NAME PROJECT: **SHOVADAN**

Our design for Mannheim project is inspired by several coherent subjects and related to the social, cultural, environmental, and climatic conditions of the region. The design is an attempt to make the most of space while minimizing the probable damage to the environment and use the project condition to gain the maximum benefit. It seeks to recognize the prestige and dignity of Germany as an industrial country and the global pioneer in applying renewable energy.

The main question was how one could think up a different, multi-purpose, and exciting idea and combine the historical, industrial, climatic, and economic conditions, the multiple goals of the United Nations, zero carbon strategy, and sustainable architecture into a single concept and giant artwork on a global scale while respecting nature.

I used the natural elements like the trees, their stems, the shape of flowers especially water lily, the spherical form of the Earth, and circular shape of the orbits to show that the fates of humans are intertwined wherever they live, and they are all responsible for climate change. The traditional architecture of Germany, architectural forms, and pitched roof were also parts of the design.

Efforts were made to design the project using light and symbolic structures with components inspired by nature.

The design consists of two parts: underground and light structures located on the ground. Meanwhile, the whole electricity needed to power the park is supplied by the designed components inside the park, and the rest of it is stored in safe equipment in the underground for urban consumption. Renewable energy will be provided by three methods in this project:

Method one: using solar panels

Method two: using concentrator photovoltaics

Method three: generating energy by walking on energy-harvesting tiles

**1. Structure and light structure of the park surface according to site plan:**

In this part, which covers almost the entire site, the whole structure with its stem-like columns (natural elements such as numerous tree stems and their leaves) is placed on a heightened ground level to provide more area and apace for greenhouses, tree-planting, green architecture (i.e. sustainable architecture), and human-centered civil space.

The whole structure and columns are designed in such a way that the wind flow enters the city freely, and the air conditioning is optimal. In this project, the whole traffic is carried out on circular pedestrian overcrossings and routes marked on the floor; therefore, all the roofs of the bridges and structures are covered with solar panels in the form of gable roofs whose forms are inspired by the aesthetic elements found in nature. Concentrated solar panels are also used to generate electricity. Thus, we can make the most of renewable solar energy in this design. I, also, made my best to use components made from recycled and/or recyclable materials such as recycled and/or recyclable plastic to attain the least possible carbon emission. Vast spaces are devoted to floriculture and exhibitions, and general spaces are designed in the park to introduce the project as a unique global project (large-scale artwork) and the symbol of Zero Carbon Park. The feasibility of the project was one of my deepest concerns. I expect it to move from a simple concept to a successful and feasible project in different scales. The park is equipped with special charging stations for small-scale electronic vehicles so that clean and non-fossil energy can be used throughout the area in various festivals and events.

**2. Underground part of the park:**

Covering a small area of the park, the underground is devoted to museum and HVAC structures. It also provides space for underground turbines which generate electricity through centralized solar panels installed at the highest level of the park and store energy. I used an ancient method employed in the Plateaus of Asia to ventilate the underground and the park in a smart manner without the need for electricity. The said method is called “*Shovadan*”. You will learn about it in the next section.

***Shovadan***

It is a good idea to build part of the space or building inside the ground to establish a proper interaction with the environment. Historic buildings attained sustainable living conditions thanks to the so-called “*Shabestan*” and “*Shovadan*” which were built inside the earth on two different levels. At a time when electricity and cooling giants were not available, the innovative design of *Shovadan* made way for the proper interaction and sustainable living conditions in hot and humid and hot and dry climates.

*Shovadan*'s approach requires that the whole or part of the building be covered in the ground in different climates (especially the heatwave that has become a crisis in Europe in the past years). The soil provides insulation against extreme heat or cold so that the air is cooled in summertime deep in the ground in a depth exceeding nine meters, and the need for mechanical and electrical cooling devices is minimized.

In this project, I sought to use both modern and traditional methods to use renewable energy. Therefore, the traditional *Shovadan* method is used in the underground right beneath the light structures to cool the whole park space and circulate cool air in the north-eastern corridor and facades. In this method, air blowing occurs through the holes that are connected from the depth of the ground to the surface of the ground without need for electricity

**Environmental sustainability**

Environmental sustainability is defined as the responsibility to preserve and even improve the earth for future generations. It is the responsible interaction with the environment to avoid depletion of natural resources or degradation of the quality of the environment. Mannheim project is an attempt to maintain the environmental conditions of the region by preserving or even improving the vegetation and minimize human intervention and contribute to animal survival by placing the structure on a heightened ground level.

It is a good idea to pay close attention to termite mounds when considering the underground architecture. Termites are extraordinary experimental architects of nature. The little creatures have lived on earth for fifty million years and gained invaluable experience in ventilation and optimal use of resources. Termites have developed a stable ventilation system by using thermal siphons and thermal air tunnels, building cellars in the heart of their mound, and using natural ventilation and chimneys in the colony.

Regarding the materials, efforts were made to use materials that cause the least damage according to traditional architects and history of architecture. I tried to make the most of recycled and/or recyclable plastic to realize this objective.

ANNUAL CAPACITY: 8,384 MWh…………… This is an approximate calculation