**Lifeloop**

Energy is not just electricity: Lifeloop is a physical display of therelationship betweenpotential and kinetic energy**.** It generates social, political, and economic interaction from the transformation of arid desert to urban oasis. It achieves sustainability via cultural viability.

The concept must be generic to succeed. Abundant, renewable resources, in this case wind, humidity, and gravity, are harnessed using simple machines. These machines, such as a wind pump or water wheel concentrate potential energy to power tasks that product a positive microclimatic effect.

In the case of Lifeloop, the mechanical collection of wind energy propels water vertically, which, in collaboration with gravity creates an endless river. This river meanders at a gentle grade around the site, powering trickle irrigation and misting, creating naturally cool spaces as a result of evaporative cooling and radiant energy transfer. The kinesis of water on this site is a versatile infrastructure, hydrating native greenery that produce shade, cultivating a sea breeze effect by air pressure differential, and introducing recreational opportunities.

Basic landscape elements such as topography, surface water, and shade cover transform the deserted Masdar City into desirable public space, indifferent to the coveted electric grid. Simple machines utilize potential energy to power processes that achieve the same end as highly controlled, complex building envelopes. Additionally, they provide the freedom to use and enjoy the city outdoors. A project as environmentally progressive as Masdar City requires corresponding public space to be practically sustainable.

Potential and kinetic energy:

We often use the term “energy” and “electricity” interchangeably, but it is important to distinguish between the two to realize our dreamed sustainable future. Energy constantly surrounds us, transforming before our very eyes. As we bask in the sun’s rays, we feel warmth in the form of a radiant energy transfer from a ball of burning gas millions of miles away. As we stand mezmerized by the gentle flicker of tree leaves in an old growth forest, we are experiencing a beautiful visualization of wind caused by a difference in air pressure. As we stand in a stream feeling water flow by our legs, we observe the transformation of potential energy to kinetic energy though the flow of water caused by gravity. Energy is present everywhere, but we fail to recognize the power of this ever-transforming source. Because it is not yet refined into electricity, we blind ourselves from endless possibilities.

Lifeloop seeks to visualize the relationship between potential and kinetic energy of a stream, flowing from a place of high elevation to that of a lower elevation. When the water reaches the reservoir at the bottom, a landmark wind pump mechanically displaces the water to a higher elevation using a direct drive system. Converting this wind energy source to electricity to drive an electrical pump would a mistake as the efficiency of the system would be lessened. The result is a dynamic display of potential wind power manifested in a flowing river at high wind events, and a series of relaxing pools when wind speeds are low.

**Naturally cool spaces:**

If we examine our own evolutionary past, one that did not include forced air conditioning systems, we can find simple and effective solutions to dealing with thermal discomfort. Natural responses are instinctual: when we are standing in the sun and get too warm, we naturally move to the shade. Historically, during times of high heat we would gather at the watering hole, a place where our bodies can transfer excess heat into a medium of high mass and lower temperature through conduction. Furthermore, the sun’s radiant energy causes the water to evaporate off our bodies, taking heat with it. Even when we stand by a river, we naturally feel cooler as a result of radiant energy transfer from our bodies to the water source.

Lifeloop creates naturally cool spaces that respond to the evolutionary biology of humans. By harnessing wind as an energy source, the result is productive in two main facets. First, if people are spending time at the watering hole cooling off instead of running their air conditioning systems, there are lowered electricity loads for the city. This would shift the energy distribution of the city from thermal comfort-based systems to that of economic benefit. Second, the gathering of people at this watering hole will further social interaction improving the health of the city and its culture, ensuring Masdar city achieves cultural sustainability.

Desirable public space:

Masdar City is at an inflection point in its development where a large, landmark gathering space is necessary for the health and successful future the city—a place where chance interactions are sparked and political conversations are heard.

Lifeloop creates a gathering space at a large scale manifested in the amphitheater event space intended to house cultural events. The bermed landscape also provides a variety of smaller gathering spaces for human interaction and conversation.

Drive sustainable economic activity:

Realistically, cities must be economically successful for the health of their citizens, culture, and political landscape. There must come a time in the Masdar dream, which we would argue is now, that it begins to shift from external funding sources to a model of economic self-sufficiency and productivity. Touted as the most sustainable city in the world, Masdar City has the appeal to attract brilliant and disruptive minds with the potential to export powerful ideas that could radiate throughout the region and globe.

Lifeloop considers not only the economic viability of its construction, but also the long-term economic impact it has on the city. This landmark site will drive tourism through its housing of large-scale events and gathering space. It will facilitate social interaction that will lead to cross-industry collaboration. It will create a physical place for local vendors to sell their handcrafted goods. Masdar City is at a tipping point and without an oasis, its growth may be stifled.

Environmental Impact Summary:

Human interventions in our landscapes should not merely strive to lessen our impact on the environment around us, but more meaningfully strive to improve the conditions present in the places we touch. Lifeloop does just that. Deep consideration of the up-front energy (and carbon) cost necessary to construct this gathering space lead to a design that, for example, has balanced cut and fill earthwork—eliminating the need for costly transportation of heavy dirt to and from the site. Sloping landscapes are held in place with indigenous plants and concrete walls are implemented only where necessary.

Engagement between the project team and local material manufacturers are paramount to both the economic and energetic success of the project. The steel to build the amphitheater cover will be sourced from Alam Steel, located just 84 km northeast of the site on the south end of Abu Dhabi. Concrete will be mixed and supplied by Al Falah Ready Mix factory, located 2.2 km from the site. Miscellaneous landscape features will take advantage of the newly founded Masdar Material Recycling Centre. Further integration of this material source would be exploited during a phase 2 competition.

By creating an oasis in the desert, we are not only establishing habitat for humans, but also a place for native flora and fauna to thrive, with emphasis placed on habitat for migratory bird populations. Critically, this site demonstrates the viability of passive, off-grid environmental control systems to create habitable public space in an extreme climate. While the climatic context varies across the world, the principles Lifeloop presents can be replicated anywhere on earth. Lifeloop reinforces the idea that humans’ relationship with the greater ecosystem is not separate, but rather intertwined—both must thrive for our shared success.