



The future noise policy in Taiwan

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ABSTRACT

High population density and the mixed residential and commercial zones cause a lot of noise complaint cases in Taiwan. The major noise sources in community are such as entertainment and business noise, the low-frequency noise from cooling towers, pumping fans, air-conditioning systems, as well as the neighbor noise. In addition, some transportation system such as railway, mass rapid transit and freeway those without effective buffering zone induce traffic noise complaints from the residents along the wayside. In order to solve the noise problems, the competent authority refer to "National environmental protection plans", proposed a new noise control policy for 2011 to 2013. The main content of this policy divided to six topics. First is to amend and revise the regulations and standards, including open spaces around wind power generators and so on. The second is to joint the environmental protection department and police office to implement noise control of in-use vehicles and improper modified vehicles. Third, the traffic noise control, to strengthen sensitive noise monitoring points of the mass transit system, railways, highways, etc. The fourth is the neighbor noise control, to strengthen the handling mechanism among the environmental protection department, police office and development department. The fifth is to establish the certification and strengthen the skill and knowledge of inspectors. The Sixth is to propose the noise standards of indoor environment.

Keywords: Regulation, Policy, Noise control

1. INTRODUCTION

Taiwan is one of the most densely-populated areas in East Asia. The population density is about 640 persons/km² in 2010. Among the large cities, the most population density of Taipei City is about 9,677 persons/km² in 2010. With limited land and a high density population, mixed-use urban environments are quite common in Taiwan where commercial premises, like entertainment, retail and office, are located adjacent to residential buildings. Commercial operations and recreational activities generate noise even the neighbor noise, which have significant adverse effects on those living nearby. Besides, cooling towers, exhaust fans, and air conditioners are common sources of low frequency noise, which is the subject of repeat complaints. In addition, due to fast expansion of cities and massive urban population growth, it is quite difficult to create a buffer zone around construction sites to reduce construction noise impacts. There have also been complaints about the noise generated by the operation of some urban transport systems, such as the high speed rail and the mass rapid transit system. According to the report, the environment noise compliance rate was from 82% to 87% as well as from 2004 to 2009. But the number of noise complaint cases was from 33,136 to 50,800. It seems that the people's requirement for quiet environment increased. Especially for the neighbor noise, low frequency noise and traffic noise. To alleviate the raise of noise complaint cases year by year, the central competent authority Environmental Protection Administration (EPA) implements several measures for noise control for 2011 to 2013.

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2. RELATED ACT AND REGULATIONS

2.1 Noise Control Act

To provide a better living environment, the EPA promulgated the Noise Control Act on May 13, 1983. The last amendments to the Act were approved in 2008. The main topics of Act include the following. The noise generates from factory plants or sites, entertainment premises, business premises, construction projects, public address facilities and other premises, construction projects or facilities officially announced by the competent authority which shall not exceed the noise control standards according to different categories of noise control zone and time interval. The EPA enforced the noise control of on-road motor vehicles. The citizens may report noise impairing public tranquility for in-use motor vehicles to the competent authorities, those vehicles which have been reported and notified by the competent authorities shall undergo testing at a designated location by a designated deadline. With regarding to the sound emitted by the motion of vehicles in land transportation systems including expressways, freeways, railways, and mass rapid transit systems, after the competent authority has measured the sound level in the section in question and found that it exceeds the land transportation system noise control standard, the operating or management organization shall determine a noise improvement plan for that section within 180 days of notification. To reinforce the control of noise generated by military airports, the military aviation competent authorities are legally obligated to discuss with local governments to make aviation noise improvement plans and preventive measures.

2.2 Noise Control Act Enforcement Rules

The Noise Control Act Enforcement Rules were promulgated in 1984, which makes detailed description of Noise Control Act. The last amendments were approved in 2010.

2.3 Guidelines of Noise Control Zone Making

The Noise Control Zone is based on “Guidelines of Noise Control Zone Making” and the Noise Control Zones are designated to suit the different demand to local land utilization conditions by local governments. There are four classes and general cases are as following:

- Class 1: For the areas which need very quite environment
- Class 2: The areas which for residential use mainly
- Class 3: Residential and commercial areas mixed or residential and industrial areas mixed
- Class 4: Industrial area

2.4 Noise Control Standards

In 1992, the EPA announced the Noise Control Standards, which was stipulated in accordance with the Noise Control Act. In this standard, the sound emitted from the factory plants or sites, entertainment premises, business premises, construction projects, and public address facilities within noise control zones shall not exceed noise control standards.

After several studies, measurement results revealed that some noise sources have the characteristic of low frequency noise. The first step was to set the low-frequency(20Hz-200Hz) noise standard in 2005 for both business and entertainment premises, which were the top in noise complaints among all noise sources. It’s the first of its kind in the international community. Immediately following that was the amendment for Noise Control Standards in 2006 targeted mainly for factory plants and comes into effect from Jan, 1, 2008. The fourth amendments were announced on Feb, 25, 2008 which set the low-frequency noise standard for construction sites and enforced from Jan, 1, 2009. The last amendment was issued on Jan, 31, 2009. Following are the detail items:

2.4.1 Time intervals

The time intervals are dependent on the different class of noise control zones.

Table 1 - The time intervals in Noise Control Standards.

	Daytime	Evening	Nighttime
Class 1 & Class 2	06:00-20:00	20:00-22:00	22:00-06:00
Class 3 & Class 4	07:00-20:00	20:00-23:00	23:00-07:00

2.4.2 Instrumentation

According to the modification of CNS No. 7129 of standards for sound level meter, the Noise Control Standards amended the relevant content and mentioned the IEC 61260 for low-frequency noise measurement.

2.4.3 Testing time period

Choose a time that is most representative of the noise being produced, or a time designated by the petitioner to measure sound level.

2.4.4 Measuring location

When taking measurements within a frequency range of 20 Hz and 20 kHz, apart from measuring noise in the residence or living quarters designated by the petitioner, measurements shall also be taken at a location around the periphery of the factory, premises or site designated by the competent authority at a distance of one meter or farther from the nearest building wall. On the other hand, when measuring within a frequency range of 20 Hz to 200 Hz, readings shall be taken in the residence or living quarters designated by the petitioner at a distance of one meter or farther from the nearest inside wall. All inside doors and windows shall be closed; if other sources of noise affect the measurement results, these sources shall be turned off and be kept idle temporarily.

2.4.5 Evaluation Method and Standards

Based on the following sound qualities of the sound source, the result of calculations for equivalent sound level (L_{eq}) or maximum sound level (L_{max}), the results shall not exceed the values shown in Table 2. The index is dB(A). There are two situations to check the results. If the peak of noise read from sound level meter displays regularly at periodic or intermittent cycles with the maximum value approximately the same, take the average of the L_{max} in five consecutive readings. Other situations shall be expressed by L_{eq} . The measurement time shall be not less than 2 minutes.

Table 2 - Noise standards for factory plants/business premises/construction projects

category	Time Interval	Daytime,	Evening,	Nighttime,
	limit	dB(A)	dB(A)	dB(A)
Class 1		50/55/70	45/50/50	40/40/50
Class 2		60/60/70	55/55/60	50/50/50
Class 3		70/70/75	60/60/70	55/55/65
Class 4		80/80/80	70/70/70	65/65/65

Table 3 - Low-frequency noise standard

Noise Control Zone	Factory plants			Business and entertainment premises			Construction projects		
	Daytime, dB(A)	Evening, dB(A)	Nighttime, dB(A)	Daytime, dB(A)	Evening, dB(A)	Nighttime, dB(A)	Daytime, dB(A)	Evening, dB(A)	Nighttime, dB(A)
Class 1 & 2	42	42	39	35(40)	35	30	47	47	42
Class 3 & 4	47	47	44	40	40	35	49	49	44

2.5 Automobile Noise Pollution Reporting Regulation

The public can either enter details of the vehicle registration number, vehicle type, and the place where the noise pollution incident occurred online, or they can make their report by phone or fax to their local environmental protection bureau. The owner of the offending vehicle will then be notified to take it to a designated testing station.

3. CURRENT STATUS

3.1 Noise Complaints Cases Statistical Analysis

The number of noise complaint cases is tabled since 2004 as Table 4, it has shown that the ascending trend for a long time except 2006 and 2008. We can learn from the information that the noise complaint cases remains high, showing that people pay attention to the noise problem. Among the category, the largest number of categories of cases is entertainment and business premises, because of the mixed-use urban area. The construction projects significantly increased in recent years because of the public constructions. The factory plants complaint cases remains about 6000 cases from 2004 to 2007, but decreased from 2008, might because of some factory moved or the noise control of low-frequency. The cases of other category which neighbor noise included increased from 2008 because of the 1999 hot-line was on-line or the official announcement of prohibited activities added by local governments in that year.

Table 4 - Noise complaints cases by category from 2004 to 2009

Year	Factory plants	Entertainment business premises	Construction projects	Public Address facilities	Traffic noise	Military authorities	Other	Total
2004	5,656	12,236	7,360	3,600	171	15	4,098	33,136
2005	5,882	15,734	8,249	3,779	236	30	4,789	38,699
2006	5,599	13,523	10,702	4,397	183	49	3,334	37,787
2007	6,400	14,510	13,017	4,688	181	63	3,948	42,807
2008	4,563	13,866	12,497	3,705	146	67	6,095	40,939
2009	4,358	16,517	16,181	5,430	122	63	8,129	50,800

3.2 Public Nuisance Cases Statistical Analysis

According to the report of EPA annual report 2010, the public nuisance such as noise, waste, odor, air pollution, water pollution, toxic etc., was 189,500 cases in 2009, compared with 2008, the increment was 25,275. By territory, the top City or County was Taipei city 63,640 cases (34.97%), New Taipei City 29,949 (15.78%) followed. By object, the top object been reported was resident, 65,172 cases (34.34%), the second object was business, 43,307 cases (22.82%) and the third was factory plants, 29,574 cases (15.53%). By petition categories, the top one was noise, 60,768 cases (32.02%), waste was second, 55,761 cases (29.38%) and odor was third, 45,203 cases (23.82%).

The number of public nuisance increased because by the amount of Taipei City, which increased 15,647 totally, accounting for 62% of annual increment for the resulting increase of the main source. By petition categories, the main source noise increased 8,182 cases and main object resident increased 15,647 cases, showed that the relation of hot-line activated.

4. THE NATIONAL NOISE CONTROL PLAN 2011-2013

Regarding to the noise problem, this plan refer to “National environmental protection plan” and “National comprehensive development plan”, the object to achieve a healthy, quietness and high-quality environment. The content is as following:

4.1 Regulations Review

- A. To add the noise control standards for noise emitted from open space facilities or area such as wind power generators, harbors, power substations and gondola.
- B. To announce the facilities prone to generate noise by stages.
- C. To tighten the land transportation system noise control standards and revise the relevant measurement methods.
- D. To propose the fifth phase vehicle noise control standards and related test methods, and

harmonize with the EU standards.

4.2 In-use car noise control

- A. To cooperate with police to strengthen the in-use vehicle noise roadside inspection.
- B. To improve the procedure of the public reporting noisy vehicles.
- C. To prevent the improper use of vehicle modification.
- D. To inspect the product of vehicle exhausted pipes.

The co-organizers are departments as well as police, transportation, product management and local governments.

4.3 Traffic noise control

- A. To strengthen the noise monitoring sensitive section in question along mass rapid transit system, railways, freeways and highways.
- B. To assist the competent authority of traffic departments to establish the self-improvement plan.
- C. To assist the local environmental department to supervise the implemented self-improvement plan delivered from transportation management agency or organization.
- D. To coordinate with traffic competent authority to evaluate the feasibility of low noise pavement.
- E. To coordinate with housing department to research and establish the insulation specification of building wall.
- F. To establish the capacity of noise mapping.

The co-organizers are transportation departments and related institutions and local governments.

4.4 Neighborhood noise control

- A. To strengthen the coordination of environmental protection, police and housing work agency, to deal with the neighborhood noise complaints.
- B. To deliberate and ask the local governments to comply with the Article 8 of Noise Control Act, enhance and review the scope of prohibited activities.
- C. To promote the concept that public not to make noise during nighttime and coordinate the local government to propose the guideline which comprise the frequently neighbor noise patterns.
- D. To recommend to the competent authority of housing and building, include the noise and vibration insulation consideration, especially for the residential buildings.
- E. To establish the legal consultation platform for public which can query for legal affairs, neighbor noise improvement information etc.

The co-organizers are departments such as police, housing and local governments.

4.5 Noise inspection and counseling

- A. To establish the certification system and strengthen the legal cognition, skills and professional knowledge of officials.
- B. To build the platform that combine with inspection, counseling and improvement to resolve the repeat complaint cases. And establish the database of repeat complaint cases, recheck the spot frequently.
- C. To increase the completion rate of case improvement and enhance the case audit as the point of annual performance.
- D. To combine with prone to noise control with the facilities to enhance the inspection of construction site.

The co-organizers are local governments.

4.6 Indoor noise management

- A. To draft a quiet indoor sound recommended value.
- B. To establish a quiet community index.

5. IMPLEMENTATION OF CONTENT

Noise Control Act was promulgated on Dec. 3, 2008, the Enforcement rules and relevant regulations were also amended in 2009 and 2010. From 2010, the point of regulation was focused on the noise control of construction sites and facilities. The facilities prone to generate noise will be

announced by stages in following years. Because the noise control of open space and facilities such as power generator and gondola are quiet complex, the noise control of open space and facilities will be drafted by increment of noise, comparing with background sound level. The noise standards for land transportation system will be tightened.

The website of reporting high noise in-use motor vehicle was online from 2009, the content will be revised and simplified later. For the in-use motor vehicle noise control, the EPA will cooperate with police office, inspect the on-road motor vehicles by roadside, especially that location or road section where modified motor vehicle usually congregated or sensitive residual areas nearby. Besides, to prevent from improper modification and removal of mufflers, the certification of exhaust pipes shall take into account and coordinate with product management department.

In order to resolve the problem of traffic noise, the Article 14 and 15 of Noise Control Act, has clearly specified that for sound level in the section in question, the traffic system operators or management organizations should propose improvement action plan and implement the plan after the authorities approved the plan. The EPA will assist the local governments to strengthen supervision on land transportation systems spot measurement and urge the transport system operators and management organization to improve the implementation of the land transportation system improvement action plan. Transportation competent authority should establish the capacity to mitigate the complaint against traffic noise. To reduce the traffic noise level, will coordinate the transportation competent authorities to test low noise pavement along noise sensitive area. To coordinate with housing and plan department to research the façade insulation practices to mitigate traffic noise effectively.

For neighbor noise, the EPA will continue to assess the further announcement of prohibited activities, establish coordination mechanism to deal with the neighbor noise effectively and quickly. In addition, promote the concept that public should be kept quiet while engaging any activity at night. To coordinate the local government to propose the guideline which comprise the frequently neighbor noise patterns, such as piano sound, children crying etc. Because such noise will propagate through wall and floor, it needs to establish the standard for evaluation of building impact sound, reduce the problem in the future.

In order to deal with noise complaint cases effectively, since July 1, 2011, any officials who in charge of noise measurement and inspection, need to trained with noise training courses and certificated. In addition to tracking the repeated noise complaint cases, the local competent authorities need to follow up the cases and provide some advice for the noise sources. The results will conclude in the annual achievement assessment for each environmental protection department. We are looking forward to reducing the number of repeated complaint cases by these measures.

Some people often expressed that the sound environment such as hospitals, libraries or other indoor public place were too noisily. In 2009, the EPA made public the “Quietness mark” to posted on public places, which could remind the public the necessity to keep quiet in public places. The recommended limit for indoor public places will propose in the future, to help public places make self-management of sound environment. Besides, recommended one to two communities, using a common living guideline to create a pattern of comfortable and quiet environment, then extend to other communities gradually. Develop community day and night noise control and community self-management of residents and other measures such as asking for low noise bus in designated routes etc., To implement the measure by stages and by items, then review the feasibility of promoting to establish a model of quiet community.

6. SUMMARY

Noise is the main environment problem in Taiwan, the EPA expects the implementation of this plan, the environmental noise measurement qualified percentage shall reach the annual object, in 2011 more than 87.9%, in 2012 more than 88.1%, and the number of complaint cases decreased gradually. The EPA will also review the regulation and standards aggressively and alleviate the noise complaint cases from noise source improvement guidance, mitigate the noise from source, propagation routes and protect the receivers.

REFERENCES

[1] Environmental Protection Administration, “National Noise Control Plan”, (2010)(in Chinese).