

**The scenario addressed in the project**

Architecture is founded on the belief that it has positively contributed to the solving of problems of any historical period. In our own period two of the main Climate Change tendencies are:

- 1 Risk of human-induced desertification as a generic challenge and in southern California and southern Spain have been studied.
- 2 Increase in sea levels, and the resultant impact on coastal populations affected by shoreline degradation.

This submission proposes an inhabited 'Soft Machine', desirable for life and work, capable of acting, changing and growing as a maximum capacity sustainable community, located on the cusp between the impacts of desertification and sea level rise and capable of helping to ameliorate and even reverse the negative impacts of these two phenomena. This generic concept is taken forward as a specific proposal for a location in southern Spain.

**Two architectural ideas are involved.**

- 1 Efficient land use & high density building.
- 2 A single large building, collaborative in nature – a scientific and artistic synthesis with community ownership.

**Four Strategic Design Criteria in form the concept**

**Locations** Located where Climate Change will have negative impact but where there is intrinsic beauty and potential to mediate the impact through selective land uses. These land uses, will comprise of a Main Building, Gardens, Vertical Farms and 'Drip' Irrigated Fields.

**Programmes** Inside the main building, varying places of 'dwelling' will be integrated with 'soft' and 'hard' machines. The building's activities, forms of inhabitation & productive landscapes, will create a synthesis of uses, tailored to each specific location. They will comprise of Market, Work Areas, Food Production, Residential Dwelling, Plant and Special Activities such as Kindergartens and Health Activities / Treatment.

**Machines** The project, its inhabitants & machines, will reverse desertification and rising sea levels to create positive contributions to natural ecology. Sea water Desalinated moves around the building and its territory for irrigation purposes. Energy sources will be clean with a population committed to the creation of a natural ecology through the synthesis of mission, site, dwelling and machines. 'Hard' and 'Soft' technologies come into play.

**Technologies** Advanced, prefabrication construction of sustainable and recycled materials will be used and the building will re-generate and breath, while absorbing CO<sub>2</sub>. North facing 'Vertical Farms' and the main building will absorb significant amounts of carbon dioxide. The project will export energy and water and import other's emissions.



**Key to Site Plan:** A: The existing coast line; B: The six-metre sea rise coast line; C: The perimeter of the concept site; D: The existing tracks that will be upgraded; E: The Building for 3000 people including 'Desalination Plant', 'Archimedes Screw', 'Green House' and 'Aquaponic Tanks'; F: 'Desalination Plant' and 'Archimedes Screw'; G: Vehicle parking – mini-buses, delivery vans, water tankers and G-Wiz electric cars; H: Pleasure Gardens; J: Sewage filtration tanks; K: Five-Storey Vertical Farms; L: Trickle-irrigated Arable Land and Chicken Farms; M: Perimeter Biodiversity Margin and Solar Concentrators generating 3.5 MW of power; N: Gate Houses; O: Existing Trunk Road.

**Site Plan and Orientation for Solar Energy/ Protection:**

The location in southern Spain is 36° 15' 45" North and 5° 18' 18" West, lying north-east of Gibraltar, on the Mediterranean side of the peninsula. Here the conditions that will emerge from Climate Change include the movement northwards of the Sahara Desert and the gradual inundation of the coastline by rising sea levels. The submission positions the project above a 6 metre sea rise level. Given the relatively sheltered nature of the location, solar energy rather than wind-generated energy is appropriate as the mainstay.

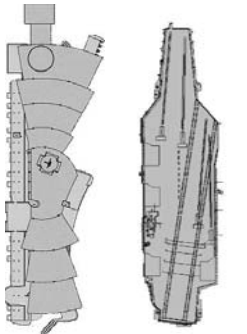
**Generic & Specific Sites**

The competition proposal is conceived as a means by which communities of 3000 people can be strategically located where phenomena interact and act to contribute to their amelioration and possible reversal. Stretching from the equator further north and south each decade, desertification / sea level rise will affect 80% of the world's populations. It will be our suggestion that 10 should be tested internationally. Two sites are considered strategically and one in some detail



**Building Size**

In order to test what 'peace' construction can achieve, the size of the concept building takes its cue from a Nimitz Class Supercarrier such as the USS Ronald Reagan, the guidance dimensions of 333 metres x 70 metres x 74 metres high are interpreted. Each site will adapt from the generic geometrical figure to harness solar impacts and moderate negative impacts. In southern Spain, morning sun is welcomed, while 'midday' impacts are optimised.



# Operation Desert Flower

## The Programme

For a maximum capacity sustainable community, capable of being 'off grid' and also capable of acting as a resource for surrounding urban areas, four themes can be considered primary:

### Dwellings

Multiplicity of spatial types and activities will be housed under the one roof. Population: 3000 people: 1500 adults and 1500 children; Individual Space: 30m<sup>2</sup> per adult; 30m<sup>2</sup> per child in a varied series of configurations of apartments and duplexes catering for the needs of a range of family sizes; Services: Fully integrated into each dwelling area; Kindergartens, primary schools, and other educational facilities for all age groups: spread throughout the building; ready access to a marketplace / agora and dealing rooms, Leisure, pleasure, reflection, sport and past times: spread throughout; Administration: community-led management. Design and Performance Principles: Energy – a zero carbon building; Water – no more than 80 litres of non-recycled water p/p/p/d, 'drip' irrigation to vertical farms and fields;; Materials; the use of long life reinforced concrete, and 'sacrificial' update-able cladding; Waste – 100% re-cycling and composting; Pollution: zero emissions and 'healthy air' agendas;

### Machines

The desalination of 100,000m<sup>3</sup> of sea water p/d, Reverse Osmosis Water Generating Plant. 240m<sup>3</sup> (0.24%) domestic; 10% other functions; 25% for the irrigation 65% for external supply. An advanced 'Archimedes Screw' to lift water to 40 metres above the level of the desalination beds; sewage treatment machines; composting machine; waste re-cycling machines; electric buses & personal vehicles; water tankers for surplus 65,000 m3 of water external areas. solar concentrators

### Productions

Calorie demand: 2,190 Mcal for 3000 people. The production of fruit, vegetables, nuts, organic chickens and organic fish; the farming of small animals within the 'Green House'; a single annual yield for open land of 16 Mcal per Hectare; a five-yield p/a production for the low tech 'Vertical Farms' giving 80 Mcal per Hectare; a thirty-yield p/a for the 'Green House' at the centre of the building giving 480 Mcal per Hectare .

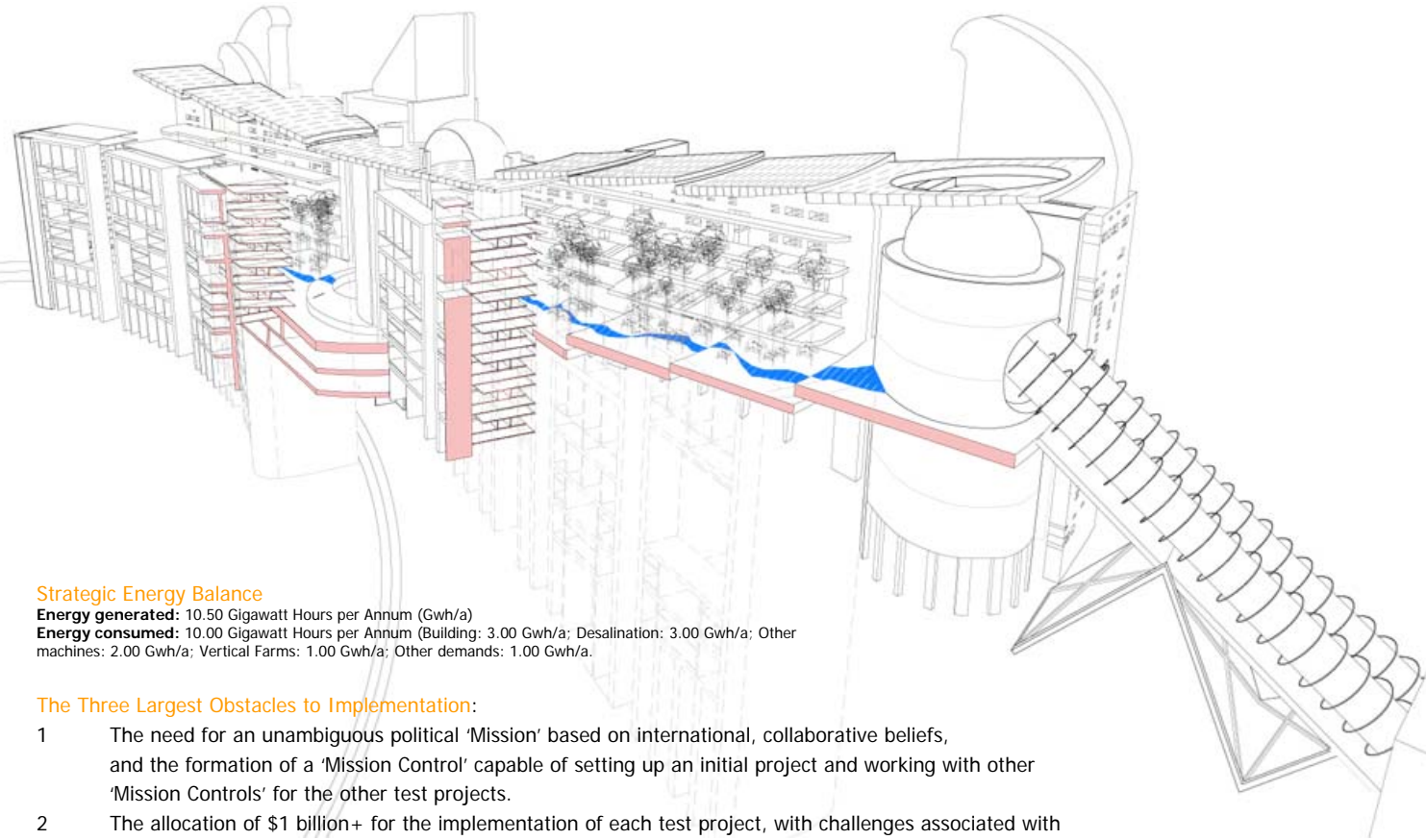
Calorie supply within the building: area of productive soil is 1 Hectare giving 480 Mcal per year. In the 'Green House', the Aquaponic tanks will produce 50,000 kg of fish fillets per year. Small animal farming will add to this calorie production.

### Territories

The overall site is 276 Hectares, the building 2 Hectares, the Community Pleasure Garden Areas 8 Hectares; the 'Vertical Farms' 58 Hectares and the agricultural land, chicken growing areas 208 Hectares. The 140 'Vertical Farms' have 0.5H of arable soil. Producing 5,600 Mcal p/a. The 44 Hectares of land between the 'vertical Farms' will be in shadow for part of the day, but includes vines and fruit trees, At one yield of 10 Mcal, this results in a further 440 Mcal of food. The remaining 208 Hectares has one yield of 16 Mcal p/a resulting in the production of 3,296 Mcal p/a.

### Resulting Food Yields and Distribution

The project can produce at least 480 Mcal within the main building and 9,396 Mcal of food outside per annum. As the population of 3000 will require 2,190 Mcal, this means that 7,206 Mcal can be distributed to adjacent urban areas (77% of production), sufficient at 2000 calories per day to feed a further 10,000 people living in surrounding areas



### Strategic Energy Balance

**Energy generated:** 10.50 Gigawatt Hours per Annum (Gwh/a)  
**Energy consumed:** 10.00 Gigawatt Hours per Annum (Building: 3.00 Gwh/a; Desalination: 3.00 Gwh/a; Other machines: 2.00 Gwh/a; Vertical Farms: 1.00 Gwh/a; Other demands: 1.00 Gwh/a.

### The Three Largest Obstacles to Implementation:

- 1 The need for an unambiguous political 'Mission' based on international, collaborative beliefs, and the formation of a 'Mission Control' capable of setting up an initial project and working with other 'Mission Controls' for the other test projects.
- 2 The allocation of \$1 billion+ for the implementation of each test project, with challenges associated with the creation of the appropriate Business Plan for the whole life cycle economy of each project.
- 3 The formation of communities of 3000 people who will be residents and members of the Missions on a long term basis.

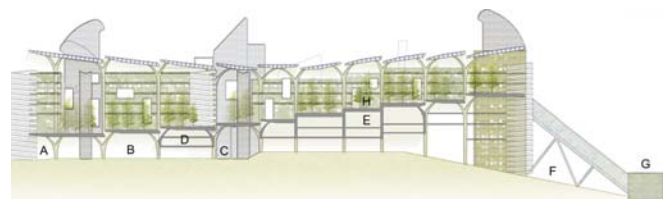
### Procurement

The costs and procurement routes for the delivery of the proposed "maximum capacity sustainable community" for 3000 people have not been considered in great detail as these will be driven as much as anything else by the location of the first 'test' project. What is clear however is that the capital costs will be significant – this is not a 'low tech' proposal in its entirety. However just as 'hard war machines' are deployed to strategic missions and incur costs associated with these roles, 'soft peace machines' can equally be deployed in places of greatest oncoming ecological stress, undertake long term missions in such locations and in so doing they perhaps deserve significant funding in order to test the premise – that the impacts of Climate Change, in terms of desertification and sea level rise, can be ameliorated and even reversed through initiatives such as 'Operation Desert Flower'



Green House Level Plan

- A. Pleasure Gardens
- B. Main Entrance
- C. Desalination Plan
- D. Archimedes Screw lifting desalinated water to +40 metres
- E. Water storage
- F. Agora
- G. Market
- H. Special activities.



Long Section