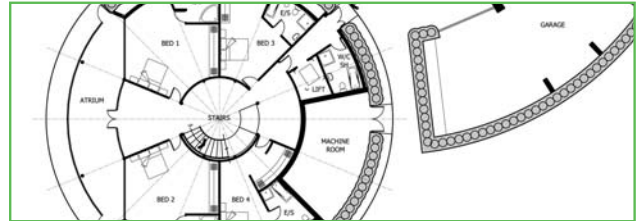


# home - revolution

## Dumble Key Systems



**Self-sufficient structure** - the house captures and stores renewable energy, enabling it to provide and process all its own power, water and waste. The energy captured or generated by the building will firstly be used directly to meet the current demands of the building, secondly to top-up the energy storage devices within the building, and thirdly exported/sold to the National Grid.

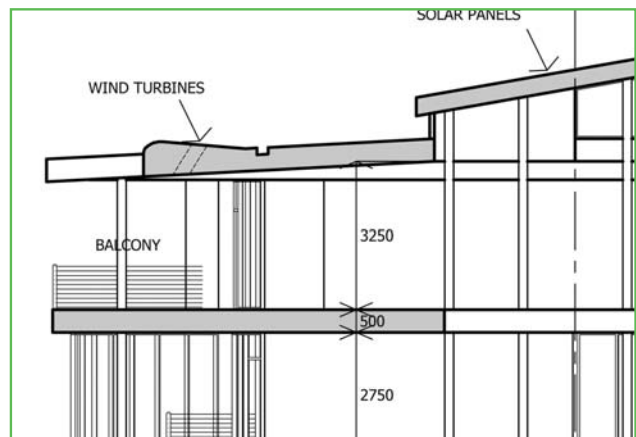
**Revolving structure** - to maximise energy capture, usage and storage, the house revolves and is capable of rotating through 360 degrees, although the Dumble site rotation is confined to around 180 degrees.

**Wind turbines (new design)** - Robin Hamilton is developing a new design for small-scale wind power generation, which is incorporated in the Dumble\*. The turbine system is designed to maximise energy capture at relatively low wind speeds, which occur the majority of the time.

When the wind speed is sufficient, the energy captured is used to generate electricity. When the wind speed is low, the turbines are used to pump and store energy (which is converted into electricity on demand).

The turbines are incorporated into the roof and upper wall structures, being largely hidden within the structure (which is designed to enhance wind energy capture). The alignment of some turbines is adjustable in relation to the alignment of the house, allowing maximum gain from both sun and wind.

\* This system is being developed independently of the Dumble; the concept is for providing local power generation using smaller units rather than remote generation with very large units and wind farms.



**Moving solar photovoltaic panels** - solar panels are mounted on the central raised section of the roof and are adjustable in angle and direction to optimise solar gain. The panels generate electricity to charge a bank of batteries.

**Ground Source heat pumps** - heat pumps provide ground source heating from an underground aquifer, from which all water requirements are also drawn. This low temperature/grade heat is increased by heat pumps and heat exchangers to provide hot water for domestic use, heating for the building and energy storage.

**Multi/Bio fuel stove** - a wood burning/multi fuel stove is featured in the living area. Heat from the stove and flue gases is captured and recycled in the machine room. The stove burns woods, biofuels and compacted waste such as paper and cardboard.

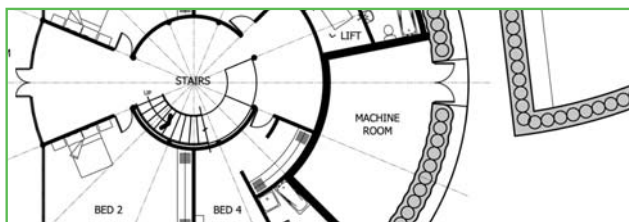


**Enhanced energy efficiency techniques** - some of the latest energy saving and recycling techniques are used and further enhanced, including thick insulation, recycling of grey water, recycling of waste heat from air



# home - revolution

## Dumble Key Systems Continued...



and water (including bath water and similar) and storage and use of rainwater.

**Machine / Plant room** - virtually all processing, control equipment and systems is contained within an insulated 'machine room' at the rear of the house, where all heat exchangers etc. are also be sited.

**Thermal mass** - the construction of the plastic pipe walls (see Key Design and Construction Features) provides a high thermal mass and can be compared to a very large conventional storage heater/radiator. The air ducts passing through each vertical wall column are interlinked, allowing air being blown through them to extract heat stored within the walls during the winter and to be cooled during the summer. This air is distributed by the machine room through the remainder of the building as required to heat or cool. Similarly, the machine room can condition the air to heat or cool the walls. The damping effect of the high thermal mass is estimated to provide a virtually constant interior temperature and the whole building is air tight with a low positive internal pressure.



**Passive solar energy gain** - The large atrium and roof capture a significant amount of passive solar energy. This energy is ducted to the machine room where it is redistributed or stored as required. The atrium is double-glazed on both the outer skin and the inner skin (between atrium and living area) and is 'insulated' from the living space to control heat gain or loss.

**Electrical power generation storage** - electrical power is directly generated by the wind turbines and/or through an inverter powered by a bank of batteries (which are also charged by photo voltaic cells) and then pumped energy storage systems. The stored power is converted into mains voltage electricity as and when required

**Energy storage** - the pumped energy storage systems provide surges of higher electrical power to meet intermittent peak demands (for example if several electrical heating devices are turned on at the same time).

**Sealed and pressurized unit** - the building is sealed to maintain full air management and avoid drafts, and generally operates at a slightly positive internal air pressure. This allows control of heating and cooling, with energy capture from exhausted stale air. Although the interior can be opened up to the exterior, when the external climate is uncomfortably cool, hot or humid,



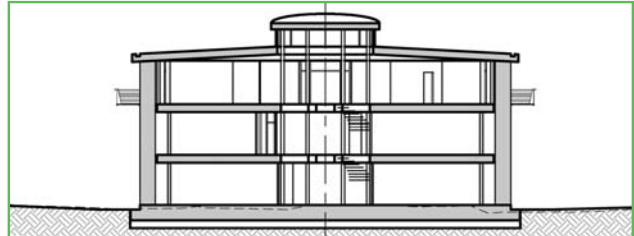


## Dumble Key Systems Continued...

the house can be partially or fully 'closed up' as required to provide maximum energy efficiency.

### **Controlled heating and ventilation production -**

When the house is partly or fully 'closed up', ventilation and heating/cooling is produced and controlled by the machine room. The stored energy and heat can be used as required; together with ongoing heat supplied by the wind turbines and geothermal/heat pump system. These systems are also used for cooling, with for example, the geothermal/heat pump system working in reverse to provide chilling. When the external climate is comfortable, the building has been designed to allow natural passive through airflow from the ground floor of the atrium, through the entire house.

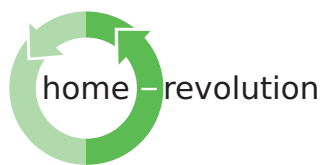


**Sewage treatment** - foul water from toilets is treated on site by a small scale packaged sewage treatment plant.

**Recycling and waste compactor** - the machine room houses a special waste compactor that processes, de-waters and compacts all waste arising from the house (other than sewage) for recycling or use as a fuel.

**Combined heat and power system** - as an energy backup, a combined heat and power system is installed. This is a diesel generator, providing direct electrical power for immediate use and charging the bank of batteries. All surplus heat normally lost through the cooling system and exhaust is recycled back into the heating system of the house or the energy storage systems. (A goal is to ensure that when the rest of the systems are optimised this will become redundant).

**Sprinkler system** - a fire control sprinkler system is installed, using power from the stored energy and water from a storage reservoir



T: 0845 300 9883  
F: 01335 324 008  
E: [info@home-revolution.com](mailto:info@home-revolution.com)  
[www.home-revolution.com](http://www.home-revolution.com)  
Registration No: 6181126  
VAT No: 907 5883 90

**Home Revolution Limited**  
The Grange  
80 Tamworth Road  
Ashby de la Zouch  
Leicestershire  
LE65 2BW