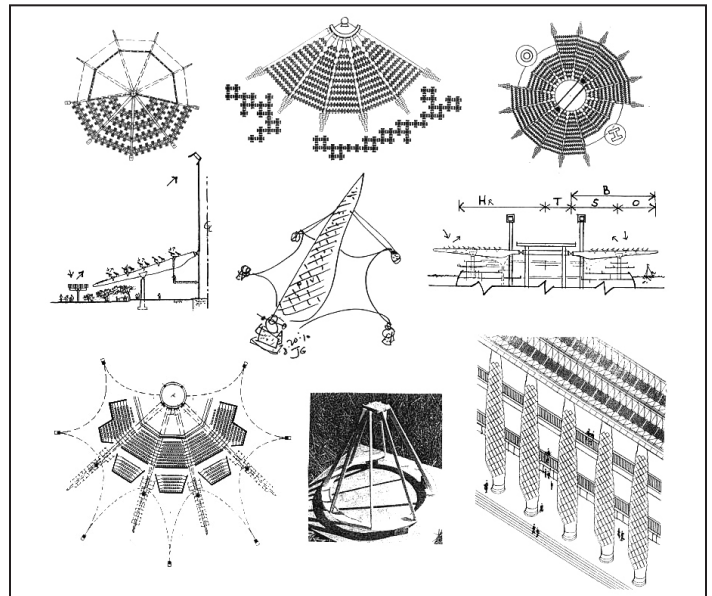


Fixed Troughs, Heliostats, Bowls and Reused Wind Blades

Earth has been host to life forms for over 4 billion years, and there is enough hydrogen in the Earth's sun for another 5 billion sunlit years. We are now in the few hundred years speck of the fossil fuel period on this geologic time line. Human population numbers are rising and consumption of finite fossil fuels are increasing at faster rates, as understanding improves about the causes of climate change. Post fossil fuel design and planning studies are a way to develop knowledge about post fossil fuel sustainability. The theory is if you look at where you are going, perhaps getting there may be accomplished more economically and with fewer dislocations. It is difficult going because there is a momentum of conventional development, and the rising global rate of greenhouse gas emissions (GHG) is crucial. The U.S. Supreme Court decided GHG emissions are a pollutant subject to regulation. For those now consuming low cost natural gas the post fossil fuel era may appear deceptively far off into the future. For those without access to cheap fossil fuels the post fossil fuel era is now. We are in a significant transition period, caught in the trappings of a fossil fuel infrastructure, while being attracted to the gleamings of a new solar era.

Architecture, urban design, and planning patterns based on the use of solar-renewable energy instead of fossil fuels could be significantly different. Large arrays of active solar collectors and large solar energy storages are substantial design elements, which can be form generating influences for aesthetic designs. Energy efficiency and passive solar design are complementary requirements, and more efficiency measures are needed, in order for solar energy to fully meet energy demands. Furthermore, architecture and urban designs without inclusion of active solar energy technologies, delay a required wider reformation, and associated learning-curve.

Efficiency advances alone may be misleading if structural changes to buildings and site planning patterns for active solar renewable energy are ignored. The opportunity for incremental development over a long period of time toward post fossil fuel sustainability is blocked by continued development of fossil fuel dependent forms. Buildings and cities have only so much area for solar collectors and renewable energy facilities. Active solar technologies need to be understood and considered at the beginning of programming and conceptual design stages. Durable buildings, landscaping, and planning designs implemented today can be in place for over 100 years,



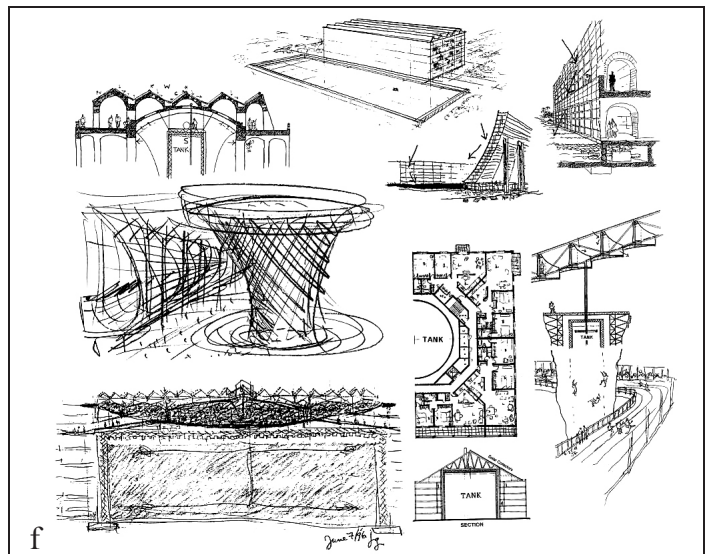
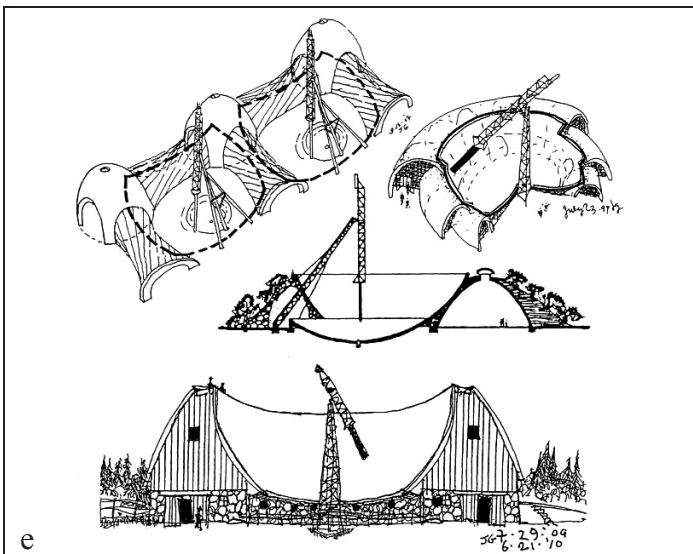
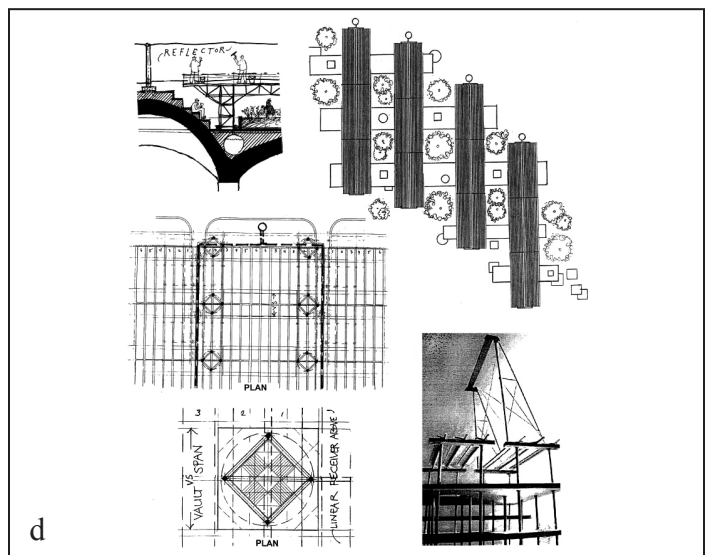
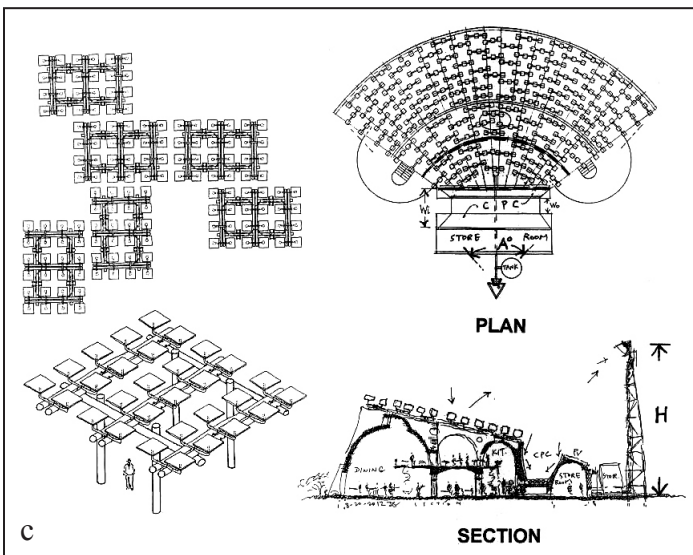
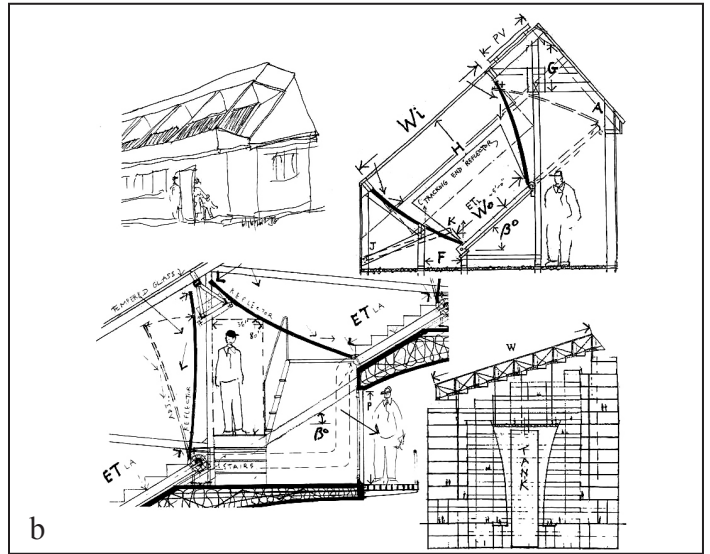
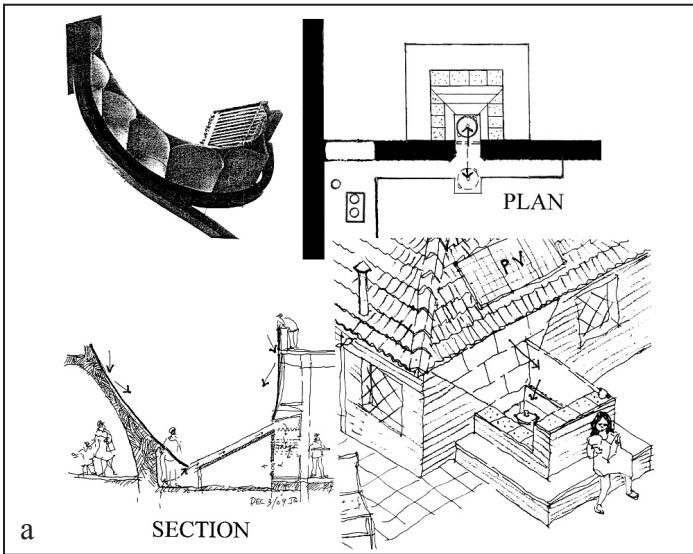
Reuse of Wind Blades as Building Structure

when active solar technology options are likely to be of much more interest because of increased cost of diminishing fossil fuels and impacts of climate change. Design and planning based on renewable energy can be a long term stabilizing factor in the transition to post fossil fuel economies. Urban developments have evolved to tightly packed land use, with little or no consideration for the placement of active solar technologies. Where could large arrays of solar collectors and large solar energy storage facilities fit into existing cities and towns?

Current “Solar Concentrating and Storage Architectonic Studies” include: Exterior fixed nonimaging troughs; Interior fixed nonimaging troughs (BIETR); Two-axis tracking small heliostats with central receiver; One-axis tracking long-span linear Fresnel heliostat reflectors with linear receivers; Spherical segment imaging fixed reflector bowl with two-axis tracking linear receiver; and Storage tanks building integrated. Another research project has started the study of reused wind blades as building structures (beams and columns).

The schematic architectonic images presented are a partial response to the very large environmental challenges; and they are suggestions for architectural and urban design research.

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Solar Concentrating and Storage Architectonics

Joel H. Goodman

a) Exterior fixed nonimaging troughs; **b)** Interior fixed nonimaging troughs (BIETR); **c)** Two-axis tracking small heliostats with central receiver; **d)** One-axis tracking long-span linear Fresnel heliostat reflectors with linear receivers; **e)** Spherical segment imaging fixed reflector bowl with two-axis tracking linear receiver; **f)** Building integrated storage tanks.