MOBILE FLOATING ARCHITECTURE

Energy Concept & Supply/Disposal Concept

(i) The Mechanical and Electrical design for the Floating Architecture has been progressed on the basis of endeavoring to provide a self sufficient solution, with sustainability in mind.

(ii) The structure needs to have the ability to move and with that in mind a propulsion system has been provided. The available options;

i. Fuel Cells were considered for driving an electric motor, since they offer a carbon efficient method for producing energy. Fuel Cells are, however, relatively in the early stages of development and with this in mind are expensive (£4,000 GBP for 60 Watts). As Fuel Cell Technology progresses it is thought that they will provide a viable option, but at this time are considered impractical.

ii. The surrounding woodlands offers an abundant fuel source should a biomass steam engine be incorporated. A 20 HP steam engine would provide propulsion and can be used to drive a dynamo to charge the batteries; whilst the 6 HP woodchip boiler generates steam to drive the engine and hot water for sanitary fittings and heating. However, there are certain system complexities and excessive costs with this option (the 20 HP steam engine costs £3,500 alone, together with a 6HP woodchip boiler exceeds £7,000); thus further research is required before proving a viable option.

iii. Alternatively, a duel fuel diesel / bio-diesel engine would prove the most viable and cost effective option; a 15-20 HP engine can propel the craft whilst charging the batteries and exhaust heat utilized for hot water and space heating.

(iii) An electric engine has currently been precluded, owing to the limitation of powering the batteries for propulsion.

(iv) Owing to the limited budget a diesel engine/Bio Fuel engine has been chosen, with a tank to provide approximately a 300km range.

(v) In addition as well as providing propulsion to move the structure, the engine also provides hot water for the sanitary fittings and electricity to charge the batteries. The batteries provide power for lights, cooking, sockets etc.

(vi) Photo-voltaic panels, will be combined with a wind turbine, to charge the onboard batteries. A standby generator running from the bio-fuel engine will be provided so as to provide back up to the batteries,

should the structure be off-shore for long periods of time and there be little electricity produced by the Photo-voltaics/wind turbine. One issue from being away from land is how people exercise. A bike has been provided, which also connects to rollers to charge the batteries.

(vii) Should the vessel be in a marina type environment it will have the ability to be connected to the local electricity grid, which we envisage will itself be generated by wind turbines.

(viii) The engine and a solar panel will heat the domestic hot water. As a standby/top up facility an immersion heater is proposed served from the batteries.

(ix) A 3000litre domestic cold-water tank has been selected to provide drinking water for one week.

(x) Waste is collected within a 'holding tank' sized at 500 litres, to last 10 days. The waste is for foul only from the toilet. A traditional style of flushing system for boats will be used, whereby the lake water will be used. As found on boats the amount of water used will be limited, so as to not too quickly fill the holding tank. Waste water from the sinks, showers etc will go to the lake. Environmentally Friendly cleaning products will need to be used. This helps keep the size of the waste holding tank down. Should the structure go into production then the economies of scale may allow for a form of waste treatment/compositing to be incorporated into the scheme.

(xi) Heating and Cooling will be provided via a Heat Pump System. Heat will be rejected to, or absorbed from the lake, via coils embedded in the hull of the structure. Refrigerant will be used to transfer the heat. The refrigerant will also pass through the domestic refrigerator. The heating and cooling around the vessel will be via a fan assisted ducted system.

(xii) A key feature is the usage display panel that gives the occupier readings on their water, waste and fuel levels as well as their energy usage and production figures. This feedback is designed to encourage the occupier to take a more considered view of their environmental impact.

(xiii) A detailed manual including drawings and systems diagrams will be provided with every MFA to give the owner a full understanding of the workings of the vessel along with the most energy efficient ways to use it. In addition a partial manual will be viewable on the boats display panel to provide an explanatory over-view to accompany the usage information.

Energy Diagram