

Competition Brief for the International Solar Building Design Competition 2007

In Conjunction with the ISES International Solar World Congress 2007,
September 18-21, 2007, Beijing, China (Final)

Overview and Goal of Competition

All people, regardless of culture or geography and definition, seek shelter and dwelling in a place called home. Like the yearning for home, solar energy is a universal resource, able to be utilized around the world, indifferent to place or politics. This competition theme 'Solar Energy for My Home' seeks ideas to establish a link between these two universal entities.

The goal of this worldwide design competition is to broaden the range of ideas of solar design, specifically in relation to human habitation. Optimally, entries will focus on the integration of ideas of solar technology and new solar building design products with innovative new concepts of design. Participants should feel free to submit either low-rise or multi-storey dwelling entries.

This competition is a centerpiece of the ISES International Solar World Congress 2007, which will be held from September 18-21, 2007 in Beijing, China. The theme of the 2007 conference will be 'Solar Energy and Human Settlement.' Registration for the competition begins October 1, 2006 and ends at Midnight CST, January 31, 2007.

Competitive Themes: ① Low-rise Dwelling ② Multi-storey Dwelling

Competition Sponsor:

International Solar Energy Society
Chinese Renewable Energy Society
Architectural Society of China
Organizing Committee of Solar World Congress 2007

Competition Administrator:

China National Engineering Research Center for Human Settlements
Special Committee of Solar Buildings, Chinese Renewable Energy Society

Competition Co-Sponsor:

Delta Environmental & Educational Foundation
Coastal Greenland Group
Beijing Siji Micoe Solar Energy Technology Co., LTD.
GanSu TianHong JinYun Property Development LTD.
Beijing Jiuyang Industry Co., LTD
Conergy AG

Jury

Composed of international and national experts in solar energy and building design field

Chinese chief commissioner: Zhou Ganshi, academician of Chinese Academy of Engineering and Sciences, former vice-minister of Ministry of Construction

Foreign chief commissioner: Anne Grete Hestnes, former president of ISES (International Solar Energy Society), professor of Norwegian University of Science and Technology

Evaluation Process

The jury will evaluate and award the First, Second, Third and Honorable Mention Prizes as well as the prizes for Technical Excellence. In addition, 10 entries will be selected directly by the delegates and conference participants, for the award for, "My Favorite Home."

Evaluation Criteria

1. All submitted drawing must conform to the following stated Project Requirements.
2. Submissions should be original, innovative and forward looking examples of the integration of solar building and building design.
3. Submissions should be feasible examples of livable space. The solar usage design should be demonstrated as a complete, integrated system of dwelling.
4. Although, as a general rule, current solar buildings can achieve a lower percentage energy consumption savings, participants can assume a higher consumption savings percentage if feasibility is demonstrated.
5. Participants should be mindful to only include economically feasible and realistic technological solutions, meanwhile, advanced technology is commendable.

Evaluation Parameters

Explanation of Evaluation Index: Out of 100%

Evaluation index	Explanation	Weight
Building design	Building concept, function, innovation, and design quality	20%
Active solar energy utilization techniques	Via special equipments, including solar collection, transform and transport to make use of solar energy	30%
Passive solar energy utilization techniques	Via special building design and building construction techniques to make use of solar energy	30%
Other sustainable technologies and techniques	Other new energy utilization techniques, water saving, material saving, waste minimization and land sensitivity/biodiversity, etc	10%
Technological feasibility	Feasible on a mass scale, economic feasibility and buildability	10%

Design Conditions and Professional Glossary

1. Appendix 1: Building design conditions
2. Appendix 2: Technology conditions
3. Appendix 3: Professional Glossary

Prize

1. Jury Awarded Prizes

General Prize :(Before Tax)

First prize: Two winners (One winner for low-rise submission, One winner for multi-storey submission): each will be awarded with 50000 RMB, certificate of merit and trophy cup

Second prize: Four winners: each will be awarded with 20000 RMB, certificate of merit and trophy cup

Third prize: Six winners: each will be awarded with 5000 RMB, certificate of merit and trophy cup

Honorable Mention: Forty winners: each will be awarded a certificate of merit

Prizes for Technical Excellence: Number of winners is dependent on Jury evaluation of submissions which are innovative with solid feasibility in technology or building design aspects. Winners will be awarded a certificate of merit. In all cases the Jury's decision will be final.

2. Public Awarded Prize

Ten entries will be selected directly by the delegates and conference participants, for the award for, "My Favorite Home." Winners will be awarded a certificate of merit.

Submission Requirements

1. Submissions should fully use passive solar energy for building design, including at least one type of active solar energy technology. Developing and applying new technologies is encouraged.
2. Submissions should be developed past the level of schematic design, with relevant, measured technical drawings.
3. Basic content of submission boards should include:
 - (1) Brief design description (not more than 200 words), including layout concept, total occupancy area, total building area and other design index.
 - (2) Brief description of utilization of solar energy technology & building design (not more than 200 words).
 - (3) One general layout (including site environmental design); elevation drawing (not less than two); section drawing (not less than one); rendering drawing (one-two); unit of each floor and collective layout siteplan; key parts (not less than two) or spatial detail drawing, node drawing and rendering drawing, etc. Collectively these should explain all assessable parts of the design.
 - (4) Participants should arrange the submission into two or four exhibition panels, each 840mm×590mm in size (arranged vertically). Font height is required as follows: title with 25mm; first subtitle with 20mm; second subtitle: 15mm; Description: 10mm; dimensions and labels: 7mm. File resolution: 100 dpi in JPEG or PDF format.
 - (5) Participants should send a digital version of submission via FTP to the organizing committee, who will compile, print and make exhibition panels for all entries. The file should be marked only with the Participant's Competition Number.
4. Submission text must be in English. Participants should try to use the words from the Professional Glossary in Appendix 3.
5. Submission should be clear; words and data should be accurate.

Participation Requirements

1. Please visit www.house-china.net/ISBC.htm, participants should fill in the registration form and send it online before Midnight CST, January 31, 2007. The registration is free of charge.
2. When a participant's registration has been received and approved, he/she will receive a unique Submission Number in the next webpage. One submission corresponds to one submission number.
3. The competition is open to individuals and teams of architects, engineers, building design institutes, colleges and universities, research institutes, solar energy researchers, and development and manufacturing entities.
4. Participants, who chose to form a team, must establish a team leader who will be responsible for all correspondence with the committee. All teams must submit one email address as their official correspondence address.
5. Participants must agree that organizing committee can print, publish and exhibit their submissions. This is a condition of submission.

Additional Items

1. Participant's digital file must be uploaded to the organizing committee's FTP site (www.house-china.net/ISBC.htm) in a folder marked only with the participant's submission number, before midnight CST, March 1, 2007. Other forms will not be accepted.
2. Any mark, sign or name related to participant's identity should not appear in, on or included with submission files, otherwise the submission will be deemed invalid.
3. Organizing committee will publish entries and evaluation results in time via the internet; winners will be honored and awarded during the World Solar Congress 2007.
4. By registering for the competition, participants agree to allow the Organizing Committee of the International Solar Building Design Competition (OCISBDC) full right to print, publish and exhibit their submissions. The OCISBDC has final copyright control over all submitted materials, images and text. All published and exhibited submissions are owned by the OCISBDC. The OCISBDC will credit participants if and when their submissions are disseminated. The OCISBDC reserves the right to append, edit or give technical treatment to submissions according to publishing requirements. The OCISBDC will not return

any submissions.

5. Submission's designer should bear the duty of submission's copyright. If the published submissions induce dissension about copyright, all legal duty and aroused related duty are bored by submission's designer.
6. Consent
By virtue of their participation in or by contribution to the competition, all parties including participants, jurors and committee members declare their consent to the present conditions. By contributing to the competition, entrants agree to accept the decision of the respective jury as final.
7. The OCISBDC will, within 30 days after first publishing of the submissions, will present two copies of the competition florilegium to the winning team or individual.
8. The OCISBDC has established a website to publish news and answer questions concerning competition.

Website: www.house-china.net

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Appendix 1

Solar building design conditions for Low-rise dwelling

1. Nature conditions

The dwelling is located at Chang Xin Dian town, Feng Tai District, Beijing. The path in site is zigzag, houses are well-ordered along with topography. Site map can be found at, www.house-china.net, www.cses.org.cn

2. Basic condition and facilities

This district already has tap water, electricity and telecommunication grid. Rain water is discharged freely. The drainage method is self-drainage by each household, without district sewage system.

3. Building design requirements

- (1) The dwelling property is 173 m², (10-13m from east to west, and 12-17m from south to north). The constructed area is 120-200 m², with one floor or two floors.
- (2) The newly constructed dwelling should satisfy the basic daily living needs. Besides, the seasonal accommodation for tourist mainly in summer should be taken into account. Dwelling includes: one living room, one dining room, three bedrooms or more, 2-3 bathrooms, one kitchen, one closet (more than 12m²), equipment room, etc.

Solar building design conditions for multi-storey dwelling

1. Nature conditions

This dwelling is located at Chao Yang district, Beijing. Site area within red lines is 3887.5 m², near city artery and branch road. Site map can be found at www.house-china.net, www.cses.org.cn

2. Basic condition and facilities

This district already has municipal tap water, drainage system, natural gas system, electricity and telecommunication grid.

3. Building design requirements

- (1) House form is regulated from 5 to 6 storey collective housing, without elevator, total building area should be no less than 5000 m². Each building area of each household should be 90m² (not include balcony), and usable area is 60-75 m².
- (2) The newly built building should satisfy the basic daily living needs. It should include: one living room, two or three bedrooms, one or two bathrooms, and one kitchen, etc.

Beijing meteorologic conditions

1. Solar radiation fraction

Latitude 39°48' and longitude 116°28' Measured point has 32 meters height above sea level.

Month	1	2	3	4	5	6	7	8	9	10	11	12
Ta	-4.6	-2.2	4.5	13.1	19.8	24.0	25.8	24.4	19.4	12.4	4.1	-2.7
Ht	9.143	12.185	16.126	18.787	22.297	22.049	18.701	17.365	16.542	12.730	9.206	7.889
Hd	3.936	5.253	7.152	9.114	9.952	9.192	9.364	8.086	6.362	4.926	4.004	3.515
Hb	5.208	6.931	8.974	9.673	12.345	12.856	9.336	9.279	10.180	7.805	5.201	4.374
H	15.309	18.443	18.483	18.205	18.416	17.222	15.198	15.465	17.481	17.006	15.114	14.205
Ho	15.422	20.464	27.604	34.740	39.725	41.742	40.596	36.420	29.881	22.478	16.508	13.857
Sm	200.8	201.5	239.7	259.9	291.8	268.8	217.9	227.8	239.9	229.5	191.2	186.7
Kt	0.593	0.595	0.584	0.541	0.561	0.528	0.461	0.477	0.554	0.566	0.558	0.569

Ta: mean monthly outdoor temperature

Ht: horizontal global solar radiation, mean monthly irradiation per day (MJ/m² day)

Hd: horizontal diffuse solar radiation, mean monthly irradiation per day (MJ/m² day)

Hb: horizontal direct solar radiation, mean monthly irradiation per day (MJ/m² day)

H: total solar radiation, mean monthly irradiation per day on incline angle, which is equal to local latitude incline exterior (MJ/m² day)

Ho: In interface above aerosphere, global solar radiation, mean monthly irradiation per day (MJ/m² day)

Sm: monthly daily duration of sunshine

Kt: atmosphere clearness index

2. Climate parameters for design

Yearly mean outdoor temperature: 11.4°C, outdoor design temperature for space heating in winter: -9°C, indoor design temperature for space heating in winter: 18°C; outdoor air conditioning design temperature: 33.2°C, indoor air conditioning design temperature: 26°C in summer, dominant wind direction: North direction

Technical Conditions

The utilization of solar energy in building includes two parts, active and passive utilization. If natural lighting & natural ventilation can be obtained via building construction and design, and radiant heat can be obtained optimally via reasonable building exposed direction, all these items belong to passive energy utilization. The active energy utilization includes solar thermal energy technology, solar photovoltaic technology, solar absorption refrigeration technology, controllable natural lighting technology, wind technology, biomass technology, etc. Based on passive design, solar building design can adopt active solar energy utilization technologies, combination and integration with other energy resources are also commendable. Relevant technologies in detail can be found at following website and references:

Chinese renewable energy society,	http://www.cses.org.cn
Chinese new energy network,	http://www.newenergy.org.cn
Building design data collection, Volume 6,	<i>China Architecture & Building Press</i>
Passive solar house pyrology design handbook,	<i>Tsinghua University Press</i>
Solar water heater,	<i>China Environment & Science Press</i>
The utilization of new energy in building,	<i>China Electrical Power Press</i>
Solar energy practical engineering technique,	<i>Lanzhou University Press</i>
Integration design for solar water heating system in dwelling,	<i>China Architecture & Building Press</i>
Florilegium of China solar building design competition,	<i>China Architecture & Building Press</i>

International solar technique referenced website:

IEA: International Energy Agency
ASES: The American Solar Energy Society
SEI: Solar Energy International
The International Solar Energy Society (ISES)
Solar Energy Industries Association (SEIA)
Florida Solar Energy Center (FSEC)
EERE: Solar Energy
Solar Energy Lab
Solar Energy Society of Canada Inc.
Solar Energy Panels - Solar Water Heaters - Wind Power
Clean Energy Basics: About solar energy
Fraunhofer-Institut für Solare Energiesysteme ISE
The UK SOLAR ENERGY Society
The Energy Story - Chapter 15: Solar Energy
RenewableEnergyAccess.com | Home Page
Australian and New Zealand Solar Energy Society
Arizona Solar Center, Your Source for Solar Energy Information
Solar Energy Applications Laboratory
Solar Energy Web Site
SunWind Solar Car Kits and Solar Energy Education

Appendix 3

Professional Glossary

absorptance for solar radiation	— 太阳辐射热吸收系数
adhesive	— 胶粘剂
air collector	— 空气集热器
air quality test (AQT)	— 空气质量检测
apartment of tower	— 塔式高层住宅
aperture	— 采光口
area ratio of window to wall	— 窗墙面积比
artificial marsh effect	— 人工湿地效应
atrium lighting	— 中庭采光
auxiliary thermal source	— 辅助热源
auxiliary thermal source	— 辅助热源
building area of dwelling size	— 套型建筑面积
building area	— 建筑面积
building energy saving rate	— 建筑节能率
building intelligent control system	— 智能建筑控制系统
capillary radiation	— 毛细管辐射
central heating	— 集中供暖
close-coupled solar water heater	— 紧凑型太阳热水器
closed system	— 封闭系统
collector array	— 集热器阵列
dehumidification system	— 除湿系统
derive from	— 衍生
design working life	— 设计使用年限
differential temperature controller	— 温差控制器
direct system	— 直接系统
double façade building	— 双层幕墙
drainback system	— 回流系统
dwelling	— 住宅
economic analysis	— 经济分析
energy saving method	— 节能措施
energy storage & heat recovery system	— 能量储存和回收系统
external windows insulation system	— 外窗隔热系统
fill up layer	— 填充层
floor area ratio	— 容积率
floor panel heating	— 地板辐射采暖
forced circulation system	— 强制循环系统
freeze protection	— 防冻

greening rate	—绿地率
ground layer	—地面层
habitable space	—居住空间
heat insulating layer	—隔热层
heat insulation window	—隔热窗户
heat metering device	—热量计量装置
heat pump heat supply	—热泵供暖
heat storage tank	—贮热水箱
heat transfer for neighbor	—户间传热量
household-based heat metering	—分户热计量
index of building heat loss	—建筑物耗热量指标
indirect system	—间接系统
indoor comfort level	—室内舒适度
insolation standard	—日照标准
instantaneous collector efficiency	—集热器瞬时效率
low temperature hot water floor radiant heating	—低温热水地板辐射供暖
lower energy consumption	—低能耗
low-rise dwelling	—低层住宅
module	—模块
multi-storey dwelling	—高层住宅
natural circulation system	—自然循环系统
natural ventilation	—自然通风
nominal working pressure	—额定工作压力
open system	—敞开系统
passive solar energy utilization	—被动太阳能利用
payback time	—回收年限
permanent index	—耐用指标
phase change material (PCM)	—相变材料
phase change solar system	—相变太阳能系统
phase change thermal storage	—相变蓄热
photovoltaic system	—光伏发电系统
plane roof	—平屋面
PV façade	—光伏幕墙
quantity of energy saving	—节能量
quasi-steady state	—准稳态
rain water collection	—雨水收集
remote storage system	—分离式系统
residential building durability	—住宅耐久性能
roller shutter sun shading system	—卷帘外遮阳系统
roof insulation system	—屋面隔热系统

roof planting	—屋顶植被
secondary utilization	—二次利用
shutter ventilation	—百叶通风
sloping roof	—坡屋面
solar altitude	—太阳高度角
solar azimuth	—太阳方位角
solar cell	—太阳能电池
solar chimney	—太阳能烟囱
solar collector	—太阳能集热器
solar driven absorption cooling	—太阳能驱动吸收式制冷
solar driven desiccant evaporative cooling	—太阳能驱动吸附式制冷
solar fraction	—太阳能保证率
solar house	—太阳房
solar plus supplementary system	—太阳能带辅助热源系统
solar preheat system	—太阳能预热系统
solar radiant heat	—太阳辐射热
solar wall	—太阳墙
solar water heating	—太阳能热水器
steady-state	—稳态
sunshading coefficient	—遮阳系数
thermal conductivity	—导热系数
thermal efficiency curve	—热效率曲线
thermal insulation	—保温
thermal pressure	—热压
thermal stability	—热稳定性
thermal storage characteristic	—蓄热特性
thermal storage	—储热器
through-draught	—穿堂风
tracking collector	—跟踪集热器
tridimensional virescence	—立体绿化
triple co-generation	—三联供
tube clamps	—固定卡子
typical floor	—标准层
usable area	—使用面积
ventilation simulation	—通风模拟
water storage capacity	—储水量
waterproof layer	—防水层
wetproof layer	—防潮层
wind speed distribution	—风速分布