

The Asthana Energy Expo 2017 has presented a challenge for Pakistan to present an exciting pavilion. The thematic description developed for “Energy for the Poor” to show the intent and resolve of Pakistan in conserving energy, propagating sustainable methodologies and renewable energy sources by showcasing its heritage and crafts. The futuristic pavilion using bamboo and other sustainable materials has been designed by MESA Architects.

EXPO 2017, ASTANA

Trading Development Authority of Pakistan  
In collaboration with Heritage Foundation of Pakistan

THEME: ENERGY FOR ALL

SUB-THEMES:

- ENERGY AGAINST POVERTY
- ACCESS TO SUSTAINABLE ENERGY TOWARDS DEVELOPMENT

## NURTURING THE PAST FOR A SUSTAINABLE FUTURE

### INTRODUCTION

The Pavilion has been designed to express Pakistan's profound concern and present its endeavours in reaching out to the marginalized sections with pioneering, low cost solutions for reduction in quantum of energy usage, along with use of renewable energy sources for the well being and development of low income populace.

The pavilion's architectural design itself expresses the emphasis on making all structures conform to low/ zero carbon footprint to curtail greenhouse gas emissions and in particular the discharge of carbon dioxide. Since a major part of world energy is known to be used for building construction, reduction in the use of industrialized materials in buildings, including in large scale shelter programs for climate change migrants, leads to a reduction in harmful gases released in to the environment.

Thus, the exciting pavilion design uses renewable bamboo and ever-present earth/clay with minimal waste stream, along with low energy lime, in an innovative manner, offering them as materials and forms that are as suitable for contemporary construction as they are environmentally beneficial and ecologically advantageous.

The pavilion is designed to encompass and reconnoiter approaches for those at the bottom of the pyramid to achieve a better quality of life. As is known, most of the energy used by the underprivileged, particularly women, is for cooking and heating, the use of widely available inappropriate biomass adding to environmental degradation and adverse affect on the health of women and children. The exhibits will provide low-cost efficient methods for cooking and heating which are essential if the quality of life for the marginalized is to be improved. As part of response to Sustainable Development Goals (SDGs) focus on low cost clean drinking water will portray the use of renewable energy sources for public good. Among the highlights will be efficient building design with passive cooling and natural ventilation and cooling systems.

The pavilion and its exhibits expresses the resolve of Pakistan for devising ways for efficient use of limited energy available to achieve a better quality of life for the marginalized sections of society.

Many aspects of energy usage for the poor are derived from methodologies found in Pakistan's own heritage and vernacular traditions. The pavilion and the exhibits have been designed to impart the importance of culture in lives of all and particularly those that are sidelined. The theme is built around the essential linkage with the past and the importance of nurturing the past for a sustainable future.

The pavilion exhibits demonstrate several ripostes which will benefit not only the poor in the developing world but which will be equally advantageous for use by the First World – methodologies that are designed to act as bulwark against global warming, withstand natural disasters and minimize depletion of the planet's resources.

### Exhibits

1. The exhibits are designed to present the lessons gleaned from Pakistan's heritage – from the sophisticated urbanism of Bronze Age Mohenjodaro and the Indus Valley Civilization, to its spectacular Buddhist and Gandharan heritage after Alexander arrived with his purple flags flying on the river Jhelum, the Hindushahi temples with their unique forms and ornate carvings, the imposing pre-Mughal and Mughal Timurid

palaces, sepulchers and chahar baghs ornamented with exceptional crafts, the stunning Sikh offerings and the eclectic colonial British inheritance.

All these within themselves carry nuggets of innovation comprising myriad ways of natural ventilation, cooling systems and heat storage using sustainable materials that minimize the use of energy, prevent depletion of resources and point the path which can be traversed to make lives comfortable for the poor, whose dream of clean energy is likely to remain unfulfilled in the foreseeable future.

The lessons include the following:

- Pedestrian narrow street patterns restricting vehicular movement (and ensuing emissions) as well as shading of buildings such as found in Bronze Age WH Moenjodaro and medieval walled cities of Multan, Peshawar and Rohri.
- Courtyard configuration in residential houses and clustering of buildings that trap cool air at night, as found in 18th century houses built in Peshawar, Lahore or Thatta.
- Wind-catchers drawing cool breezes into structures as found in cities such as Hyderabad and Thatta in Lower Sindh.
- Karez preventing evaporation of underground water streams as found in the vast areas of Balochistan.
- Landscaping with use of water pools, fountains and vegetation in historic gardens and buildings as found in landscaped Timurid Mughal chahar baghs (paradisaal gardens), imperial quads in WH Lahore Fort, Shish Mahal subterranean chambers, the water ponds in Hindu and Sikh places of veneration for congregations.
- Vernacular tradition of building in earth which extends to all provinces in Pakistan and uses different ways of moulding and application, creating cool oasis in the midst of desert-like extremely hot conditions - the decorations themselves exhibiting the aspirations and superb creativity of highly creative so-called 'lower echelons' that are based on age old wisdom and ancient traditions.
- Hand crafted products with little or no-energy needs e.g. glazed tile (kasha), women's crafts, decorative crafts from wood, products from date palm and other grasses and a host of other wonderfully crafted products many of which are carried out by women.

2. Zero/low carbon footprint structures that are based on sustainable materials i.e. earth/clay, lime and bamboo, thus curtailing carbon footprint of construction, especially for large-scale housing in the rural areas and by building hybrid structures in urban centres. Already Pakistan is in the lead for building zero/low carbon shelter program, which are flood resistant and thus DRR (Disaster Risk Reduction)-compliant. These have been built as a response to rehabilitate hundreds of thousands of households that were displaced by floods 2010 to 2014. Similarly presentation of seismic proof structures, that have been tested to withstand 670% of the seismic movement of Kobe earthquake, that have been built as a response to earthquake 2013 and 2015, provide valuable knowledge for self-build low-cost sustainable structures in disaster affected areas.

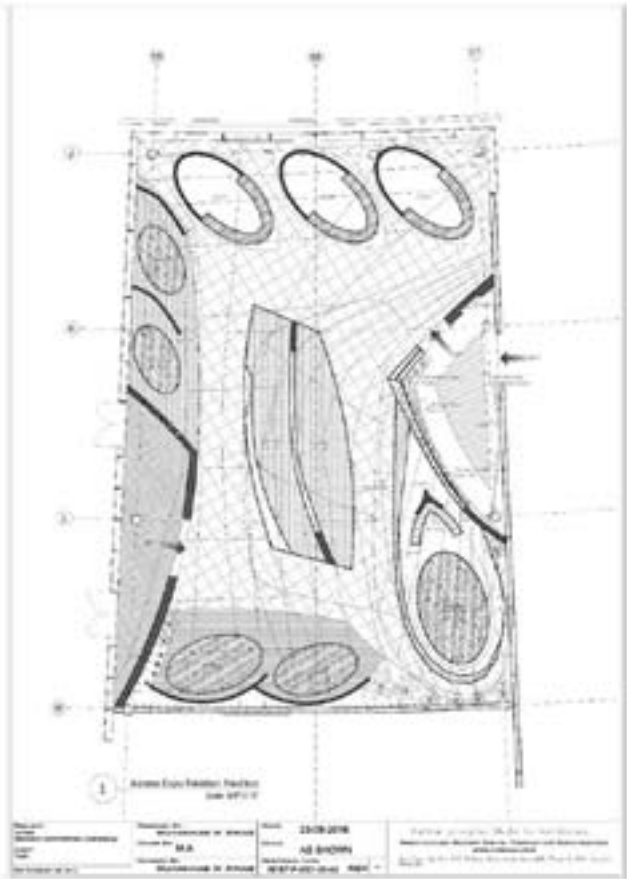
3. Reduction of the use of biomass for cooking or heating which is among the highest usage by the poor will be presented through the Pakistan Double Stove. The techniques for special smokeless fuel efficient earthen stoves that are self-built by housewives will be presented showing the beneficial effect of the use of agricultural waste and saw dust as fuel. The innovative earthen stove avoids the use of biomass such as dung or twigs/wood which are known to be highly damaging to the ecosystem. The Pakistan Double Stove, with design modification, provides heating for rooms in colder climates.

4. Sustainable construction for passive cooling and DRR-compliance. Use of passive cooling and natural ventilation techniques in construction, which require minimum energy for heating or cooling as well as providing flood and seismic resistant structures.

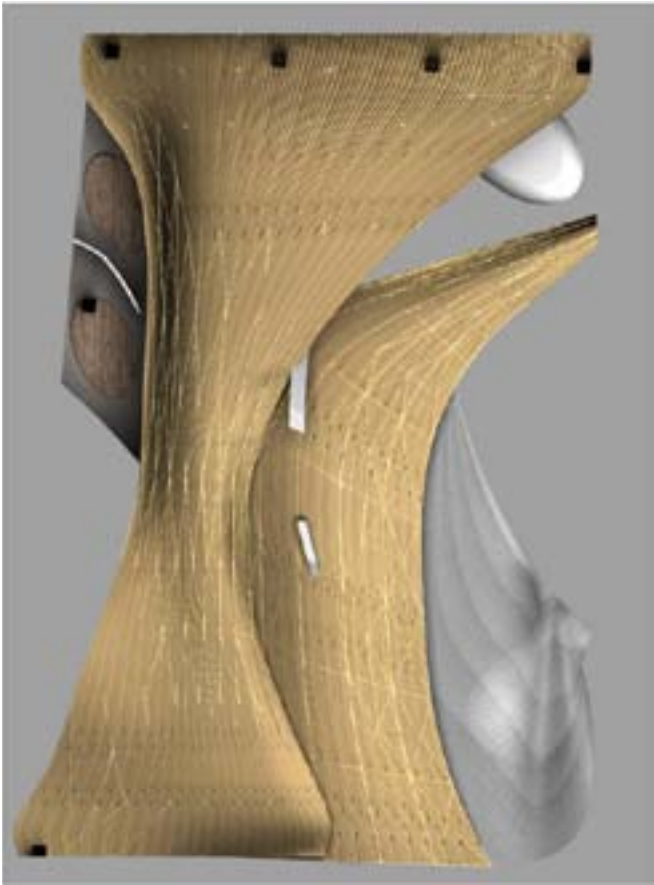
5. Clean water for the poor is among the most urgent requirements. Thus the use of renewable solar energy in the remotest areas helps in the production of mild chlorine that has been tested to be suitable for use as drinking water. The methodology allows access in the far flung areas and thus provides an amenity which is a matter of right.

Solar energy is also used for water pumps, thus increasing the access to drinking water in many parts where ground water is suitable for drinking. The pumps also allow water to be used for agriculture thus supporting development efforts.

6. Mini hydal power for remote settlements. The mini-hydal systems installed in the mountainous areas of Pakistan provide an almost regular energy source for the benefit of the poor households scattered on distant hills. This form of clean energy has extended the days of work for even remote isolated communities and is particularly beneficial for women and children. Access to clean energy has many advantages especially for development effort which can lift the disadvantaged populace from abject poverty.



Ground Floor Plan for Astana Expo 2017 Pakistan Pavillion



Roof Plan