**Trees and Seesaws**

Considering the context of the German Federal Garden Show-BUGA to be held in 2023, we propose an eco-friendly open structure that can accommodate visitors and provide public activities along with recreation.

The roof with 1450 m2 of colored PV panels provides comfortable semi-climatic venue and serves as a primary energy harvester. 23 tree-like vertical structures that support the roof, and the relocated existing trees are in harmony.

23 seesaws installed at the bottom of the structure are also eco-friendly energy generator. The kinetic energy generated by BUGA 23 visitors using the seesaws is converted into electricity and stored in a battery buried underground. It has educational value in that it converts the joy felt through active play into energy by inducing the participation of users.

**Support of Public Activities and Social Co-benefits**

The proposed design aims to create an open public space with components that benefits both nature and people.

It provides the opportunity for visitors to enjoy the surrounding landscape of BUGA 23 in any direction while having minimal impact on the green corridor to benefit the city.

By adjusting the number of modules in various configurations according to need, it is easy to reduce and expand the size, so it can accommodate various activities from two people to more.

Through the juxtaposition of green PV panels and real plants, man-made structures and natural elements harmonize to provide users with a new spatial experience.

Furthermore, this project directly reminds people that the ultimate goal of sustainable energy provided by new technologies is symbiosis with nature.

**Support of UN sustainable development goals**

This project can support following UN sustainable development goals:

Goal 3: Good Health and Well-being

* Riding on an energy generating seesaw can benefits healthy life due to its physical activity.

Goal 7: Affordable and Clean Energy

* The proposed structure produces renewable energy with solar power and manpower without carbon emission.

[Goal 11: Sustainable Cities and Communities](http://www.un.org/development/desa/disabilities/envision2030-goal11.html)

* The design composition can be adjusted according to the context, and people can gather and play various activities while generating clean energy.

[Goal 15: Life on Land](http://www.un.org/development/desa/disabilities/envision2030-goal15.html)

* The design of this project is completed through juxtaposition of actual plants.

**Technologies Used in the Project**

The project generates energy with two technologies.

The first is colored photovoltaic glass. The photovoltaic glass in shades of green with 40% transparency will be installed on roof to generate powers. It blocks direct sunlight and diffuses green light to provide a pleasant environment with real trees.

The second technology is kinetic energy generating seesaw. Electrical energy is generated by human power as a play and social interaction between people. This technology is specifically suitable for this site due to BUGA 23, an event that can attract around 2.1 million visitors.

**MWh generated per year**

*Colored Photovoltaic Glass*

Solar panel power output per day (6 hours): 0.18kW/m2 x 6 = 1.08kWh/day

Solar panel area: 1450 m2

Energy output per day: 1566 kWh/day

MWh generated per year: 1566 kWh/day x 365 = 571.5 MWh

*Kinetic Energy Generating Seesaw*

Power output per day (8 hours): 0.5kW x 8 = 4kWh/day

Number of seesaws: 23

Energy output per day: 92 kWh / day

MWh generated per year: 92 kWh/day x 365 = 33.5 MWh

**Total MWh generated per year: 605 MWh**

**Environmental Impact Summary**

* Preserve existing trees that may be cut due to events by transplanting them as part of the design element.
* The tree-like structure composed of thin and light components allows the wind to pass freely without disturbing the green corridor.
* Colored PV panels block direct sunlight and provide comfortable outdoor space for users.
* Due to its scale and shape, the proposed structure harmonizes with the surrounding nature.
* By supporting the entire structure with 23 pile foundations, the impact on the site is minimized and can be easily removed during demolition.
* After use, the whole structures can be dismantled and used in a private garden or recycled for other purposes because all components are dry-assembled on site.

**Technology and Reference**

*Colored Photovoltaic Glass*

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