

Analysis of water saving in the construction process based on green building

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Abstract: Under the premise of ensuring their own food, clothing, housing and transportation , We aim for sustainable development to make the building and nature coordinate with each other and to create a healthier and more comfortable living space. This article analyzes the water resources in the construction process, discusses why they are wasted and how to reduce their waste In addition, a water-saving combination method will be proposed to optimize this situation.

1. Introduce

With the acceleration of the times and human science and technology reform and social progress, the scale of construction industry is gradually expanding. In the city where we live, there are buildings under construction everywhere. Construction industry refers to the survey, design, construction and maintenance department after the completion of construction in the process of construction and installation. The products produced in the construction industry are transferred to the users in various ways. Through this form, all kinds of productive and non-productive fixed assets will be formed and exist in the national economic system. At the same time, it is also a means of production for the material production departments and transportation departments of the national economy and an important material basis for people's life. But we found that for some construction enterprises, they only pursue how to get the maximum benefits with the minimum cost. For example, industrial waste gas, construction waste, construction dust and so on. They are all the pollution generated in the construction process. As long as their normal construction can be ensured, pollution of they caused will not be within the scope of their consideration and they will not care where these pollutants eventually go. But this article thinks that with the establishment of our country's green building system, these construction enterprises should not only blindly pursue interests, but also pay attention to the protection of ecological environment. To put the concept of green building into all aspects of construction, we should also bear in mind the importance of green for the development of our country, and strengthen the concept of saving resources. Under the premise that we all have this consciousness, this paper will discuss the importance of water saving in the process of green building construction and the improvement measures.

2.The importance of water saving in green buildings

The primitive man's initial requirements for the building were as long as they could shelter from the wind and rain, resist the beasts and prevent the invasion. At the same time, they hope to have a place to recuperate after a day of hard work. But with the development of thousands of years, our requirements for the residence we live in are gradually increasing. We are not only limited to a more comfortable, durable and safe living environment, but also care about the sustainable development including environmental protection, health of the building, the future of the society, energy saving, water saving and so on.Green building is based on this concept of ecological development civilization. Among them, water saving is also an indispensable part of the construction process of green buildings.Nowadays, due to the scientific and technological innovation of our country. Let some new green solutions be widely used, green building also because of this has been some improvement. As we all know, the purpose of green building is the combination of energy saving, environmental protection, low-carbon and pollution reduction.Among them, water saving is also an indispensable part of the construction process of green buildings. In order to maximize "greenness", we must increase the use of water resources, raise the requirements for green infrastructure and select the best combination plan after weighing and evaluating to achieve the goal of water saving ,the high efficiency of environmental protection^{1,2}

3. Analysis of waste of water resources

China is also a relatively water shortage country. Although freshwater resources rank fourth in China, the

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population base of China is too large. Therefore, Water consumption per capital is much less than that of other countries. Our people have not paid special attention to these problems. For example, when the school water tap is used, the tap is not closed tightly or well, when washing the car, the non-recycling spray of the car washing faucet, when the pipe tap broke, the water flowed for a long time and no one went to repair it and so on. All these phenomena result in the waste of water resources. It's just a waste of water in life. In real architecture, some architects did not pay attention to the problem of water resources when designing buildings. They lacked water conservation awareness throughout the construction process. Not to mention that they still remember the principle of sustainability, and did not even consider whether this will lead to a large loss of the user's economic interests. Take the toilet used in the residence as an example, the old toilet can use up to 13L of water for a single use. Scientists have discovered that 6L of water can just be rinsed out without causing waste. It's better to use more and less water. Therefore, in the specification, sanitary appliances must not be used with a flush volume greater than 9L at a time. In addition, some sanitary appliances will drip, leak and run out in vain which may be due to unqualified inspections or incorrect installation methods. But for whatever reason, we didn't replace it in time and didn't have a corresponding countermeasure. In real life, this code has not been applied to living buildings, so water resources in this respect have not been reasonably used. In real life, this code has not been applied to living buildings, so water resources in this respect have not been reasonably used.

Non-traditional water sources include rainwater, seawater, reclaimed water and so on. During our construction process, the utilization rate of non-traditional water sources has always been a water-saving indicator that my country and even the world pay attention to. China now also advocates the collection of non-traditional water sources, and in the process of construction application in order to improve the utilization of water resources³.

Before that, we need to know that rainwater is actually a kind of very recyclable water. The first is that it can be used in many places, such as spraying roads, watering the land, cleaning up dirt on houses and storing water in toilets. Second, it is free, it can be collected within a certain period of time. It is very economical, and it can be used without any processing. Even if such an easy-to-use non-traditional water source can be effectively used after a little scientific design, the utilization rate is not very high during the construction process.

The people involved in construction projects are not very green-conscious, have not effectively conducted research on the possibility of non-traditional water use. Too much pursuit of low-cost architectural design and reluctance to spend on the design of water resources, thus reducing its actual impact in the process of green building, causing a great waste of water resources.⁴

4. Score and cost calculation of water saving

According to 7.2.10, 7.2.11, 7.2.12 and 7.2.13 of the 7.2 scoring items of water saving and water resource utilization in the 2019 Green Building Evaluation Standard and the scoring criteria for water-saving methods, table is listed as follows (1):

Table 1. Scoring Criteria

a Use of higher grade sanitary appliances	15
b Greening irrigation and air-conditioning cooling water system	12
c Combined with the rainwater comprehensive utilization facilities, the outdoor landscape water body of room is constructed. The rainwater replenishing water is utilized for the outdoor landscape water body, and the ecological water treatment technology to protect the water body is adopted	8
d Use of non-traditional water sources	15

According to the way of permutation and combination, 11 combination schemes⁵ can be obtained. The total evaluation scores of

$$\Sigma Q = Qa + Qb + Qc + Qd \quad (1)$$

Qa=the evaluation scoring of a

Qb=the evaluation scoring of b

Qc=the evaluation scoring of c

Qd=the evaluation scoring of d

are calculated respectively. Then according to the Evaluation Standards for Green Building, the evaluation score of each type of indicators in green building should not be less than 25 points. a+b, b+c and c+d should be excluded. The incremental cost coefficients showed that C1 equals 1.55, C2 equals 0.37, C3 equals 0.87 and C4 equals 0.27. Finally, the incremental costs of each portfolio separately are shown in the following table (2). according to the formulation that incremental cost coefficient is equal to the direct incremental cost divided by the evaluation score⁶⁷

$$\Sigma C = CaQa + CbQb + CcQc + CdQd \quad (2)$$

Ca=the incremental cost factor of a

Cb=the incremental cost factor of b

Cc=the incremental cost factor of c

Cd=the incremental cost factor of d

Table 2. Permutation and combination

Combined approach	Total evaluation	incremental cost
a+b	27	27.69
a+d	30	27.3
b+d	27	8.49
a+b+c	35	34.65
a+b+d	42	31.74
a+c+d	38	34.26
b+c+d	35	15.45
a+b+c+d	50	38.7

Obviously, the combination incremental cost of b+d is the lowest whose score of technical price evaluation is the highest. So this way is the best scoring efficiency. It is proposed that the first water-saving equipment or technology should be adopted in the greening irrigation and cooling water system of air conditioning, and innovative water-saving measures should be used in the use of non-traditional water sources. These two ways are the best efficient optional combination scheme to achieve the optimal water-saving effect with the minimum incremental cost. Here's how to use innovative technologies to improve both of these measures.

On the one hand, in terms of afforestation irrigation, anti-clogging ability of innovative technology can be widely used in order to avoid the problem of too little water caused by the complicated water. A transparent pipe installation accelerator, such a design convenient detection and inspection can be used to Check blockage problem for the purpose of strictly controlling the water, avoiding the waste of water resources, but ensuring the cost being not too high, and at the same time it also has the automatic cleaning function, in which the accelerator makes the water flow through the vortex accelerate, better washing away the garbage, preventing pipe blockage. In addition, the design of the soil moisture sensor automatic water-saving irrigation system decides automatically to select how much water, and automatically displays the soil temperature according to the soil moisture⁸. Next, a new automatic water collecting device is exceedingly convenient in the aspect of saving water in the air conditioner. Because the condensed water dripping from the air conditioner is clean and harmless under general conditions. And the quality of water is good, and the pH is neutral. The water can also be used to raise fish and water flowers. What's more, it is not easy to produce alkali for bonsai farming.

On the other hand, rainwater from non-traditional sources can be collected and used directly to irrigate toilets and gardens. Now we can build a rainwater collection pool specially for collecting water. The rainwater collection pool is composed of pool body, water inlet well, water outlet well and water outlet pipe. Sponge rainwater storage module and polypropylene are used for

rainwater storage⁹. This technology can effectively collect rainwater, and also has the dual penetration of water, so as to ensure the cleanliness of water. This kind of water can be used as urban miscellaneous water. Its production process is also under the concept of green technology. They are made of recyclable materials, safe and pollution-free. Reaching a certain water quality index, the reclaimed water meets the operating requirements in some aspects after biological physical or chemical treatment. So it can be used in the process of green building construction. Water needs to be used in the site. As far as possible, it is best not to use tap water at the construction tap. On the country, rain water or domestic water is a good choice. Obvious water-saving significance will be embraced through these ways. Urban pollution can be reduced. And at the same time, the process is relatively simple the cost of sewage treatment is reduced so that the freed up construction funds can be put into other constructions. Besides, the water shortage problem in some cities can also be improved¹⁰.

5. Conclusion

From a long-term point of view, the water-saving behaviour under the green building is of great significance to our growing demand for happiness. Or should we emphasize that today's architecture is not just a place to live and resist the cold. We should also adapt to the development of our country while being comfortable. It is our top priority to reduce the loss of national resources and realize the maximization of national green. Our country's resources are limited. While increasing the economic benefits caused by construction, we should also pay attention to improving the water-saving system. From now on, according to the actual situation to develop plans, scientists vigorously to explore some advanced technology when these plans perfect to vigorously promote these technologies and gradually strive to benefit our children and grandchildren, bearing in mind that "Lucid waters and lush mountains are invaluable assets." Water-saving behavior is not only a requirement for individuals to understand and fulfill, but also a general requirement for green development for the whole society. Although there exists a lot of waste of water resources at the present stage, we should start from ourselves. Our researchers choose the best combination of water saving, namely optimizing green irrigation, water saving by air conditioning and using non-traditional water sources, based on the scoring items and costs of building water saving, to achieve the maximum utilization of water resources.

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