The Green Building Scheme for a Sustainable Eco-City in Taipei

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Abstract: Taipei City has put a significant effort toward the implementation of green design and green building schemes towards a sustainable eco-city. Although some of the environmental indicators have not indicated significant progress in environmental improvement, implementing the two schemes has obtained considerable results; therefore, the two schemes are on the right path towards promoting a sustainable eco-city. However, it has to be admitted that the two schemes are a rather "technocratic" set of solutions and eco-centric approach. It is suggested that not only the public sector but also the private sector need to put more effort toward implement the schemes, and the government needs to encourage the private sector to adopt the schemes in practice.

Key words: Green building; Sustainable development; Eco-city; Urban planning

1. INTRODUCTION

According to the development strategy of the Taipei City Council, the term of Eco-city is interpreted as environmental city. To reflect this recognition, two programs have been implemented in Taipei, including the "Green Axis" and the "Trash Collection Fee and Recycled Trash programs". In order to achieve the goal of an Eco-city, the city council have tried to construct certain green axis ways and routes in the mountain trails and water fronts recently. For example, a few paths have been built on the mountains around Taipei basin and water fronts near the rivers, and this has received a positive recognition by citizens in Taipei according to the discussions in some interviews conducted for the research. According to statistical analysis, the dust falls and airborne particles have been progressively reduced in Taipei City since 1974 (see Figure 1). In this regards, the Eco-city campaign in Taipei has been succeeding in realizing its targets. However, as the average temperature in summer from 1998 to 2005 in Taipei City is still around 30 centigrade degree (see Figure 2), and this is considerably high comparing with the temperature level in some reference places such as Hong Kong; therefore more efforts have to be put to relieving the greenhouse effect and air pollution generated due to the large use of motors and air conditioners in the Taipei City.

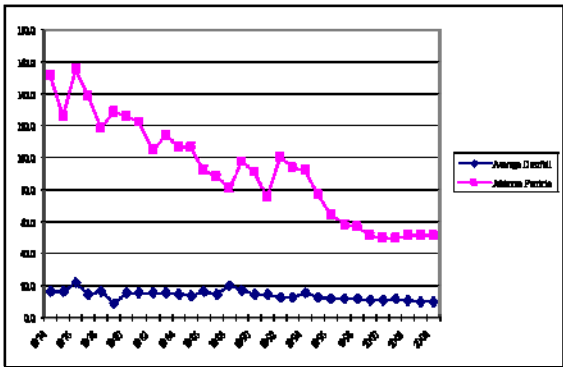

Fig.1 The dust falls and airborne particles in Taipei City

As a matter of fact, the Taipei City Council has put some efforts to planning for a sustainable Eco-city; and it has to be admitted that the Taipei City Council has put much effort to the implementation of green design and green building schemes, which are believed to be effective for developing sustainable buildings to achieve the Eco-city, although some environmental indicators have not indicated that there are great improvements

in the urban environment in Taipei. Based on this review, this paper aims to explore several relevant issues regarding the Eco-city, including the status of sustainable development in Taipei, the green design and green building schemes in Taipei, and the indicators for sustainable development in Taipei; meanwhile it will present some relevant issues based on discussions during the interview with practitioners from both building and urban planning professions in Taipei City.

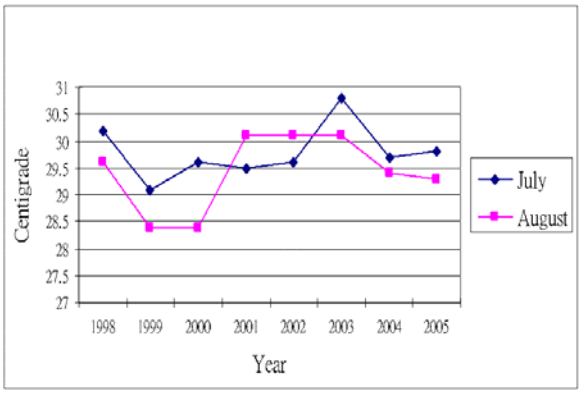

Fig.2 The average temperature in summer in Taipei City (1998-2005)

2. THE STATUS OF SUSTAINABLE DEVELOPMENT

According to the *2005 Environmental Sustainability Index* [1], which was conducted by Yale University and Columbia University, Taiwan was ranked 145th in the world, among the last two and only better than North Korea. Comparing with all others such as the UK (ranked 65th) and Germany (ranked 31st), Taiwan still needs to put a lot more effort to realizing its sustainable development strategy. Although the *2005 Environmental Sustainability Index* uses various indicators such as air quality, biodiversity, land and Eco-efficiency in its calculation, some Taiwanese academics argued that its calculation method and results are unacceptable by them because some necessary data was missing or inaccurate. On the other hand, Taiwan was ranked 5th according to the *Growth Competitiveness Index (GCI)* [2] in 2005. It is apparent that the economic competitiveness of Taiwan and its capital city Taipei is much strong than their environmental competitiveness in sustainable development. During the interview, one of the NGOs [3] members strongly criticized that Taipei City Council while most academics' say is that people should evaluate their real performance instead of blaming the data.

In addition, it is evident that most of the leaders and government officials do not have a clear idea of what a sustainable Eco-city might mean for Taipei. For example, each year the Major of Taipei City has to report to the Taipei City Councillors regarding the performance of the Taipei City Council. In the reports it was obvious that there was not any progress on citizen participation or "equality" mentioned until January 2005. All the reports were about what had been done for infrastructure construction in Taipei. In this regards, there is a potential requirement to use a group of indicators to demonstrate the status of sustainable development and therefore to advance to a more sustainable urban environment such as the Eco-city.

3. SUSTAINABLE DEVELOPMENT INDICATORS

A group of sustainable development indicators have been developed and approved by the Taipei City Council for three times since 1996. At the first time, it was developed in 1996 through the report of *Indicators and Strategy of Sustainable Urban Development for Taipei City* [4], which was a research result from the National Chung-Hsing University. Eighty indicators, which comprise of 10 core dimensions with 3 sustainable Eco-city principles but without the participation principles, were developed but finally not adopted by the Taipei City Council. One academic from the research group complained during the interview that the sustainable development indicators were useless because the government did not have courage to adopt and implement them; and for that reason, he didn't believe that the government would implement the sustainable development indicators which have been proposed for the second time in 2004 (see Table 1). The second set of indicators was adopted by the *Taipei Sustainable Development*

Indicators and Strategy of Sustainable Urban Development [4] for Taipei City, 1996	Urban Development Bureau, Taipei City Government	National Chung-Hsing University	10 core dimensions, 80 indicators: Ecology sustainable 5 Water resources use 4 Economic efficiency 9 Resources autonomy 7 Environmental load 13 Living amenity 9 Transport convenience 5 Environment management 9 Social security 13 Education and culture 6	Environment + Futurity + Equality + Participation -
Sustainable Development Strategic Plan for Taipei City, 2004 [5]	Taipei City Government	Taipei City Sustainable Development Committee	3 core dimensions, 48 indicators: Environment resources symbiosis 29 Social security progress sharing 12 Economic technology wisdom growth 7	Environment + Futurity + Equality + Participation +
Evaluation system of Sustainable Development Indicators for Taipei City, 2005 [6]	Taipei City Government	Urban Planning Association	Drafting now by using 48 indicators proposed from the report of Sustainable Development Strategic Plan for Taipei City, 2004	Environment + Futurity + Equality + Participation +
System of Sustainable Development Indicators (SDI) for Taiwan, 2004 [7]	National Council for Sustainable Development (NCSD) at the Executive Yuan in Taiwan	National Council for Sustainable Development (NCSD) at the Executive Yuan in Taiwan	6 core dimensions, 42 indicators: Ecological resources 7 Environmental quality 6 Social pressure 6 Economic pressure 7 Institutional response 7 Urban sustainable development 8 divided into two categories: Island Taiwan Indicators and Urban Taiwan Indicators.	Environment + Futurity + Equality - Participation -

1	bird species	11	[illegible] length	21	solid trash recycled ratio	31	commitment ratio	41	cooperation participation
2	fish species	12	average PSI	22	solid trash compost ratio	32	household of the poor	42	male and female employment ratio
3	Green resources indicator	13	average water use per day per person	23	trash recycled ratio	33	public social welfare expenditure ratio	43	unemployment ratio
4	urbanized area extension ratio	14	sewage treatment ratio	24	local environmental plan implementation	34	male and female life length	44	private car ownership ratio
5	Green area per person	15	reservoir water quality	25	inquisition case of remonstrating pubic effects of pollution statistics	35	public disaster injured and death	45	public transport passenger frequency
6	river runoff	16	tap water quality	26	environment ecology protection budge expenditure	36	citizen participation of vital planning decision	46	internet household ratio
7	average urban infiltration	17	sanitation sewage ratio	27	government subsidize pollution prevention and recycle expenditure	37	neighbour park adoption ratio	47	convenient citizen service automaticity
8	urban main river accessibility	18	trash per day per person	28	environment impact evaluation case investigation completion ratio	38	visit art activity frequency per person	48	public area wireless internet ratio
9	pubic facility area ratio	19	electricity consumption	29	green building ratio	39	adult literacy ratio		
10	pedestrian length	20	CO_2 production	30	urban population density	40	average student per classroom ratio		

Strategic Plan Report [5], which initially proposed 48 sustainable development indicators (see Table 2), covering 3 core dimensions, including Environmental resources and symbiosis, Social security progress sharing and Economic technology wisdom growth; and embracing 4 sustainable Eco-city principles. The third package of indicators was commissioned by the Taipei City Council and proposed by the Urban Planning Association in May 2005 [6]. They used the 40 sustainable development indicators proposed in 2004 to integrate with relevant policies and regulations so as to make processes to provide a sustainable policy evaluation system.

Currently there have not been any sustainable development indicators for Taipei City to achieve the Eco-city strategy; therefore, the Taipei City Council is seeking alternatives from research results in 2005 [6]. The sustainable development indicators proposed in 2004 have been improved and are closer to the four principles of sustainable Eco-city than what had been proposed in 1996, because it promotes a new element of the participation principle, which the former one does not have. On the other hand, comparing with the previous *Sustainable Development Indicators for Taiwan* [7], which did not cover the issues of equality and participation, the new Taipei sustainable development indicators is much more firmly based on the Eco-city principles.

4. GREEN BUILDING SCHEME

According to the perceptions from the majority of interviewees in the research, the term of Eco-city has been narrowed to be an environmental city, therefore one of the best “shortcuts” to develop an Eco-city or Eco-country might be to introduce a Green Building Scheme and Ecological Engineering Scheme. During the late 1990s, the Green Building scheme and the Ecological Engineering scheme were introduced to Taiwan enthusiastically, and were highlighted and enacted into institutions by academia and the government. The Green Building Scheme was promoted by central government directly; whilst the Ecological Engineering Scheme was introduced by central government but implemented by local government. Both schemes and concepts have been recently and widely introduced via countless training classes and conferences organized by the government. All these efforts have actually brought a positive influence in promoting the concept of Eco-city in Taiwan, at least in this narrow sense.

Since 2002, Taiwan central government has launched a National Development Plan called *Challenge 2008*, which focuses on the globalization, the technological development, and the innovation of environmental protection. Among its ten specific goals of the plan, the *Water and Green Construction Plan* intends to rejuvenate Taiwan's ecology and build a model environment for sub-tropical countries. Among its five sub-plans of the *Water and Green Construction Plan*, the *Green Construction Plan* is crucial to the sustainable development in Taiwan. The *Green Construction Plan* initially introduced the Green Building and the Green Campus Scheme. In terms of the Green Building Scheme, which is mainly the responsibility of the Architecture and Building Research Institute (ABRI), Ministry of the Interior, the focus is on site ecological and environmental technology, construction waste reduction, building energy conservation, natural resource usage, indoor quality control, and green building demonstrative projects; in the future, it “will extend the scheme to green community, green city, and green country” [9].

In the past several years, the Green Building Scheme has secured two main achievements. The first one is the introduction of the *Green Building Evaluation and Labelling System*. Starting in 1999, the *Green Building Labelling System* was established to assess new buildings by both private and public sectors, which qualified against 9 indicators, including Site planting indicators, Water resource indicator, Site water preservation indicator, Daily energy saving indicator, CO_2 reduction indicator, Waste reduction indicator, and Sewage and trash improvement indicator, etc. As of the end of 2005, there were 815 certificated issued, with about 9,522,140 M^2 of floor space coming under the Green Building Label throughout Taiwan. It was predicted by the government that the building energy consumption had been reduced by 20 % and water consumption had been reduced by 30 % in these buildings [10]. The second achievement was developing a Green Building Material Labelling

system which started for private enterprises or factories in July 2004. It targeted four aspects, including health, recycling, high performance and ecology. And there are currently 2 companies who are qualified to issue the Green Building Material Label in Taiwan (see Figure 3).

Fig. 3 The Green Building Label and the GreenBuilding Material Label [10]

In addition, the Construction and Planning Agency, Ministry of Interior, revised building laws, which attaches green building regulation as a supplement into the Architecture Technology Codes in March 2004. The supplement includes the following items: green site planning, site water saving system, building energy conservation, life water reuse management system, and green building materials utility rate. There are different stages to implement enforcement in January 2005. It is expected that more private buildings will take part in the green building practice. As the Green Building Scheme is directly promoted by central government, Taipei City Council does not play a vital and active role in implementation, and there have been some successful cases in Taipei.

5. ECOLOGICAL ENGINEERING SCHEME

Taipei City Council has played a very important role in implementing the Ecological Engineering scheme. The term of "ecological engineering" was originally invented by Howard T. Odum in 1962 [11], who argued that the ecological engineering is "those cases where the energy supplied by man is small relative to the natural sources but sufficient to produce large effects in the resulting patterns and processes". In order to employ the Ecological Engineering Scheme, Taipei City Council followed central government's instructions to establish the Committee of Ecological Engineering inside Taipei City Council in 2002. Up to now there have been 35 completed projects, including buildings, roads or restored river banks, completed by the Department of Public Construction Works of Taipei City Council. It is suggested that the Ecological Engineering Scheme should also invite the private sector to participate.

Meanwhile, it has been also argued by the interviewees and the government that whether the Ecological Engineering Scheme and the Green Building Scheme are on the right path towards the sustainable Eco-city. Currently these two schemes are on the top priority of the implementation of government's sustainable strategy, and it is suggested that not only the public sector but also the private sector could put more efforts on both schemes. Therefore, the government need to encourage the private sector to adopt and implement the two schemes in practice. However, it is a rather "technocratic" set of solutions and eco-centric approach.

6. CONCLUSION

Planning for the sustainable Eco-city has been highlighted in Taipei City in recent years. The environment of society has been being progressed; however, the Taipei City sustainable development indicators have not been implemented. The *2005 Environmental Sustainability Index* ranked Taiwan 145th. For planning and developing a sustainable Eco-city, Taipei City has put significant efforts to the implementation of Green Design and Green Building schemes. The implementation of the two schemes has achieved considerable positive results; therefore, the two schemes are believed to be useful for developing the sustainable Eco-city. It is suggested that not only the public sector but also the private sector could put more efforts to follow the two green schemes. However, it is a rather "technocratic" set of solutions and an eco-centric approach, which needs much more requirements.

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