The geodetic solar village – synopsis for a pilot project

Description:

The geodetic solar village is a vision for a community center with autonomous energy supply. The community aspects of education, knowledge transfer, culture, farming, nutrition, health, social communication and ecologic economy can be placed in an arrangement of geodetic domes (see picture page 3). The domes might as well be used as single components in various urbanistic or rural developmental requirements.

By organic photo-voltaic color cells and a combination of other innovative technologies as

- wind- and water powered electricity
- heat pumps, capillary technology
- conventional solar technology

the domes will be supplied autonomously, according to the most convenient local resources.

The domes offer a solution against the centralization and waste of property caused by extensive solar and wind parks. We do not consider these as ecologically sufficient and sustainable long term future solutions. In particular, energy transport over long distances by means of cables can be avoided in this way.

On top the pilot project will include the empowerment of the region by employment incentives, ecotourism, educational and social programs and cooperation as well as social and cultural offers for the local community members similar to the Eden Project in Cornwall[1]. In regions lacking in infrastructure this would provide perspectives on self-help and sustainable cooperative economy would enhance stabilization[2]. Damage and regulatory needs already caused by climate change and interventions through pesticide application and agricultural genetics could be reduced and remedied by the domes.

Reasoning:

The combination of a geodetic dome with organic dye-sensitized photo-voltaic cells as foil offers a variety of applications, which are sensible for following reasons:

- Due to its construction method, the Geodetic Dome offers a very cost-effective possibility to produce the largest possible interior space with minimum material expenditure[3]. The dye solar cells as foil in combination with transparent module components open up the possibility of using solar radiation both directly and indirectly as a source of energy[4].
- As greenhouses they can be used for cultivation as well as for species protection. The local cultivation of non-native fruits/vegetables saves imports, transport and cooling costs, prevents overexploitation and monocultures in the classic cultivation countries and is therefore ecologically and economically sustainable. A protection against genetic impurities can also be realized here. Protected and endangered species can find a habitat in specially created biotopes[5].
- Community facilities such as meeting and cultural facilities, bathhouses, research and knowledge transfer, self-help workshops, health centers and alternative gastronomy can be completely supplied with regenerative energies in the sense of sustainability in combination with other innovative technologies and constructed in the locally required sizes and equipment.
- The majority of the required techniques and components are already available and only need to be combined in the model project in a sensible way depending on the function. The main work therefore lies in researching the effectiveness to be achieved with regard to energy consumption and the supply of the local population.

Due to the current developments in solar technology, in particular the dye-sensitized solar cells as films, the lightweight construction of geodesic domes made of modules opens up far-reaching application possibilities. It should be noted that there is a large unexplored potential of efficiency and effectiveness (angle diversity for solar radiation), which applies especially to the dye cell in the non-optimal angle ranges and moderate solar radiation, as well as combinations with other innovative technologies such as 3D printing, heat pumps, sensor and capillary technology.

[1] http://www.edenproject.com
[2] https://en.wikipedia.org/wiki/Commons, https://en.wikipedia.org/wiki/Economy_for_the_Common_Good
[3] http://www.geo-dome.co.uk
[4] http://www.colorsol.de
[5] http://www.edenproject.com

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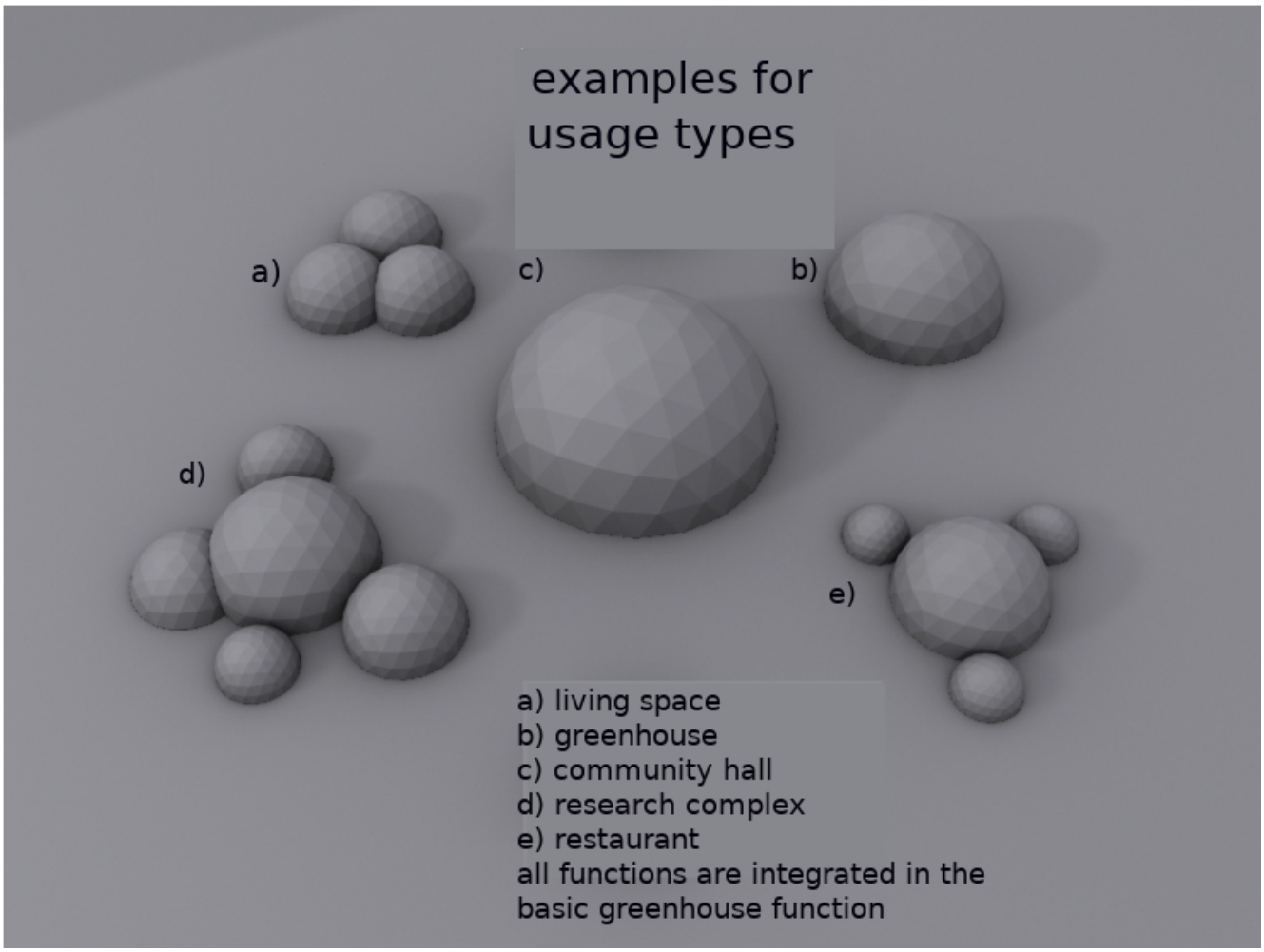
Model project:

For an exact energy calculation of the application of the dye-sensitized solar cell as a building foil, a model project is to be aimed at with various partners in order to investigate the feasibility, effectiveness and possible combinations with other technologies.

A pilot project in a rural region with adequate involvement of the community/county and the local initiatives and population is an appropriate option.

To create a model project and a research project, the following work steps are aimed at first:

- - Research on the following questions, this is only a rough selection:
- - Energy efficiency: Up to which sizes and in which functions can a solar dome be operated energy self-sufficient?
- - Efficiency of use: How many people in a municipality can be supplied with tropical fruits as required, how many local jobs can be created?
- - Overall balance: How much resilience and public welfare can be created/strengthened with the implementation of the solar domes, how does the CO2 balance and the ecological footprint of the community improve?
- - Contacting the Eden Project and other partners for advice and, if necessary, cooperation.
- - Establishment of a charitable corporation with corresponding objectives
- - Formation of teams for individual specialist areas with corresponding competencies:
- - Regional integration at political level
- - Science/Research Colour solar cells, biotopes, species protection
- - Eco-technology and water management
- - Organic agriculture and horticulture
- - Interfaces to digital technology, 3-pressure, sensor and closed-loop control technology
- - Social and cultural projects, employment promotion, education
- - sustainable tourism development based on knowledge transfer
- - public relations
- - Networking with corresponding projects and institutions, universities, etc.
- - Communication with interested communities and regions
- - Development of a conclusive overall concept taking into account the local situation



3D graphic by Martin Hoenicke 2010

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