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Environmental Noise Abatement Policy in Thailand

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ABSTRACT

Thai environmental noise abatement policy is illustrated in this paper for two purposes: to describe how the policy was developed in Thailand, and to lay the structure of the policy down. As a result, its problem will be discussed and given the new wave of the better noise abatement policy and regulation. The noise abatement has not been viewed as a priority pollutant in all Thai national environmental management plans; hence, the manpower and financial support for noise abatement will never be sufficiently granted. In a country like Thailand, insufficiency in specialists on acoustics or noise pollution control has delayed the successful abatement policy implementation. Establishment of the noise abatement concept in substantive law and regulation is also problematic. The enforcement of the policy, law, and regulations will be the most important role to come across in order that the noise abatement will be successful.

Keywords: Environmental Noise, Noise Management, Noise Policy

1. ESTABLISHMENT OF ENVIRONMENTAL NOISE ABATEMENT POLICY IN THAILAND

The sustainable environmental management in term of policy and law has been influenced since 1970s by international law. The development of the Enhancement and Conservation of the Environmental Quality Act B.E.2518 (1st wave) in 1975 wrote down the framework of the environmental protection, including noise pollution management in Thailand. As a result, the National Environmental Board and its administrative office were established to play a key role in the environmental management. (Table 1) [1]

The first wave of the noise pollution policy and law was attached in the air quality management policy and law development, including the environmental impact assessment process (EIA process) of the required projects, the official records of noise complaints, and the annual report on national ambient noise situations. The noise monitoring activities have been set up in order that the noise levels are published in the annual report of the environmental quality situation, required by law. The noise monitoring equipment was purchased by the Office of National Environmental Board (ONEB) to carry on noise measurement of ambient noise situation and the complaint cases related to noise pollution.

The noise impacts determination was widely discussed in the EIA reviewing process of the required project in each noise emission determination, starting from the second wave of the Enhancement and Conservation of the Environmental Quality Act B.E.2535 in 1992 (ECEQA B.E. 2535). The noise prediction models were adopted into the determination of noise impacts in the EIA process by the environmental consultants and noise experts. The proposed noise monitoring plan of each of the EIA required projects put down the alternative scenarios of noise monitoring methods of environmental noise. The noise pollution subject has been included into the environmental science curriculum in leading universities since then.

The Air Quality and Noise Management Division, Pollution Control Department (PCD) was established in 1992 by law, reshuffling to be the Air Quality and Noise Management Bureau in PCD under the Ministry of Natural Resources and Environment (MoNRE) in 2002. The noise monitoring equipment was procured by the PCD to perform the mandatory on annual noise situation in the

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environmental quality situation report. The Noise and Vibration Pollution Section in the Environmental Research and Training Center (ERTC) under the same Ministry was concurrently established in 1992 and reshuffling in 1992 to take charge of noise and vibration related research project. The noise measurement knowledge was spontaneously accepted among the government officers. The training courses on the environmental noise measurement were launched for capacity building in the government side.

The noise permissible limits of on-road vehicles from many countries were adopted into Thai regulations as known in the name of the "Motor Vehicle Noise Standards". (Table 1) Both noise levels of the new and used motor vehicles periodically measured and recorded into data collection of motor vehicle noise levels by PCD officers in order to lower the noise levels standards down. The EU and Japanese noise permissible limits for motor vehicles were adopted by PCD into Thai regulations, commonly. [2]

The specific noise emission from the long-tailed inland vessels or "boat taxi" and the blasting noise from quarry are identified as local typical noise emission in Thai society. The specific noise permissible limits were set up by law. (Table 2) [2]law.. Nevertheless, the ambient noise levels to protect human hearing ability using the 24-hour Equivalent Continuous Sound Pressure Levels (dBA) or $L_{eq,24hr}$ (dBA) from the United States of America was adopted by the Notification of the National Environmental Board No.15 on General Noise Standards, dated on 12th March B.E.2540 (1997).[2]

The method for rating industrial noise affecting mixed residential and industrial areas or BS4142-1990 has been also adopted into Thai noise regulation on the Notification of the National Environmental Board No.17 in 2000 [2] for general purposed of the annoyance from any sources of loud noise. The BS 4142-1990 was superseded by the BS 4142-1997, therefore it influenced on the amendment of the Notification of the National Environmental Board No.29 on Annoyance Noise Level Standards B.E. 2550 (2007) for the same purposes. (Table 1)

2. EXISTING NOISE ABATEMENT POLICY, LAW, AND REGULATION

Generally, the noise abatement, stated in various levels from national to local, is not prioritized as an important pollution by Thai policy makers. Since 1994, the overview of noise pollution situation, the measured noise levels, the noise complaints statistics in Thailand was mostly collected and annually published by PCD, as mandated by the ECEQA B.E. 2535(1992). They were published at PCD website, <www.pcd.go.th/indexEng.cfm>. Generally speaking, although the noise-level situation is not logically worse but there were still loud noise situations, especially in the vicinity of industrial plants, international airport, roadside areas, and specific point near pubs or bars in the community area from reproductive sources. [2]

2.1 Noise Abatement Policy

Noise abatement policy was established under the first wave of the ECEQA B.E.2518 in 1975 and gradually developed on the direction of the second wave of the ECEQA B.E.2535 since 1992. The existing policy is presented in the Environmental Quality Plan B.E. 2540-2559, comprising of the five years implementation plan which is at present the Environmental Quality Plan B.E. 2550-2559 (2007-2116) [3], comprising of the promotion on vehicle noise pollution management, participating by private sectors, the reinforce of new legal instrument on noise pollution control—i.e. promote noise zoning, enforce new regulation on self-management or treatment of noise in workplace and community, enforce possible control measures on noise emission in community, enforce new rules and guideline for low-noise pavement of new road and re-paved the existing road pavement, etc.

The noise pollution management policy is included in the Master Plan on Air Quality and Noise Management and the Strategic Plan on the Pollution Management B.E.2551-2554, proposed by PCD. [4] Even though the new Draft thereof, including noise management policy under the concept of the sustainable consumption and production, green economy, low carbon society, zero waste, participatory public policy process, is being prepared [5], the present policy and law enforcement only pinpoint to the post-audit process, post-monitoring process. In the local levels, the Action Plan for Bangkok Metropolitan Air Quality and Noise Management B.E. 2555-2559 (2012-2116), including the noise management, proposed by PCD and Bangkok Metropolitan Administration (BMA), is under public participation and revision process. The noise management policy will be implemented in companion with the air quality management in all the above policy and plan.

2.2 Noise Abatement Law and Regulation

Policy instrument similar to legal instrument shares advantages to perform noise reduction in opposite way. Policy is quickly implemented by the related government and officers, whist law and regulation is slowly progressed in legal process. The policy implementation, development of law, and it enforcement will be concurrently conducted under sharing benefits basis to turn down the volume of loud noise. Regulations and guidelines related to noise pollution are developed and published in order to fulfill the gap between noise reduction at its source and others recommendations. The present noise regulation is illustrated in Table 2. [6][7]

3. WHAT ARE THE DIFFICULTIES WE FACE IN REALITY?

The challenges or difficultiyes are that it is hard to practically accept and learn all of the difficulties by only a person perspective; moreover, it is a too-advanced step to visualize all of them in overview perspectives. Laying down the overview perspectives will take input observations and recommendations from the other's investigation and evaluation. (Figure 1) The answer will be readily illustrated almost of difficulties in the reality in order to determine the problems, strength, and weakness of the noise abatement management by empirically based investigation.

3.1 Knowledge

Information and understanding related to sound or so-called "acoustics" is fundamentally necessary for developing the proposed noise management plan, noise abatement policy, noise regulation, noise control application, etc. (Figure 1) The knowledge of noise pollution, however, has been considered only when the noise conflicts or complaints come into spotlight.

Regarding the understanding of noise pollution, the volume of loud noise will depend on the receptor's perception, frequency distribution, living condition of receptor, personal health condition, culture, etc. At least, the basic physics of sound, sound propagation outdoor, room acoustics should be introduced for understanding of loud noise effects such as noise induced hearing loss, sleep disturbance, speech interference and intelligibility in order to provide the appropriated noise abatement program. (Figure 1)

All the above mentioned knowledge on noise pollution are generally circled inside the academic world—i.e. acoustics for science students, noise pollution for environmental science students, noise controls engineering for applied science students as the compulsory or optional courses. For example, the noise pollution is a compulsory course for the bachelor of environmental science in Thammasat University but it is an optional course for the same degree in King Mongkut's Institute of Technology Ladkrabang (KMITL), apart from difference in curriculum and laboratory quality. Besides, only few books or documents on noise related issue are published in Thai, particularly noise prediction model, noise engineering controls, room acoustics, architectural noise, advanced instrumentation and measurement method, emission inventory of specific noise sources, noise evaluation and management of specific sources, etc.

Not putting the right man into the right job is another problem in noise management. Sometimes, the competent officers may not be assigned to handle noise cases. There are number of general topics on command and control based noise pollution, distributing by other agencies such as DIW, DLT, etc. But others specific noise abatement topics or guidelines or permissible limits in relation to receptor based noise sources in community, for example, construction noise, industrial noise, railway noise, are not going to be published to the interested parties, particularly to layperson. Moreover, there are none of any noise abatement policy regarding to the other principles namely the precautionary principle, prevention principle, the responsibility of polluters principle, the economic incentives or market driven based approaches, and the voluntary approaches.

In addition to lacking of the deliberative information and understanding on noise related topics among those responsible agencies or trained officers, including public outreach for layperson, establishment and enforcement of the noise abatement concept in substantive law and regulation in the following steps are highly concerned. Thus, the straightforward status of difficulties on noise abatement knowledge in Thailand can be divided into three groups: (a) having an appropriated knowledge and understanding, (b) not having sufficient knowledge or an ineffective implementation of knowledge, and (c) lack of an appropriated knowledge. The mainstream of the required knowledge on noise pollution status can be identified as the "(c) not have an appropriated knowledge" and "(b) have knowledge with ineffective and unsuccessful treatment", mainly.

3.2 People and Institution

The institution and people who are working in the environmental noise related issues play very important roles in the achieving those challenging against loud noise problems. To discuss on the difficulties of this issue, the stakeholder analysis shall be sketched on the purposes of the identification of the interest parties and their roles. There are six groups of the interested parties, involving in the environmental noise related issues: (1) people and/or community (2) academic (3) NGOs (4) private/business sector (5) media, and (6) government sector from PCD, ONEP, or DEQP, the industrial inspectors from DIW, etc. (Figure 1).

Apart from issues regarding the academic side mentioned above, acoustician, physicist, acoustic engineer or scientist in university or academic institution who can support all parties with their strong technical background, there are the small numbers of competent people in the academic side. From my observation in many years, a number of environmental science students, both undergraduate and graduate levels, are not increased in Thailand.

Doubtlessly, the capacity building of the interested lecturers in the academic side should be improved without any delay in order to support the capacity building of the student side, distributing for all parties in order to handle all tasks on noise conflicts management, noise complaint handling, noise control engineering, noise measurement, noise evaluation, etc., including the training program on noise pollution management for the responsible government officers.

NGOs, people, civic groups, and the media frequently work together in the nuisance related noise cases in the community. Frequently, watchdog activities have been named by the government side or other related agencies as non-expertise opinion. However, they can widely be contributing to collect the firsthand collection of loud noise data, representing the complaint cases in various media, recorded by the simple equipment such as the personal mobile phone, the personal MP-3 recorder. Those recorded noise situations will be provided as the useful firsthand evidence to the interested officers or to the court for further investigation.

Business sector provides the procurement on low noise products, new engineering control technologies and their installation, new noise measurement equipment and instrument, acoustics consultant service or engineering control service, etc. Since business sector activities are based on policy, regulation, requirements and demand, currently there are a small number of the private acoustics consultant services in Thailand, except consultants or suppliers in acoustic design in the musical industry or entertainment service sector.

3.3 Management Instrument

Noise management needs appropriate instruments to implement all of the mitigation measures to solve loud noise problems or noise conflicts in real society. Principle in management needs four actions in the process—i.e. the problems identification and analysis, the mitigation measures and scenarios, the evaluation and monitoring process, and the corrective action and improvement process. Many of instrument will be applied into the management process of four actions, namely technical instrument, policy and legal instrument, economic instrument, etc. It is very important to precisely choose the appropriate management tools and to flexibly apply on the four processes.

3.3.1 Policy and Legal Instrument

The policy and legal instrument are still the effective actions which balance the social justice with the environmental justice. When the problem was analyzed by root-cause analysis, the appropriated policy can be implemented prior to conduct another analysis of problem solving techniques. Some of implemented policies can be superseded by the law and regulation, while the others can partly be superseded, depending on its nature or content.

Generally, due to red-tape legislation procedure, most legal instruments become effective later than the policy initiative for long-term solution. Otherwise, the progressive regulation can be written to be the prevented measures for example, the noise limits for new products and new facilities installation, etc.

Regarding the existing policy, the efficient root of the problem analysis has not been yet identified by the empirical based evidence. The existing noise monitoring system and measured data were partially collected only from roadside and general area to be the representatives of the ambient noise in general. They illustrated the wrong picture for the policy makers on the ambient noise situation. Under the current data collection, it will be almost impossible to make a practical and efficient decision on the development of noise management plan. The noise mapping technique, the popular and sound technique to be applied for the random noise representative with mixed type of

noise emission, have not been applied for identifying the existing noise levels. Therefore, it has not been gained benefits from its strength—i.e. flexible tools, immediately take into action, easy to revise and improve, role model for development of legal instrument, etc.

Moreover, the development of noise regulation, based on bias collection data, fails to include the noise permissible limit for the specific noise emission—i.e. home appliance products, toys, industrial facilities, entertainment activities, earth moving facilities, etc. The situations may be worse when we consider the noise regulation on the receptor side, protecting human hearing loss and avoid noise disturbance. (Table 2) In short, the noise regulation have not been adequately supported the fundamental achievement to reduce loud noise environment in Thai society.

Regarding the local side, the Action Plan for Bangkok Metropolitan on Air Quality and Noise Management B.E. 2555-2559 (2012-2116) is under public hearing concerning the protection of human rights to live in sound environment as recognized by the Thai Constitution. During the hearing, public cast doubts on the effectiveness of its implementation process.

3.3.2 Technical Instrument

The noise measurement techniques, widely provided by the international standards or guidelines, including the international textbook on acoustics, from my observation, are not widely recognized by the mandated officers' recommendations, especially local officers, handling the complaints cases. Owing to lacking of professional staffs, the technical instrument is inappropriate and unsuccessful performance in the reality. There are, for instance, many large construction sites in Bangkok, making loud noise at night time without any common abatement policy from BMA. While some right-awareness neighbors lodge complaints, BMA takes action on a case by case basis without the successful ground rules to abate construction noise. In addition, the airport noise monitoring system at the Suvarnabhumi Airport has been under installation process since 2008.

3.3.3 Economic Instrument

The economic instrument was appeared in Thai regulations by the international trading, the bilateral or multilateral agreement, or the international law—i.e. the Civil Aviation Act B.E.2514 (1971) influenced by the Chicago Convention 1944, the ECEQA B.E. 2535 (1992) influenced by the Stockholm Declaration and Agenda 21 of Rio Declaration. Sadly, it is not exercised in the existing noise policy and law, even if they were mechanically adopted by the ratification of other laws—i.e. market driven mechanism is one of the powerful economic instruments, applying into the pollution control particularly noise sources reduction. In other words the useful international law or guidelines are not widely applied in Thailand.

4. DREAMING OF NEW REALITY IN NOISE ABATEMENT POLICY

To make dream come true, the multiple approaches will be flexibly and appropriately integrated into the projected new wave of environmental abatement policy and law. Some of essential parts of recommended approaches are in the following. (Figure 1)

4.1 Knowledge Management

The knowledge management concept shall implement into the content building of the specific knowledge on environmental noise related issue, particularly in specific curriculum and training course, civic education guidelines, technical guideline, etc.

4.1.1 Technical Knowledge

All the basic knowledge shall be taken into account. The acoustics or environmental noise should be compulsory course in the related university curriculum for long-term building capacity. The new wave of noise abatement policy, law, and regulation in Thailand ought to be in compatible with the ISO 1996-1:2003 and ISO 1996-2:2007, respectively.

The noise permissible limits of the specific noise sources, particularly aircraft noise, home appliance products have to be set up with their implementation guidelines. Noise mapping techniques will be implemented in replacement of the present noise monitoring data by PCD to reduce yearly budget and manpower cost of operation.

4.1.2 Promote Civic Education and Self-Education

The knowledge shall be assembled into the noise abatement knowledge tank within well-oriented data mining to provide information and understanding to pubic through many types of media, comprehensively. Prevention principle and precautionary principle, among other noise abatement measures are needed to be collected and published.

4.2 Connecting People

In order to achieve the capacity building goals, many types of network will be pulled up in knowledge management, promotion on civic education and self-education on environmental acoustics, development of new policy and law, improvement of related university and professional training curriculum, promotion on civil participation in all process of knowledge management, development of related guidelines, etc.

The capacity building on the specific groups of profession, from academic and practical field, will be initiated as soon as possible. The think-tank will be created as the center of excellence on environmental noise management. The selection of profession may start by polling the competent officers from existing organizations—i.e. the Noise and Vibration Standards Laboratory of the National Institution on Metrology of Thailand (NIMT), the AQNMB of PCD, the Noise and Vibration Research Section of ERTC, the private consultants or insulation providers, scholars and experts from universities, the other noise level meter providers, volunteers, etc. The new communication techniques shall be utilized in the network building process such as the world café, the caravan, the opened space, etc. The collaboration program shall be created to recruit node of connection of them both in the domestic and international levels. The rules of competent and merit review will be gradually created by their activities and recommendations. The peer review will be concurrently introduced by the network building process. From those of the collaboration program, the public awareness on environmental noise will be gradually initiated.

4.3 Adopt Appropriate Tools

How to select the appropriate tools? Acceptedly, there are no specific solutions. The management is an art to practically and flexibly use sciences in solving problem process. The economic gear can immediately take into account in the existing policy prior to prepare for regulation development in the next steps. The polluter responsibility can apply for reducing noise at its source by noise limits of new products. The hearing protection gears can easily mandate to be worn in the working in loud noise area but it may not be practically used. The specific noise guideline shall be published for daily noise problem solving in community but they may not read and understand them all. The noise monitoring system shall be installed to monitor environmental noise in the vicinity of airport. The collected noise data by any of monitoring system shall not only be reported in annual pollution situation report but also be applied for evaluating and validating the noise prediction model, fulfilling the noise emission inventory, improving the accuracy of noise mapping techniques.

The selection of the appropriate management tools will be beneficial to noise abatement policy when the policy makers clearly learn and understand their strengths and limitations, including the root cause of noise problem in local space and availability of noise abatement. The four processes of management shall be implemented to maintain continuing process of the proposed noise abatement policy and law enforcement under the noise management plan.

5. CONCLUSIONS

The environmental noise abatement policy, law, and regulation are powerful instrument to deliberate the noise reduction techniques and engineering, economic instrument, and others to implement into practices. The legal instrument will provide skeleton of implementation process, particularly in the structure of the administrative organization and personnel in order to fulfill the noise abatement goals. There are also some difficulties with regard to establishment of the noise abatement concept in substantive law and regulation in their following steps. The problem analysis, the selection and implementation of appropriate tools, the peer review and improvement process, knowledge management shall be put forward in the working process of all interested parties responsibilities on noise management issue. The enforcement of the policy, law, and regulation will be the most important role to come across the present problems in order that the noise abatement will be successful under the governance principle.

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[6] Pollution Control Department, “Noise and Vibration Regulation” <http://www.pcd.go.th/Download/regulation.cfm?task=s2>access 28 May 2011

[7] Krittika Lertsawat, “Environmental Noise Regulation in Thailand,” Inter-Noise 2009, Ottawa, Canada.

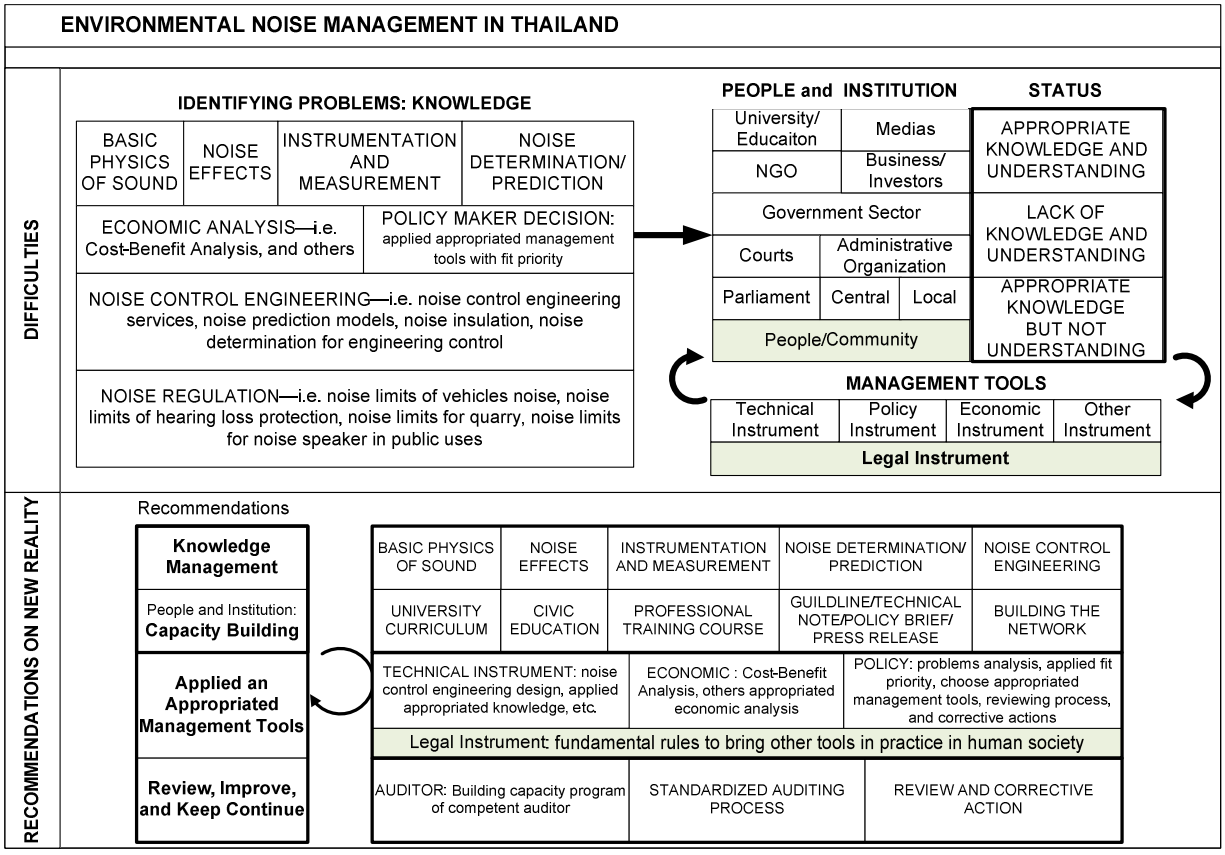

Figure 1 – Environmental Noise Management in Thailand

Table 1 – History of the Environment Noise Abatement Policy, Law, and Regulation in Thailand

1975	Enactment of the Enhancement and Conservation of the Environmental Quality Act B.E.2518 (1st wave)
1975	Establishment of the Office of the National Environmental Board (ONEB) under the Prime Minister's Office
	Noise impact assessment was discussed in the environmental impact assessment project reviewing process (EIA reviewing process) by ONEB
	Noise complaints case records were collected by ONEB
	Policy, law, and regulation development were conducted by ONEB
	Yearly environmental situation report has been published by ONEB
1978	Amendment of the ECEQA B.E.2521 (ONEB was under the Prime Minister's Office)
1979	Amendment of the ECEQA B.E.2522 (ONEB was under the Ministry of Science, Technology, and Environment)
1992	Enactment of the ECEQA B.E.2535 (2nd wave)
	Establishment of the Pollution Control Department (PCD), Department of Environmental Quality Promotion (DEQP), and Office of the Environmental Policy and Planning (OEPP) under the Ministry of Science, Technology, and Environment (MoSTE).
	Establishment of the Air Quality and Noise Management Division, Pollution Control Department
	Enactment of the Industrial Work Act B.E.2535
	Noise impact assessment was discussed in the EIA reviewing process by OEPP
	Notification of the Ministry of Science, Technology and Environment on Motor Vehicle Noise Level (28th August B.E. 2535)
1994	Notification of the Ministry of Science, Technology and Environment on Inland Vessel Noise Level (7th December B.E. 2537)
	Yearly National Pollution Situation Report by PCD (until now)
	Noise complaint cases records were conducted and published by PCD (until now)
	Air Pollution Information Report by PCD
1996	Notification of the Ministry of Science, Technology and Environment on Noise and Vibration Control Standards from Quarry (23rd November B.E. 2538)
1997	Notification of the National Environmental Board No.15 on General Noise Standards , dated on 12th March B.E. 2540
	National Policy and Environmental Quality Plan B.E. 2540-2559
	Environmental Quality Management Plan B.E. 2540-2544
1998	On-line noise monitoring data by PCD website
	Environment Quality Situation Report by OEPP (ONEP in present)
1995	Yearly Air Quality and Noise Management Situation Report by PCD (until now)
1999	Noise impact assessment were including in the EIA preparation guideline for the requirements regarding the EIA process in the licensing application
2000	Notification of the Ministry of Industry No.2629 on Silencer for Motorcycle Exhausted Pipe (B.E. 2543)
	Notification of the National Environmental Board No.17 on Annoyance Noise Level Standards, dated on 6th June B.E. 2543
	Notification of the Ministry of Natural Resources and Environment on Motorcycle Noise Level (B.E. 2543)
2002	Reshuffle of the Pollution Control Department (PCD), Department of Environmental Quality Promotion (DEQP), and Office of the Natural Resources and Environmental Policy and Planning (ONEP) under the Ministry of Natural Resources and Environment (MoNRE).
	Reshuffle of the Air Quality and Noise Management Bureau, Pollution Control Department
	Environmental Quality Management Plan B.E. 2545-2549
2003	Notification of the Ministry of Industry on the Occupational Safety Measure of Workplaces in the Industrial Plant (B.E. 2546)
	Amendment of the Notification of the Ministry of Natural Resources and Environment on Motorcycle Noise Level (17th July B.E. 2546)
	Amendment of the Notification of the Ministry of Natural Resources and Environment on Motor Vehicle Noise Level (7th July B.E. 2546)
2005	Amendment of the Notification of the Ministry of Natural Resources and Environment on Inland Vessel Noise Level (14th June B.E. 2548)
	Amendment of the Notification of the Ministry of Natural Resource and Environment on Noise and Vibration Control Standards from Quarry (B.E.2548)
	Master Plan on Air Quality and Noise Management B.E. 2548-2559
2007	Amendment of the Notification of the National Environmental Board No.29 on Annoyance Noise Level Standards (B.E. 2550)
	Environmental Quality Management Plan B.E. 2550-2554
2011	Action Plan for Bangkok Metropolitan on Air Quality and Noise Management B.E.2555-2559

Table 2 – Environmental Noise Regulation in Thailand

Code/Act	Regulation	Authority	Effective Year	Noise Descriptor	Noise Limits	Measurement Conditions/Position
At noise source						
ECEQA B.E.2535	Notification to the Ministry of Natural Resource and Environment on Inland Vessel Noise Level	PCD	7-12-1994 Amend.by 14-06-2005	L_p (dBA) 0.5 m at end of pipe	≤ 100	- With 45° of horizontal plane within pipe level - 3/4 of maximum for gasoline engine and maximum for diesel engine - Without load - Background noise < 90 dBA
IPSA	Notification of the Ministry of Industry No.2629 on Silencer for Motorcycle Exhausted pipe	TISI	2000	L_p (dBA)	≤ 95	Product standards: TIS.341-2000FD1100 THAILAND
ECEQA B.E.2535	Notification of the Ministry of Natural Resource and Environment on Motorcycle Noise Level	PCD	2000 Amend.by 17-07-2003	L_p (dBA) 0.5 m at the end of pipe	≤ 95	- With 45° of horizontal plane within pipe level - 3/4 of maximum of ≤ 5000 cycle/min or 1/2 of maximum of > 5000 cycle/min
ECEQA B.E.2535	Notification of the Ministry of Natural Resource and Environment on Motor Vehicle Noise Level	PCD	28-8-1992 Amend.by 7-7-2003	L_p (dBA) 0.5 m at the end of pipe	≤ 100	- With 45° of horizontal plane within pipe level - 3/4 of maximum for gasoline engine and maximum for diesel engine
				L_p (dBA) 7.5 m from vehicle	≤ 85	
ECEQA B.E.2535	Notification of the Ministry of Natural Resource and Environment on Noise and Vibration Control Standards from Quarry	PCD	23-11-1996 Amend.by 2005	L_{max} (dBA)	≤ 115	- Properties line or buffer zone of quarry
				$L_{eq,8hr}$ (dBA)	≤ 75	
				L_p (dBA)	≤ 70	
IPSA	Notification of the Ministry of Industry No.3533 on Industrial Standards for Motor Vehicles (>4 wheels) Noise Levels	TISI	2006	L_p (dBA)		Product standards: TIS.341-2000FD1100 THAILAND -stationary noise -pass-by noise
			Passenger cars≤ 9 seats		≤ 74	
			Passenger cars > 9 seats, <150kW ≥150kW		 ≤ 78 ≤ 80	
			Passenger cars > 9 seats, ≤2000kg 2000<w≤3500kg		 ≤ 76 ≤ 76	
			Truck,> 3500kg, <75kW 75kW≤P<150kW ≥150kW		 ≤ 77 ≤ 78 ≤ 80	
At Receiver						
ECEQA B.E.2535	Notification of the National Environmental Board No.15 on General Noise Standards	DIW	2003	L_{max} (dBA)	≤ 115	Free field Outdoor: at least 3.0 meter from many reflecting plane Indoor: at least 1.0 meter from any reflecting plane or 1.5 meter from openings
				$L_{eq,24hr}$ (dBA)	≤ 70	

Code/Act	Regulation	Authority	Effective Year	Noise Descriptor	Noise Limits	Measurement Conditions/Position
IWA B.E.2535	Notification of the Ministry of Industry on the Occupational Safety Measures of Workplaces in the Industrial Plant	DIW	2003	TWA L_{peak} (dBA)	≤ 140	Noise restriction zone
				TWA $L_{eq,8hr}$ (dBA)	≤ 90	Calculated by: $T = \frac{8}{2^{(L-90)/5}}$
ECEQA B.E.2535	Notification of the National Environmental Board No.29 on Annoyance Noise Level Standards	PCD	6-6-2000 Amend.by 2007	$L_{eq,1hr}$ - L_{90} (dBA)	≤ 10	- Free field at receiver - Sensitive receiver or during 22:00-06:00, penalty+3dB to $L_{eq,1hr}$ - Five conditions to take $L_{eq,1hr}$, including [$L_{eq,1hr,\ source} - L_{eq,1hr,\ background}$] - Three conditions to take Background noise in L_{90}
Rule of BMA B.E.2548	Rule of Bangkok Metropolitan Administration on Noise levels limits of musical performance related events B.E.2548 (2005)	BMA	2005	$L_{eq,t}$ (dBA) -at all performance time -instanta-neous period	≤ 90	- Indoor and outdoor performance hall or buildings
				$L_{eq,t}$ (dBA) -instanta-neous period	≤ 110	

Remark:

1. the Enhancement and Conservation of the Environmental Quality Act B.E.2535 (ECEQA B.E.2535) in 1992
2. The Industrial Work Act B.E.2535 (IWA B.E.2535) in 1992
3. The Industrial Products Standards Act B.E. 2511 (IPSA B.E.2511) in 1968
4. Pollution Control Department (PCD)
5. Department of Industrial Works (DIW)
6. Thai Industrial Standard Institution (TISI)

Sources: http://www.pcd.go.th accessed 25 May 2011