MICROBIAL FUEL CELLS

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- Soil-based microbial fuel cells (s-MFC) can generate electrical energy exploiting the redox potential of several different types of bacteria placed in the soil. They are really important for the following reasons:

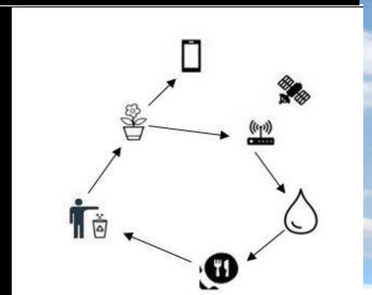
  3) Can generate free and clean electrical energy

  4) Have an educational purpose, mainly to raise consciousness on the importance of soil and environmental services as well as the mechanisms of nature to generate electrical energy. **All** of this would be explained to visitors with boards.

- The substrate of the s-MFC would be the organic waste (ex. Fruit, food or vegetables wastes) collected from the apartments near the park and from the garbage cans inside; this would make people think about the importance of recycling, expressing the fact that even the smellier waste can be a resource.

- The MFC would provide enough energy to power wi-fi routers that can give free internet access to visitors (encouraging people to gather and work in the park); also, the remote connection can drive the smart irrigation system, further reducing the water consumption.

- We can summarize the entire process with the sentence: "Using organic waste to power your phone and to feed the crops".



SOCIAL FUNCTIONS

- The whole project would bring several benefits to the Mannheim community: people and visitors would walk under the structure surrounded by flowers and crops; there would be working positions with internet connection provided by the MFC, park benches and chessboards. Leisure activities, sports and games would be encouraged; people would gather in the park to study, work, go running or simply to have a rest.

- The edible crops placed under and outside the structures would be cultivated by the citizens as shared gardens/farms. This would provide food and education about the respect of the soil similarly to the german Schrebergarten.

HISTORY INSIDE MODERNITY

- The shape of the structure tries to connect the Mannheim history with the challenge of giving modern touch to the park. In particular, on the main and secondary structures the LSC and thin film PV cells disposition recalls the block-scheme of the Mannheim city center, meanwhile the curved-shape of the upper surface provides a post-modern identity to the artwork.

- Some historical parts of the site would be preserved and visitors encouraged to explore them, they're the U-Halle building and the railroad. Proper boards with historical information of the past and history of the site would be provided as well.

LED LIGHT AT NIGHT

- Part of the harvested energy is stored and used to power low-energy consuming LED lights that would color with green light all the structure wings. In a philosophical way, this is like an act to return the green light-radiation band to the nature, thus closing the nature-aesthetic and energy bond.

LUMINESCENT SOLAR CONCENTRATORS (LSC)

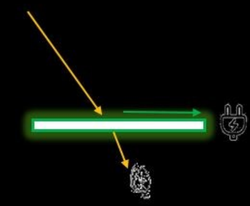
- The LSC surface material separates only the green light (495-570 nm) from the EM spectrum and directs it to the border of the cell where the photovoltaics system converts it into electrical energy. This reflective propriety gives a touch of luminescence to the cell, giving a brilliant aesthetic effect.
- The other wavelengths can go through the cell and activate photosynthesis in all the plants and crops placed under the structure. Green light doesn't significantly contribute to the photosynthesis, so it can be freely converted into electrical energy
- The NIR-TLSC can also collect the radiation in the near infrared bandwidth (750-1300 nm) and transform it into electricity, the main advantage is that a significant percentage of NIR radiation is thermal and comes from the ground, especially at night. This brings two advantages:

  1)

  The LSC cells would work with the absence of sunlight, thus reducing the intermittence problem of RES by powering the grid also at night or in cloudy days, independently from the presence of the sun.

  2)

  The cells don't need to be oriented towards the sun to perform the most; in this artwork the cell structure is vertically placed



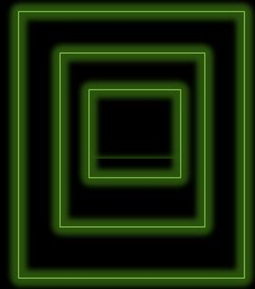
THIN FILM SILICA PV

- The grass in the back of the thin film silica PV has a double affect:

  3) Aesthetic: makes a green and nature-based connection between the ground and the sky

  4) Physical: the grass can reduce the air temperature through evotranspiration, thus increasing the PV cell efficiency

- Higher efficiency than the LSC, they provide the energy load to the electrical grid during midday
- Placed on the upper part of the structure where the concave curvature is higher in order to increase the energy harvest and reduce the soil consumption.



VERTICALLY-ORIENTED T-SLC

- Vertically-oriented TLSC cells would bring several advantages:

  5) Can collect solar radiation from both sides and from multiple directions
  6) Would greatly reduce soil consumption

  7) Perform better in the morning and evening hours (7.00-10.00 and 18.00-21.00), so they reduce the traditional effect of an abundance of energy in the midday and a reduction in the morning and afternoon, increasing the flexibility of the energy system towards the electrical grid.

  8) Can be easily cleaned and get hardly shaded by dirt