required to operate homes is SGZC. The proportion of Zero carbon energy is predicted to reach 100% by around 2030, when optimised imported grid energy will be entirely from renewables.



Maintaining comfort through the seasons, without increasing carbon emissions, is addressed by our design process. Cold weather comfort is enabled by highly insulated fabric. Low carbon hot weather comfort, in highly insulated lightweight buildings, presents a greater challenge. Design measures adopted in our 'future' homes will include:

- Open plan design with cross ventilation
- External shading from overhangs, canopies, blinds, shutters or landscaping
- Internal opening windows (allowing closure of shutters for security & ventilation)
- Enhanced warm air extractor fan(s) in the top floor ceiling, usually located in shower rooms.



We have also facilitated trials which demonstrated that when ground source heat pumps are used, effective comfort cooling may be achieved by feeding ground water cooled pipes through a simple fan unit. On hot summer days the temperature of ground water is considerably cooler than air temperature. Additional energy used by the fans is small and is negligible compared to systems that use refrigerants.

