***The Flower Garden***

**The *VISION* told via storytelling**:

*Some day in the near future…*

The wind is blowing creating a pleasantly warm evening breeze, and the flowers are swaying to the gentle rhythm. The long grass softly tickled their ankles, and the sky is a deep blue.

A couple is taking their routine stroll along the old railway tracks of Spinelli Park, just enjoying each other's company, and admiring all the beautiful flowers surrounding them. The woman stops to smell some of the fragrant blooms, while the man observes wind turbines in the distance, looking curiously like sculptural adaptations of the same flowers that surrounded them.

They don’t mind as it starts to get dark because as the stars come out, so do the turbine-powered lights; softly illuminating their path that leads them home.

It is a beautiful evening in Mannheim.

**Activities**

The proportions of common wind farms today do not usually consider the human scale; effectively resulting in the elimination of human interaction or engagement of the space that surrounds them. *The* *Flower Garden* proposes to merge these two spatial areas by converting wind turbine infrastructure into sculptural elements that enhance human engaged spaces, while adopting various turbine scales to be operated for various uses.

The design premise is to use native flowers of a given region, in this case Mannheim, as the main source of inspiration. In addition to this, the design incorporates various scales of wind turbines that can be utilized for specific uses/owners and can therefore be built/employed in different locations. Because the sizes of given objects have different relationships to the cities and people that inhabit them, the design of the flower-inspired wind turbines change based on their scale. This idea has informed the strategy of the proposal and has led to set of design guidelines. For instance, the larger the turbines are, the larger the visual impact is to the city, and therefore the more sculptural it is designed. The smaller the turbine is, the closer it operates to ground and therefore the more it should limit visual interruption by blending into its surroundings. Below is a list of the 3 categories of proposed wind turbine sizes, and a description of how they are to be used.

* *City Scale* – This is the largest wind turbine size proposed. These would be building sized turbines that can be seen along the skyline. This would be part of a city initiative to increase the amount of clean energy used for the city – whether sold to its users or specified for city owned properties and necessities (such as streetlights or providing the electricity for public buildings). Assuming the largest size would have a 50m blade length, at 13.78km/h (based on average Mannheim wind speeds) with 50% efficiency; a single City Scale Wind Turbine could produce 132kWH.
* *Property Scale* – This is the middle-sized turbine proposed for larger plots of residential lands, allotment gardens, or community spaces. The energy produced by these should be able to sustain 50%-100% of the energy required for the building that it shares property with. For instance, for an allotment garden, the wind turbine should cover the energy use for the shared community sheds that may have some heating in the winter, outlets for power tools or devices, lighting, and perhaps a communal stove top/kitchenette. Assuming a 10m blade length, at 13.78km/h (based on average Mannheim wind speeds) with 50% efficiency; a single Property Scale Wind Turbine could produce 1.32kWH.
* *Garden Scale* – This is a small-scale turbine to be used for individual property owners and personal use. They are designed to look as close to flowers as possible to blend into residence gardens. Because of their size, a handful of turbines will be needed to have a large impact on the home’s energy use. Assuming a 0.5m-2.5m blade length, at 13.78km/h (based on average Mannheim wind speeds) with 50% efficiency; a single Garden Scale Wind Turbine could produce between 0.01 – 0.33kWH. (see diagram on pg. 2 for more calculations).

*Figure 1* attempts to visualize the experience one may have when all these turbine scales are combined and sprinkled around a converted rail track in Spinelli Park. The converted tracks would create a trail that celebrates the wind sculptures that participate in the outdoor community amenity green space, while simultaneously acting as the city’s clean energy-producing infrastructure. Due to the non-conventional ‘Garden Scale’, *Figure 3* visualizes how a private garden in one’s back yard may implement these smaller scale turbines. Lastly, *Figure 4* visualizes a community garden, or allotment (potentially also located in Spinelli Park), to showcase what ‘Property Scale’ turbines may look like. These visualizations utilize similar spatial and environmental qualities to that of Mannheim; however, this proposal can be adapted to other environments and locations.

**Technology**

Instead of inventing new, complex, and untested energy-making solutions, *The Flower Garden* utilizes simple and well-known infrastructural systems. Harnessing the wind for power dates back nearly 4 thousand years, where plans have been found to convert blade rotations into small, powerful, water pumps used for agricultural irrigation. Countries have recently shown a desire for clean, renewable energy, and have dedicated large areas of land to support this new industry. Windfarms have increasingly gained popularity over the past 100 years to be used as the prevailing form of wind-energy infrastructure.

An entire industry is already dedicated to the technology of the systems; utilizing more efficient and stronger materials to allow for larger sizes and more energy output is a constantly evolving and already considered activity. This proposal does not attempt to interfere with this procedure. Instead, the proposal suggests a new way to implement this evolving technology/system into a human-integrated environment.

**UN Sustainable Development Goals (SDG’s)**

*The Flower Garden* aligns directly with two UN SDG’s

* “7: Affordable and Clean Energy”. This goal is clearly considered in the proposal through the expansion of clean energy usage. Investing in wind energy production will encourage future energy stability and affordability while helping the environment. The target goals for this SDG, which this proposal would play a part in, includes a 2030 timeline that mandates: universal access, reliability, and an increasing share of renewable energies.
* “11: Sustainable Cities and Communities”. This goal includes the investment of usable, accessible, and enjoyable green public spaces. This is increasingly important since urban living has become, and is projected to stay, the dominant living condition of humanity. Some of the target goals for this SDG, which this proposal would play a part in, includes a 2030 timeline that mandates: reduced environmental impact of cities, paying special attention to air quality, and implementing policies that mitigate climate change while also planning towards resource efficiency.

*The Flower Garden* doesn’t just look to simply ‘*check the box’* of these two Sustainable Development Goals, but instead attempts to carefully merge them to create an elevated public space to be enjoyed by city inhabitants, done by utilizing wind-energy in a sculptural/scalable human-friendly way.

**Environmental Impact**

Because *The Flower Garden* uses an existing technology, rather than inventing a new and unknown product, existing environmental impacts are already known. This is considered a positive due to the reduction of ‘unknown’ disasters that are more probable in new technologies. Any known issues can be accounted or designed for. For instance, birds can be killed by flying into large turbines. Altering a turbine colour to contrast that of the sky, or providing more lights along the blades, can reduce this fault.

The scalability and modularity of the *Flower Garden* creates minimal disruption on existing landscapes. A land assessment to decide the location of the ‘*City Scale’* turbines should be done due to the deep foundations usually required for structural support. This land assessment should avoid any existing infrastructure already in the ground, which would theoretically require re-location of it to support this new piece of infrastructure. Also, any land that requires large removal of existing natural habitats should be avoided. The goal is to locate these new infrastructural scaled elements in a nondestructive manner. Because of the proposed scale of ‘*Property’* and ‘*Garden’* turbines, little environmental disruption is necessary for foundational requirements.

Initial construction often utilizes fossil fuels and less than ideal manufacturing processes. There are embodied carbon emissions to create new wind turbines, and this is likely the largest considered environmental impact of the design. Which materials are used, where they come from, and how they are assembled will greatly change this all-encompassing calculation. Because of this, it can only be assumed that as supply chains adapt to greener methods of energy, as do transportation and manufacturing, the embodied energy to create a wind turbine will decrease. The Mannheim Flower Garden intends to be part of this better future.