

SOLAR HEATING & COOLING PROGRAMME
INTERNATIONAL ENERGY AGENCY

General Situation on Solar Energy Buildings in China

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Policies

Features of the new standard



General code for energy efficiency and renewable energy application in buildings



The first national mandatory standard, Technical law code

Policies

Key features

The entire construction process

The code covers the entire construction process of new buildings and existing building energy efficiency renovation projects.

- Design
- Construction
- Acceptance
- Operation management

Policies

Features of the new standard

Mandatory enforcement

- The mandatory construction standard system covers all kinds of construction projects in the field of engineering construction.
- After the implementation of the mandatory construction standard, the existing mandatory standards in the relevant national and industrial standards of engineering construction shall be abolished at the same time.

Policies

Features of the new standard

The document of building projects:

- Feasibility study report
- Construction plan
- Preliminary design documents

should include:

- ✓ Building energy consumption
- ✓ Renewable energy utilization
- ✓ Building carbon emission analysis report

Policies

Features of the new standard

Mandatory carbon emission calculation

- Carbon emission intensity has been set with an average reduction of over **7 kgCO₂(m²·a)** .

Policies

Features of the new standard

Clear terms of renewable energy utilization

The clear indicators and requirements are proposed for renewable energy utilization.

- solar energy
- air energy
- ground energy
- other renewable energy systems

Policies

Features of the new standard



Solar system

- ✓ Solar energy system should be used in new buildings
- ✓ Solar energy system design should be completed synchronously with buildings design
- ✓ Corresponding protection measures should be taken according to different climate conditions
- ✓ Life and decay rate of solar energy system should be given
- ✓ Heat collection efficiency of solar thermal system was stipulated

Policies

Features of the new standard

Improvement of new buildings energy efficiency level

- The average design energy consumption of residential buildings and public buildings will be reduced by **30%** and **20%** respectively on the basis of the current national standards.

Types	Residential buildings		Public buildings
Region	Severe cold & cold region	Other regions	All regions
Energy efficient rate	75%	65%	72%

Policies

Features of the new standard

Improvement of HVAC energy efficiency level and lighting requirements

- The requirements for chiller, heat pump system, multi-connection and other cold and heat source equipment unit efficiency are comprehensively improved.
- The lighting power density achieves the target value requirements, and further reduce the building operation energy consumption.

Demonstrations

ZEB (PV-Building in CABR)



Demonstrations

Comparison before and after the reconstruction



Before:

- 3,000 m²
- Office building
- Since 1970s.

After:

- PV 235kWp
- 15th Dec, 2021.

Demonstrations

3 kinds of PV modules



Type	Monocrystalline silicon solar panel	Thin film PV modules	Transparent thin-film PV modules
Installation area	569m ²	849m ²	51.6m ²
Installed capacity	115kWp	118kWp	2.2kWp

Demonstrations

Energy efficiency measures



PV modules as shadow curtain

- Reducing cooling load
- Increasing PV area



Windows with high performance

- Heat transfer coefficient is 1.5 W/m²K
- Great Air impermeability



PV system

- Install capacity is 235kWp with 1500m²
- Monocrystalline silicon solar panel
- Thin-film solar cells

Reduction of energy consumption



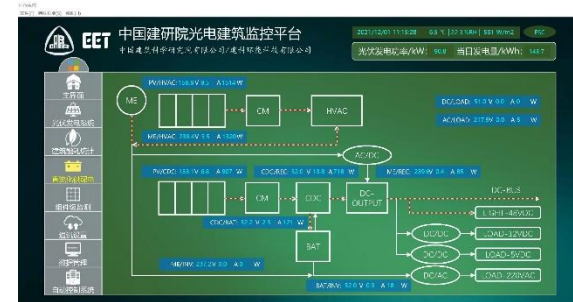
Supplement of renewable energy



Net-zero carbon emission

Demonstrations

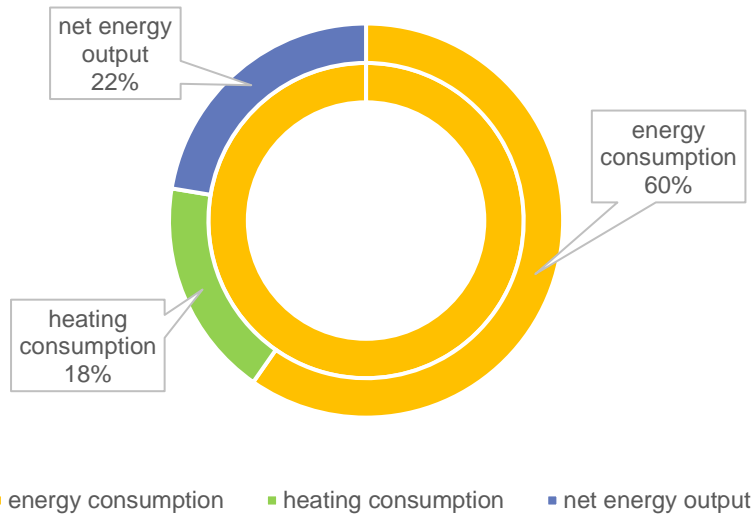
Monitoring——photovoltaic energy storage and DC microgrid central control unit PEDF



- Monitoring building PV generated energy, building electric consumption, and heat consumption.
- Automatically switch PV grid connected state.

Demonstrations

Measurement of the energy consumption



Energy generation per unit building area kWh/m ²	Energy consumption per unit building area kWh/m ²	Heating consumption per unit building area kWh/m ²	Net energy output per unit building area kWh/m ²
+67	-40	-12	+15

Demonstrations

energy consumption simulation



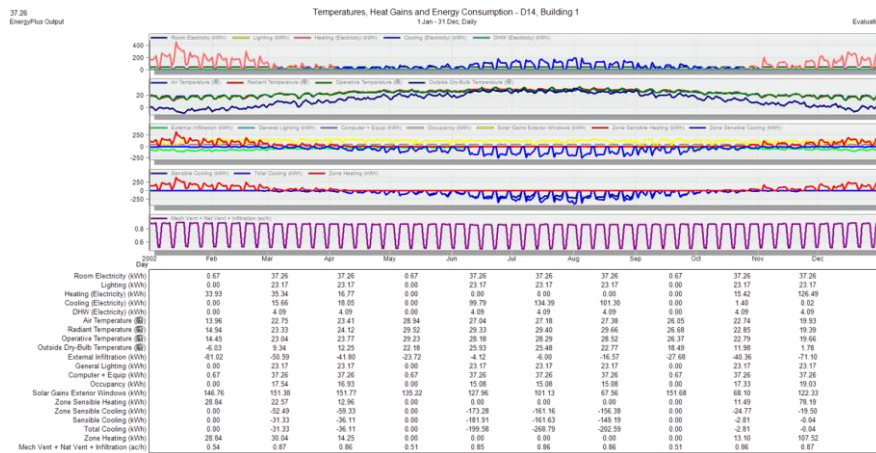
Draw model

Set parameters

- Envelops materials
- Personnel behavior
- Equipment and light power
- ...

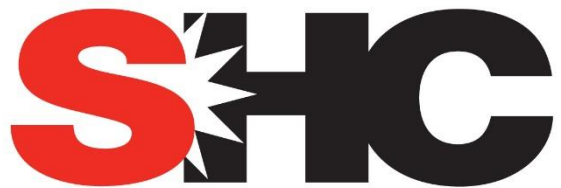
Run simulation

Output results



Thanks for listening!

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