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An Exploration of Law Instruments in Kaohsiung Sustainable Actions: Taking Kaohsiung City Green Building Autonomy Act for example

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Abstract: *After Kaohsiung City merging with surrounding Kaohsiung County and thus expanding in scale in 2010, Kaohsiung city has the characteristics of multi-ethnic, diverse landscape, and distinctive cultures. The promotion of the action plan for Kaohsiung building environment transformation is based on the planning of the residential and commercial sector. A periodical approach was used for plan promotion according to various topographical and cultural environments, stressing local culture, green buildings, and citizen participation. Relevant laws were established to ensure the practical implementation of the transformation plan. This plan enables a reconsideration of cultural positioning and corrects the development of built environments. By adopting a core positioning of water and greenery, the concepts of ecology, economy, livability, creativity, and internationality are used to remold the living environment of Greater Kaohsiung. Thus, along with the citizens of Kaohsiung City, we participated in the action plan for sustainable building environment transformation. "Kaohsiung City Green Building Autonomy Act" is the National Capital Act to make the green building standard higher than the central ones. By stipulating the green building design of equipment and facilities, the act laid the technique foundation of environment control for the meaning of Kaohsiung citizen's green life. Moreover, it shows our responsible attitude to deal with the issues of climate changing and high carbon emissions. The thesis explores many directions of the act, including the legal institution process, the strategy of awarding and forcing working together, the financial resources raised by the creation of green building development fund, the benefit analysis of building license applications for the past two years. At last, this propose is to advise the act in connection with the complex issues of urban conservation, public participation. There is an important reference value to solve the problem of citizen's livelihood and improve the quality of life.*

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1. Introduction

After the merger of Kaohsiung county governance range 2946 km^2, a vertical elevation 3500 meters above sea level, with a multi-ethnic, diverse landscapes, urban and rural culture with distinctive characteristics. In response to sustainable development, disaster prevention and other needs in the face of industrial pollution, the elderly birthrate, industrial exodus, urban and other complex issues disappear historical features, new buildings must have innovative Kaohsiung value and meet the expectations of the public towards.

To establish a subtropical climate zone new paradigm of low-carbon cities livable city government, the Executive Yuan has been awarded "eco-city program to promote green building" with a series of low-carbon action. Following the above, new and existing buildings in Kaohsiung apply "smart green building improvement" on the green building technology research and promotion. And with the implementation of the building set "three-dimensional green" buildings as a “Sunshine Community” and legal counseling illegally built into tin roof "photovoltaic roof-top" and other projects and innovations Act.

However, the government's policy tool: Act peremptory norms of urban style and cultural preservation under the same whether positive improvement. How to upgrade the industry to deal with sustainable development? The motivation of this paper is to discuss urban life of ordinary people saved contradiction with the complex range of issues of mutual influence.

2. Kaohsiung green building autonomous regulations

As the city's carbon dioxide emissions per capita for the country's highest city, how to reduce the damage to the buildings of the city environment and to follow the relevant provisions apply outside the central green building, and according to the city's special climate conditions, Kaohsiung develop higher than the central regulation of carbon reduction standard and green building requirements to expand the effectiveness of carbon reduction. The goal of transformation of city into "the people-oriented, disaster prevention, green energy, industry" concept as environment friendly has been created "from enhancing the construction industry to promoting sustainable urban aesthetics and construction Environment" win-win situation. Kaohsiung green building autonomous regulations were announced 18th June, 2012, and implementation in the same year on 1st July.

2.1 Contents of Kaohsiung City Green Building Autonomy Act

"Kaohsiung City Green Building Autonomy Act" was integrated urban climatic conditions of Kaohsiung, such as high temperature; high humidity and abundant sunshine. In response to environmental issues on Kaohsiung buildings, including insulation, urban heat island effect and storm flood control, can be achieved the local characteristics of green building and the goal of building carbon reduction and mitigation on water saving, power reduction, citizen

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health, and environmental protection. This Act regulates all public and private buildings for public use, and includes the use of existing buildings for change. The green building codes have various criterias for different building sizes. The items include solar photovoltaic and/or greens roof top of the building, enhance thermal insulation, temporary garbage storage facilities, water-saving toilet, rainwater and gray water recycling system, storm water catchment tank, improvement of the use of green building materials, and bicycle parking spaces and elevators etc.

In addition to setting related to green building codes, the autonomous regulations also provide incentive grants related measures and regulations relaxed, for example: green building construction permits a reduction in the application of the provisions of fees, city budget subsidies folk green construction, Awards the deep balcony and three-dimensional greens set, and green building related facilities free application method miscellaneous licenses and other sources etc. These will greatly enhance the willingness to set builders with green building facilities to achieve a win-win for the environment and industrial situation.

2.2 Benefits of Kaohsiung green building autonomous regulations

In response to the instantaneous rainfall and increased building disaster prevention capabilities, Active in green building city ordinances and demonstration projects on "Green Roof" were introduced. From 2011 to 2013, The benefit is to complete seven cases in six places of public buildings green roof demonstration cases, which includes Kaohsiung City Art Museum (Figure 1), the Shin-Shing Branch of police station next to MRT O5R10 Stop, Kai-Shieng Hospital, Fengshan Eastern Revenue Service Office, Kaohsiung Labour Bureau, San Min District Office photovoltaic farm (Figure 2) etc. Total green area obtained 4,623 m^2. The private sector applied green roofs total 213 cases and the green area of 65,500 m^2. A total of 1,402.64 tons of carbon emissions reduced in three years. Recently, the annual goal on green roof settlement targets 30,000 m^2 which equals carbon sequestration capacity of 600 tons per year. The scattered areas set up to help micro detention and increased urban sponge function, than fundamentally prevent the urban flood.

Figure 1 Roof greening project of Kaohsiung City Art Museum

Figure 2 Roof PV Farm of San Min District Office

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In 2013, the amount of 230 construction license were applied to green building applications, accounting for 5.98% of the full year of construction permits of 3848 applications. These 230 green buildings face the resulting environmental benefits include: green roofs settlement achieved the area of 31,788 m2, increased solar photovoltaic power generation facility set 4,616 peak kilowatts (Kwp), which was Equivalent to 4.6 Kaohsiung Main Stadium of World Games, increased bicycle parking spaces 1657 seats and bike affiliated shower area 239 m2, the rainwater harvesting tanks were set up about 16200 m3, the installation of energy-saving lamps set the total 1,630.7 KW, which rovincial power had 815.3 KW, the buildings have required to set rainwater catchment and water recycling facilities up to 13,200 tons per year to effectively mitigate urban storm, which the equivalent of six new standard pool capacity annually.

3. Award requirements - photovoltaic building ordinance

Kaohsiung City Government in order to pursuid the environmental sustainability and also to follow the Central Government Policy on “strengthen energy conservation and carbon reduction, the development of clean energy, expanding green industry, green energy and recycling applications in urban and rural construction”, established the country's first photovoltaic building ordinance. The aim is to face the view of Kaohsiung climate “abundant sunshine”, creative skyline “hut lined”, problem of heat island “less green parks”, carbon emissions “carbon dioxide emissions in the top of the nation”, and citizen needs “roofing insulation facilities”. Kaohsiung City Government has promoted the application and development of solar photovoltaic facilities as a major policy.

3.1 Contents of Kaohsiung Act of photovoltaic building

“Kaohsiung building roof solar photovoltaic facility setting approach” was issued and implemented on 26th April 2012. Connection also completed “Kaohsiung photoelectric smart building label certification approach” and “Kaohsiung City Government solar photovoltaic facilities executive task-force guidelines”. The above acts were customized as all the country's first local ordinance. The criteria stipulate photovoltaic facility with the height 4.5 m below, and an area less than 50 % of gross floor area can be free account its height and area. After 2013, the solar PV roof can be set and covered the whole area of a roof , terrace and roof projections can also be attached.

3.2 Benefits of Kaohsiung Act of photovoltaic building

Municipality actively promoted solar photovoltaic and the first smart community with photovoltaic roof of 4.5 m height has been completed (Figure 3), and BIPV sunshine factory has also been completed and opened (Figure 4). The building numbers of solar photovoltaic applications was top four of Taiwan in 2011. After the implementation of the photoelectric Act, the number of applications was 280 in total of 2012 as the top one city in Taiwan. The ratio was about 19.8 % of the country's total number of applications with a striking result. The total capacity is set up to 15,335 KW. In 2013, the city's total number of cases to apply was

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571 (growth rate of 204 %), the same first highest number of cases nationwide application with a total capacity of up to setting 23,995 KW.

Figure 3 Kaohsiung first smart community with PV system

Figure 4 Kaohsiung first BIPV Sunshine Factory

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Annual generation capacity of 19.92 million kWh and carbon reduction amounted to 12,400 tons which were equivalent of 587 hectares of forest carbon absorption measurement. The solar photovoltaic life up to 20 years, These set in Kaohsiung current total capacity approximately 40.546 MW to estimate a total reduction of about 600,000 tons of carbon dioxide in 20 years, which means the carbon sequestration benefits equivalent to an area of about 30,000 hectares of forest absorbed with an afforestation cost savings equal to $ 100 billion. Taiwan also reduced for about 1.1 billion carbon tax. These settings can also be avoided photovoltaic facilities illegally built a new generation and gradually changing the existing rooftops chaos.

4. Conclusion and Recommendation

4.1 Conclusion

Kaohsiung in recent years to develop a low-carbon measures to spare no effort, including industrial zone integration, the use of solar energy, public bike settings, promotion of low-carbon green energy, construction of bike paths, wetland ecological corridors etc. Actively seek to uniquely Asian International Committee for Local Environmental Initiatives (ICLEI) Kaohsiung environmental sustainability capability training centers, and to cooperate with the International Initiative for a Sustainable Built Environment (iiSBE) on the verification of Kaohsiung green building project. Promoting environmental sustainability proved Kaohsiung strength of the transition to a low carbon green city.

The actions of Kaohsiung toward the sustainability are fruitable. Kaohsiung was named as the one of five Asian cycling center obtained from CNN, and the projects of “Heart of Love River”, “Chau-Tsai Wetlands”, “Lin-Pi Wetland Park”, and “Chung-Tu Wetland Park” successively won the “Construction of the World's Excellence Award” from World Real Estate Federation (FIABCI). The Sustainable Development Action in 2013 was obtained a “Sustainable Environment and Harmonious Society” Outstanding Group Award and Healthy Cities Award from the central government “Executive Yuan” of Taiwan. Futhermore, Kaohsiung pubic consturctions and projects got 4 Gold, 3 Silver and 3 Bronze Medals of “International Livable City Award”, which was organized by the United Nations Environment Programme and has said as “Global Green Oscar” (Figure 5). These represents the achievements of Kaohsiung City Government in promoting ecological construction obtained worldwide recognition, involving the issues on urban plan, community environmental management, and sustainable development of natural resources.

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Figure 5 International Awards for Livable Communities 2013

4.2 Recommendation

In summary discusses the strategy of sustainable development in Kaohsiung city preservation of content and meaning, made the following recommendations:

1. Sustainable development strategy will need to reflect the true lives of ordinary people: Kaohsiung City Government will continue in the environmental reform movement, the implementation of sustainable buildings should balance between the decree to develop goal-oriented tools and the designers' creation on the aesthetics of life. Urban and architectural style should return to local conditions, ethnic settlement culture, the nature of social life, and the public participation to opinion feedback.
2. The central government should create laws to fully empower local urban and rural landscape of elasticity: The implementation of the policy, public sector often utilize the integrated decree tools and resources. Local government should try to integrate urban design and construction management departments of the ambitious reform efforts worthy of recognition for the Kaohsiung urban and rural landscape. "Viewing grobally, Acting locally" means that the the central law and building codes of the construction and management should give more authority of the criterias for local circumstances and local government should carefully autonomy to set construction management regulations,

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