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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 50801-2013

Evaluation standard for application of renewable energy in buildings

可再生能源建筑应用工程评价标准

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Edition Note on the 2025 edition

The copy carries the marking (2025 edition) under the title on both the cover and the title

page, and it is printed by China Architecture and Building Press, Beijing, 2025.

It opens with Announcement No. 42 of 2025 of the Ministry of Housing and Urban-Rural Development, which approves the partially revised provisions of the national standard Evaluation standard for application of renewable energy in buildings GB/T 50801-2013 with effect from 1 August 2025, and states that the partially revised provisions are made public on the Ministry portal and published in the journal Engineering Construction Standardization. The announcement is dated 20 March 2025.

The explanation of the partial revision states that the work was carried out by China Academy of Building Research Co., Ltd. together with other organisations, under the Ministry notice on the 2022 plan for the preparation of engineering construction codes and standards, ref. Jianbiaohan [2022] No. 21. The main contents of the partial revision are: the calculation methods for the conventional energy substitution, the carbon dioxide emission reduction, the sulphur dioxide emission reduction and the dust emission reduction indexes were revised; the evaluation indexes of the solar photovoltaic system were revised; and evaluation indexes and test methods for medium and deep geothermal ground-source heat pumps and for air source heat pumps were added. The partial revision covers 87 provisions, of which 9 are new and 1 is deleted; the explanation lists the numbers of those provisions and names the drafting organisations.

1 General Provisions

1.0.1 The standard was drawn up in order to carry through the national laws, regulations and policies on the use of renewable energy in buildings, on the protection of the environment and on the carbon peaking and carbon neutrality goals, to raise the awareness of society in applying renewable energy, to promote the sound and orderly development of the application of renewable energy in buildings in China, and to guide the testing and the evaluation of the energy saving, environmental and economic benefits of renewable energy application projects in buildings.

1.0.2 The standard applies to the testing and the evaluation of the energy saving benefit, the environmental benefit and the economic benefit of the new construction, extension and reconstruction projects of renewable energy application systems in buildings.

1.0.3 When renewable energy application projects in buildings are tested and evaluated, besides meeting the requirements of this standard, the provisions of the relevant current national standards shall also be met.

2 Terms

2.0.1 renewable energy application system in buildings: a system for the supply of hot water, space heating, air conditioning, electricity and the like in a building in which all or part of the energy used is provided by renewable energy such as solar energy, geothermal

energy and air thermal energy.

2.0.2 solar thermal system: a system that converts solar energy into heat for uses such as heating and cooling; in buildings it mainly comprises solar hot water, space heating and air conditioning systems.

2.0.2A solar hot water system: a system that converts solar energy into heat to supply hot water to a building, mainly comprising the solar collector, the hot water storage tank, the pump, the connecting pipework, the supporting frame, the control system and, where needed, an auxiliary energy source used with it.

2.0.3 solar space heating system: a system that converts solar energy into heat to heat a building, whose main components include the solar collector, the heat exchange and heat storage device, the control system, the auxiliary heating or heat exchange equipment using another energy source, the pump or fan, the connecting pipework and the terminal heating system.

2.0.4 solar air-conditioning system: an air conditioning system in which a solar collector heats the heat medium to drive a thermally driven refrigeration system; it is made up of six parts, the solar heat collection system, the thermal refrigeration system, the energy storage system, the air conditioning terminal system, the auxiliary energy source and the control system.

2.0.5 solar photovoltaic system: a power generation system that converts solar energy directly into electricity by the photovoltaic effect, comprising the photovoltaic array, the inverter and the other balance of system components.

2.0.6 ground-source heat pump system: a heating and air conditioning system that uses rock and soil, groundwater or surface water as the low temperature heat source and is made up of a water source heat pump unit, a geothermal energy exchange system and the in-building system. According to the form of the geothermal energy exchange system, ground-source heat pump systems are divided into shallow buried pipe ground-source heat pump systems, medium and deep buried pipe ground-source heat pump systems, groundwater ground-source heat pump systems, sewage source heat pump systems and surface water ground-source heat pump systems; surface water source heat pumps are further divided into river, stream, lake and sea water source heat pump systems.

2.0.6A air source heat pump system: a system that uses air thermal energy as the low temperature heat source and heats a building by the reverse Carnot cycle, made up of the air source heat pump unit, the distribution system and the terminals.

2.0.7 solar fraction: the percentage of the total energy consumed by a hot water, space heating or air conditioning system that is supplied by solar energy.

2.0.8 cost-benefit ratio of the system: the ratio of the incremental investment in the renewable energy system to the total energy saved by the system over its design service

life, expressing the investment cost of saving each kilowatt hour of conventional energy by the use of renewable energy.

2.0.9 energy efficiency ratio of ground-source heat pump system: the ratio of the cooling capacity of the ground-source heat pump system to the total electricity consumption of the heat pump system, that total including the electricity consumed by the heat pump unit, the cooling tower and the circulating water pumps of each stage. The printed symbol is EER with the subscript sys.

2.0.10 coefficient of performance of heat pump system: the ratio of the total heating capacity of the heat pump system to the total electricity consumption of the heat pump system, that total including the electricity consumed by the heat pump unit, the heat source tower and the circulating water pumps of each stage. The printed symbol is COP with the subscript sys.

2.0.11 load ratio: the ratio of the operating load of the system to its design load.

3 Basic Requirements

3.1.1 The evaluation of a renewable energy application project in buildings shall include the evaluation of the indexes, the conformity assessment of the performance and the grading of the performance. The single indexes shall be evaluated first, and the conformity assessment of the performance shall be made on the results of those single index evaluations. Where the assessment result is a pass, a grading evaluation should be carried out; where it is a fail, no grading evaluation is carried out.

3.1.1A For a project applying two or more renewable energy systems, the total conventional energy substitution shall be given.

3.1.2 The evaluation of a renewable energy application project in buildings shall be based on the results of actual testing. Where conditions allow, long term testing shall be preferred, otherwise short term testing shall be used. Where the long term and the short term test results disagree, the long term test result shall govern.

3.1.3 The evaluation of a renewable energy application project in buildings shall cover all the renewable energy systems of that project; the number of systems to be tested shall be determined by sampling according to the form and the scale of the systems, and the sampling method shall comply with 4.2.2, 5.2.2 and 6.2.2 of this standard.

3.1.4 The testing and the evaluation of a renewable energy application project in buildings shall first pass the acceptance of the sub-division works of the disciplines to which the renewable energy application belongs, the sub-division acceptance of building energy efficiency, and the format inspection specified in Section 3.2 of this standard.

3.2.1 Before a renewable energy application project in buildings is evaluated, the formalities shall be complete and the documentation shall be whole. The documents inspected shall