

How do we satisfy our need for energy, and sustain the environment?

“My name is Jamie. It is 2100 and I am a journalist currently living and working in Masdar, a new city that is home to 50,000 other residents and covers only seven square kilometres of the desert. Designed by Lord Foster and located on the outskirts of Abu Dhabi, Masdar has cost the United Arab Emirates over £15 billion to construct, and it is the example on which all other new cities are being modelled on. 100% of our energy is supplied through renewable means, with roughly 80% of our roof space being used to capture solar energy while many other surfaces of our infrastructure are used photovoltaically. Moreover, our air conditioning is supplied from wind towers, and cars are banned. Further helping Masdar to use half of the energy of a city of a similar size is the proximity of light rail stops (no resident lives further than 200m from one of these) along with the solar desalinization and recycling of water. In addition, new driverless taxi pods have been introduced, and these are said to run on magnetic tracks. The reason I, like the majority of other residents, moved to Masdar is a passion for the meticulously thoughtful engineering that went into the construction of such an innovative city. The city is orientated from North-East to South-West in a deliberate attempt to obtain the optimum light and shade environment, while narrow, 3 metre wide roads that are no longer than 70 metres, and 5 storey build limits act to create a huddled casbah effect. The city is ever changing, and a truly exciting place to live. I can honestly say that I am proud to be a resident of Masdar, and am eager to see what influences the city has on future civilisation.”

“My name is Alex. It is 2150 and I have lived in Masdar for my entire life. Now thriving city on the outskirts of Abu Dhabi, Masdar covers huge area of desert. It has, like pretty much all other cities in my life time, spread rapidly, and now houses ten times the original population of 50,000. Yes, Masdar is a wonderful, awe inspiring sight, but sadly it also failed to achieve and sustain all of its long term goals. A victim of its own success, Masdar, with its new downtown high rise district and numerous highways, has succeeded in converting itself from the possible ‘saviour of the world’ into yet another dirty, polluting conurbation, marking another scar on our maps. The city, once a pioneer of sustainable living, now has a grotesque footprint on our environment, and hopes of creating a ‘sustainable future’ for mankind have been well and truly dashed.”

The sad fact is that eventually, if mankind cannot control its greed, all of its attempts to stem its hunger for energy and to sustain the environment in which it lives will be in vain. Plans for Masdar indicate that it will not fail, but many similar attempts to create ‘eco-cities’ are already beginning to fault. A vast quantity of these are still only in the early planning stages, the most notable of which is Dongtan on Chongming Island near Shanghai. Over 75% of global energy consumption is related to cities and major urban areas, so my personal view is that humankind’s sustainable future will be found in a large number of these small, low emission, environmentally conscious communities. However it is clear that man really struggles to control urban sprawl. The evidence is clear. Many of Britain’s greenbelts are being eaten away by commercial and domestic construction projects. It is due to this lack of containment that the Masdar that Alex experiences is so different to the experience Jamie gained just 50 years earlier. With these larger conurbations, waste disposal is more complicated, more costly and less effective, while the general level of environmental awareness and quality of life falls dramatically. Supporting this view is BioRegional’s ‘BedZED’ project located in Wallington in South London. BedZED comprises of 100 homes, community amenities and provides work space for 100 people. Through this project, BioRegional claim to be attempting to show that eco-construction and developing green lifestyles can be easy, accessible and affordable, and provide a good quality of life, and they have certainly succeeded.

The potential is there. We have designs that are capable of sustaining these relatively small populations, and with the need for nearly 15 new cities in China resulting from the destruction caused by the Three Gorges Dam, there is a great opportunity to construct a good number of ‘eco-cities’, which could trigger further ‘eco-projects.’

It is clear that these 'eco-cities' are not the only solutions that we may employ in the hope of reducing the demand for energy and moving towards a more sustainable future. Advertisement campaigns today are adamant that, to ironically quote a major British polluter, "every little helps", and they are certainly not wrong. Evidently, an effective method of prolonging the life of existing energy stocks is by actually reducing your individual consumption. One may walk or cycle the mile long journey to the milk and morning paper rather than drive to it, and neighbours could run car pools during the school run. These may even have other advantages such as alleviating our world's obesity problem and reducing congestion during rush hour. If the use of a car really is indispensable, why not buy a low fuel consuming or low emission car such as the increasingly popular Toyota Prius? At home, cut those energy bills down to size by installing cavity wall and loft insulation, draft stoppers on doors and double glazed windows. Don't leave so many appliances on stand-by and purchase energy efficient light bulbs as opposed to normal light bulbs. These minor changes in habits will, if enough of us follow suit, have a significant impact on the emissions we omit as a community. Many are cheap, easy and certainly not time consuming, others are less so, but all are sure to pay for themselves in savings in due course, indicating that energy conservation may actually reap personal financial rewards.

Governments have a key role to play in achieving environmental sustainability and reducing its nation's demand for energy. In the short and medium term, a government can promote recycling and investment in renewable sources of energy, offer grants and subsidies to households to improve efficiency and make public transport and utility vehicles efficient and more attractive to potential users. Governments have recently begun to introduce congestion charges in high density urban areas, famously in London. This not only reduces the use of private vehicles in highly congested areas, but promotes the use of public transport (a large component of UK government expenditure.) It also increases government revenue, which may be put towards the research and development of more efficient technologies, towards reducing income inequality, and towards generally improving the quality of life of its citizens. This may be achieved directly through a number of means, perhaps the most obvious being to employing more workers in the public sector (teachers, doctors, nurses and police.)

One of the most promising government initiatives on a larger scale is the EU's emissions trading scheme (ETS). Under this ETS, the world's first multinational 'cap-and-trade system' for greenhouse gasses, firms are allocated a set number of 'polluting quotas' that may be traded, and subsequently carry ever changing values. Large polluters, who would normally exceed their polluting limits and consequently face stiff fines, can buy quotas from less polluting firms who sell in order to gain additional revenue. Clearly, by internalising the marginal and social costs of polluting, this program has environmental, social, political and economic advantages, and so is certainly beneficial.

The third and final 'main player' in the battle to reduce our demand for energy and sustain the environment is the scientific community. It has the potential to achieve both, through new innovations and developments in more efficient technologies. However the scientific world also has one other ability, one which would, without a doubt, be extremely attractive to households, firms and governments alike. The scientific community could, in theory, actually satisfy our want for energy and may even be able to provide our communities with the opportunity to expand their energy consumption, and all while still sustaining the environment. We are seeing major developments with nuclear fusion at the moment, and there is real talk that this may be the paramount provider of energy for future generations. Put simply, nuclear fusion occurs when four hydrogen atoms 'fuse', forming a helium atom. This new atom gives off immense energy, and this process is essentially what makes the sun hot, and allows life to exist on earth. Iter, the International Thermonuclear Experimental Reactor, which has Korean, European, US, Indian, Russian and Japanese ties was given the go ahead in February 2006. It paved the way for Fusion. This Fusion is different from Fission as Fusion does not have any benign bi-products, thus allowing the provision of energy without many of the associated problems. The main advantage that fusion has over other developing forms of energy production is the sheer bulk of its support. I believe that it is this international interest that will allow nuclear fusion to go a long way as a method of energy production. The technology is not quite there yet, but the vast investment is a sure-fire way to ensure the breakthroughs that humanity urgently needs.

Furthermore, scientific advances are allowing us to capture renewable energy forms more comprehensively. The use of wind, geothermal and hydro electric power is becoming increasingly common, with the ability to construct large offshore wind farms just becoming a possibility. In addition, the idea of 'Ocean Thermal Energy Conversion' (OTEC) is starting to flourish. OTEC uses the temperature difference of an oceans warm surface and cold depths to generate electricity; however it can only currently be applied in tropical areas where the temperature difference is in excess of 20 degrees Celsius. The USA opened the world's first 'at-sea-power-plant' off the coast of Hawaii where the warm surface water vaporises ammonia. This vapour is then used to drive a turbine, generating electricity, only to be condensed by the cooler water before the process is repeated. At present however, OTEC is costly and does not produce vast quantities of energy, although it is certainly promising to improve in the future.

The need to satisfy our energy requirements is possibly the greatest challenge that we, as a society, face in our lives. We also need to realise that we only have one real choice: to resolve the issues of sustainable living now, rather than to go on polluting as we have been only to leave future generations to face the consequences of our ways of life. Put simply, it is imperative that we find sustainable methods by which to live. Sustainability in the individual household has already been achieved, and now we face the task of reducing the cost of this, in order for it to spread. In my eyes, this is the best way in which we can achieve what is yet to be achieved, to create entirely sustainable communities while making the infrastructure in which these houses lie sustainable. Sustainability on the grand scale may only be accomplished if we work together, all moving towards a common goal. There is a vast number of developing ideas in the technological and scientific worlds that have the possibility of solving both our environmental and energy problems. I conclude that a combination of these, integrated into the foundations of a community such as Masdar, hold the key to the sustainable future of mankind.