

# NOISE/NEWS

## INTERNATIONAL

Volume 18, Number 4  
2010 December

*A quarterly news magazine  
with an Internet supplement published  
by I-INCE and INCE/USA*



### **NOISE-CON 2011**

Travel Planning

### **INTER-NOISE 2011**

Travel Planning

### **MEMBER SOCIETY PROFILE**

INCE/Europe

### **JANET MOSS**

Third CAETS Forum on worldwide  
product noise emissions

### **TOR KIHLMAN**

International experience with noise  
emission reduction requirements  
and technical possibilities

# Technology for a Quieter America



In 2006, NAE initiated *Technology for a Quieter America*, a multi-year study to review state-of-the-art noise-control engineering, describe the technological, economic and political climate for noise control, and identify gaps in research. During the past three years, a 14-member umbrella committee, chaired by NAE member George Maling (managing director emeritus of the Institute for Noise Control Engineering of the USA), five subcommittees, and focused working groups have explored three categories of issues related to noise-control engineering and public concerns: applications of current technologies; research and development initiatives; and intra-governmental and public relations programs. The report is now available from the National Academies Press.

*Technology for a Quieter America* assesses major sources of noise (transportation, machinery and equipment, consumer products, etc.), how they are characterized, efforts to reduce noise emissions, and efforts to reduce noise in work places, schools, recreational environments, and residences. The report reviews regulations that govern noise levels and the roles of federal, state, and local agencies in noise regulation.

It also examines cost-benefit trade-offs between different approaches to noise abatement, the availability of public information on noise mitigation, and noise-control education in U.S. schools of engineering.

Findings of the report focused on several critical areas: Hazardous noise-Occupational noise exposure limits should be reduced and engineering controls should be the primary focus of controlling workplace noise. "Buy-quiet" programs that promote the procurement of low-noise equipment and allow market forces to operate can play an important role.

Cost Benefit analysis: The Federal Aviation Administration has been proactive in cost-benefit analysis of noise reduction at airports; these studies, along with similar research from Europe, could lead to highway noise reduction. The report examines the relative merits of "low noise" highways and the use of noise barriers.

Metrics: Advances in the ability to collect, store, and analyze noise data challenge us to reexamine metrics that were developed in the 1970s. Purchase information: [http://www.nap.edu/catalog.php?record\\_id=12928](http://www.nap.edu/catalog.php?record_id=12928)

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Portland Waterfront Marriott—The venue for NOISE-CON 2011

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# NOISE/NEWS

## INTERNATIONAL

*This PDF version of Noise/News International and its Internet supplement are published jointly by the International Institute of Noise Control Engineering (I-INCE) and the Institute of Noise Control Engineering of the USA (INCE/USA). This is the first volume that is being published in PDF format only. The PDF format means that the issues can be read by freely available software such as that published by Adobe and others. It reduces publication time, saves printing costs, and allows links to be inserted in the document for direct access to references and other material. Individuals can sign up for a free subscription to NNI by going to the web site <http://www.noisenewsinternational.net>*

### I-INCE

The International Institute of Noise Control Engineering (I-INCE) is a worldwide consortium of societies concerned with noise control and acoustics. I-INCE, chartered in Zürich, Switzerland, is the sponsor of the INTER-NOISE Series of International Congresses on Noise Control Engineering, and, with the Institute of Noise Control Engineering of the USA, publishes this quarterly magazine and its Internet supplement. I-INCE has an active program of technical initiatives, which are described in the Internet supplement to NNI. I-INCE currently has 46 Member Societies in 39 countries.

### INCE/USA

The Institute of Noise Control Engineering of the USA (INCE/USA) is a non-profit professional organization incorporated in Washington, D.C., USA. The primary purpose of the Institute is to promote engineering solutions to environmental noise problems. INCE/USA publishes the technical journal, *Noise Control Engineering Journal*, and, with I-INCE publishes this quarterly magazine and its Internet supplement. INCE/USA sponsors the NOISE-CON series of national conferences on noise control engineering and the INTER-NOISE Congress when it is held in North America. INCE/USA Members are professionals in the field of noise control engineering, and many offer consulting services in noise control. Any persons interested in noise control may become an Associate of INCE/USA and receive both this magazine and *Noise Control Engineering Journal*.

### NNI and its Internet Supplement

[www.noisenewsinternational.net](http://www.noisenewsinternational.net)

The primary change in this PDF-only volume of *NNI* is the ability to have “hot links” to references, articles, abstracts, advertisers, and other sources of additional information. In some cases, the full URL will be given in the text. In other cases, a light blue highlight of the text will indicate the presence of a link. At the end of each feature or department, a light blue [back to toc](#) will take the reader back to the table of contents of the issue.

- The Internet supplement contains additional information that will be of interest to readers of *NNI*. This includes:
- The current issue of *NNI* available for free download
- *NNI* archives in PDF format beginning in 2003
- A searchable PDF of annual index pages
- A PDF of the current *NNI* conference calendar and a link to conference calendars for worldwide meetings
- Links to I-INCE technical activities and I-INCE Technical Reports

## What Can INCE Do for You?

**R**ecently I was forced to make a career change. I had been working in automotive noise and vibration for the past 25 years. Frankly, I anticipated working in this field until I was ready for retirement. However, due to the downturn in the industry, I was suddenly forced to look for a new position with very few opportunities that interested me in the automotive arena. Fortunately, I was able to find a new position at the National Institute for Occupational Safety and Health (NIOSH) where I am working on noise control in the mining industry. This has been a major change involving relocation and a steep learning curve with a new industry and new noise and vibration issues. This has caused me to think about my career and what has been important and helpful for me. I thought it might be of value to share some of these thoughts.

The most important item I discovered or was reminded of is, to paraphrase a famous quote, "noise has been very, very good to me." It has provided good compensation, a lifetime of great experiences, and the opportunity to travel and work with interesting people. Almost 40 years ago when I was first introduced to noise control as a co-op student, it was simply an assignment. My boss at a small consulting firm said "you are going to be our noise expert" and threw a pile of books at me. My first task was to write a manual for the office on noise control practices for institutional building mechanical and electrical systems. Guess what? I found it interesting and stuck with it.

So, noise control is a good place to be. But, how has INCE-USA helped me? It is remarkable to me that the vast majority of my noise control professional contacts are INCE members. There are a lot of people that I first met through SAE or other organizations, but with only a few exceptions these people are also INCE members. Clearly, INCE is the organization to be a part of for contacts in the

noise control industry. There is no better place to make and keep noise control contacts than at the NOISE-CON and INTER-NOISE meetings. In many ways INCE is the noise control community.

During my career, I have worked places where my INCE Board Certification meant nothing and frankly I sometimes wondered whether it was worth keeping up. However, when I was looking at new job opportunities, I found that having the INCE certification was an important qualification and was meaningful to many of the people with whom I talked.

Without my certification, my involvement with INCE, and my service on the Board of INCE, I might still be looking for a position. Clearly the reason for being actively involved in INCE is not just to for finding a job. However, participation in INCE is still the best place to further your career and to find like minded people working on similar issues. There may be only 1000 members, but they are the most important people and usually the most active in the noise control community.

Therefore, I feel comfortable in saying that being an active member in INCE is one of the most important things one can do to further your noise control career. There were times when I considered dropping my participation and possibly even my membership in INCE. It just did not seem that important when I was with some of my employers, but it was important to me. I am very pleased that I stayed active in INCE. It has made a difference in my career and my life.

Please consider how you can be more active in INCE and what it might do for you. You never know how your contributions to INCE may payoff in the future. I can attest to the value.  [back to top](#)



**James K. Thompson**

*2010-2011 President*

## A Healthy Future



**Bernard Berry**

*European Editor  
I-INCE VP for Europe  
and Africa*

In my editorial in the March issue of this magazine, I noted that it is all too easy to lose sight of the fundamental reasons why we are so busy measuring what we measure, predicting what we predict, designing what we design, and planning what we plan. I asserted that, at the very centre of the many inter-related objectives which we all have is “**human response**” to the acoustical environment. In other words – “What is the impact of that environment on those exposed to it?” I summarized some of the relevant developments in the field of Noise and Health, and highlighted the publication of some key reports.

As we look forward to 2011, I would like to continue this process and also look ahead to a major event next year. One important theme in recent years has been what we might call “the cost of noise.” Researchers in several EU countries have tried to put a price on the health effects of noise, in order to highlight various issues. See for example “Noise, Health and Money”.

<http://www.msronline.nl/binaries/msr/rapporten/2008/eindversie-themarapport-engels-2008.pdf>

In the UK, techniques have now been developed by Government economists so that the implications of prospective changes in transport policy can be evaluated from considerations of the costs associated with cases of cardiovascular disease which are predicted to arise due to high noise levels. See “Noise & Health – Valuing the Human Health Impacts of Environmental Noise Exposure.” July 2010.

<http://www.defra.gov.uk/environment/quality/noise/igcb/publications/noisehealthreport.htm>

At the pan-European level, the European Environment Agency, EEA, established the Expert Panel on Noise (EPoN) in January 2009 to facilitate the implementation and development of Europe’s noise policy. The panel consists of national noise experts who advise the EEA and the European Commission on assessing and managing environmental noise. In November 2010 the Expert Panel published a “Good Practice Guide on noise

exposure and potential health effects,” which can help national, regional and local authorities to prepare action plans by concisely explaining how to quantify health impacts.

<http://www.eea.europa.eu/publications/good-practice-guide-on-noise>

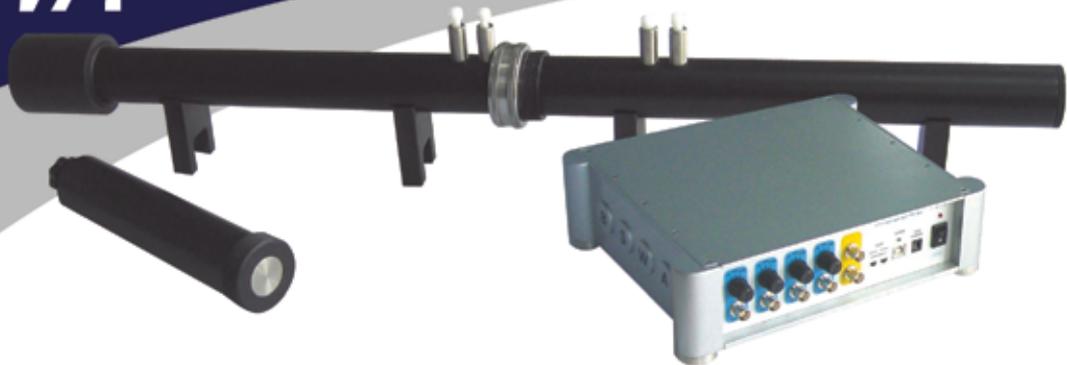
Turning to the future, we must recognize the importance of continuing research on the topic of noise and health, and of ensuring that we have a new generation of talented researchers to contribute to new developments and increased understanding. I have previously explained the formation of the new European Network on Noise and Health ENNAH, which includes 33 partners from 17 countries across Europe. An important element of the network is the exchange program for junior researchers in noise and health designed to increase expertise among junior researchers in this important area. Examples of such exchanges are given on the ENNAH website [www.ennah.eu](http://www.ennah.eu).

Finally a reminder that the 10th International Congress on Noise as a Public Health Problem ICBen 2011 will be held between July 24th - 28th 2011 in London, UK, organized by the UK Institute of Acoustics on behalf of the International Commission on the Biological Effects of Noise (ICBen).

<http://www.icben2011.org/>

This congress aims to present the current state of the art in research on the biological effects of noise on health and is suitable for research scientists, policy makers and industry concerned with the effects of noise. Papers and posters will be welcome on topics including noise induced hearing loss, noise and communication, non-auditory physiological effects of noise on health, influence of noise on performance and behavior, effects of noise on sleep, community responses to noise, noise and animals, interactions with other agents and contextual factors and noise policy and economics. I am sure that everyone will receive a warm welcome to London, the 2012 Olympics City, in 2011!  [back to toc](#)

# BSWA



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## INCE/Europe

INCE/Europe was formed in 1999, following discussions with Board Members of I-INCE. INCE/Europe has the primary goal of aiding the exchange of information about all aspects of noise and vibration, with a dual emphasis on engineering and Europe, whilst reaching out to those who work in acoustics, but whose interests may not be fully covered by their own, non-acoustical, professional bodies. INCE/Europe is a not-for-profit organization incorporated in England and has been a Member Society of the International Institute of Noise Control Engineering (I-INCE) since 2003. INCE/Europe is also a Sustaining Member of the European Acoustics Association (EAA) where it sits on the EAA Technical Committee on Noise.

INCE/Europe acts to assist individuals and groups working on the effects and control of noise and vibration and has had a major activity in the promotion of specialist meetings on topics not readily covered in large international congresses.

Since 2001, INCE/Europe has been the lead association in the organization of eight European or International meetings:

- Sound Insulation of Glazings (den Haag 2001)
- Observatories for Community Noise (Lyon 2004)
- Uncertainties in Noise Measurements and Prediction (Le Mans 2005)
- Wind Turbine Noise 2005 (Berlin)
- Noise at Work 2007 (Lille)
- Wind Turbine Noise 2007 (Lyon)
- Wind Turbine Noise 2009 (Aalborg)
- Wind Turbine Noise 2011 (Rome)

INCE/Europe will act as the organizer of the first joint I-INCE Symposium to be held in Paris in July 2011 on Inducing “Buy Quiet” Purchasing Attitudes Through Simplified Product Noise Ratings. (See the announcement in the European News Department in this issue.—Ed.)

INCE/Europe, through its Board Members, has also been active as a key partner in the organization of the following meetings:

- Developments in Materials for Noise and Vibration Control (Senlis 2001)
- Low Frequency Noise (York 2002)
- Fan Noise 2003 (Senlis)
- Euronoise 2003
- Low Frequency Noise (Maastricht 2004)
- Euronoise 2006,
- Fan Noise 2007 (Lyon)
- Euronoise 2009

The activities of INCE/Europe are guided by a Board of Directors, Geoff Leventhall (UK) and Roy Lawrence (UK), and a President Jean Tourret (France). The INCE/Europe Secretariat is listed below. The web site for the organization is <http://www.inceurope.org>.

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*This is the 74th in a series of articles on the Member Societies of International INCE. This is an update of the profile that appeared in the 2001 September issue of this magazine.—Ed.*

Member Society Profile is a regular feature of *Noise News International*. If you would like to have your society featured, please contact George Maling at [inceusa@aol.com](mailto:inceusa@aol.com).



**NOISE-CON 2011  
and the Summer  
Meeting  
of TRB's ADC40  
Committee on  
Transportation  
Related Noise  
and Vibration**

**25-27 July, 2011  
Portland, Oregon,  
USA**

## Conference Information and Travel Planning

### Conference Information

The 25th conference of the Institute of Noise Control Engineering, NOISE-CON 2011, will run concurrently with the summer meeting of the Transportation Research Board, Committee on Transportation-Related Noise and Vibration (TRB ADC40 – [www.adc40.org](http://www.adc40.org)) on Monday through Wednesday (25-27 July, 2011). This conference is joining the overlapping transportation noise and vibration interest of the two organizations in Portland, Oregon to take advantage of the strong public interest and readily accessible public transportation project sites currently found in the Pacific Northwest.

### NOISE-CON 2011 and TRB ADC40

The technical program for the joint conference will provide an opportunity for public and private organizations to share technical information on noise and vibration topics associated with high speed rail, light rail systems, highway surface and tire noise and aircraft noise to name a few. In addition, the technical program will include papers in areas such as *Experience with Measuring and Modeling of Wind Turbine Noise, Control of Noise Both Interior and Exterior to Buildings, Industrial Noise Measurement and Control, Product Noise Measurement and Control, Noise Measurement Equipment and Techniques, Structural Noise Transmission and Control and Community Noise Measurement and Control.*

Kerrie Standlee, P.E. of Daly-Standlee & Associates, Inc. in Beaverton, Oregon is the General Chair for the meeting. Carole Newvine, Oregon Department of Transportation, is the TRB ADC40 committee meeting contact. Hugh Saurenman of ATS Consulting in Los Angeles, California and Paul Donovan of Illingworth & Rodkin, Inc. in Petaluma, California are the Technical Co-Chairs for the meeting.

### Vendor Exposition

An exposition of vendors of noise-control related materials, instrumentation and software companies will commence on Monday evening with a reception sponsored by the vendors and end on Wednesday morning at noon. A social gathering for attendees will occur at an off-site location to include special activities for conference members as well as family guests. A special accompanying guest program will also be included as part of the conference to encourage attendees to bring their families and consider the Portland area as a location for a wonderful vacation.

### Celebration of the Founding of INCE/USA

NOISE-CON 2011 will celebrate the 40th Anniversary of INCE-USA by holding a special social event to recognize the founding organizers and past presidents of the organization.



### Registration Costs

Conference fees vary according to the date of registration and the number of events attended. A complete schedule of costs will be available on the registration page of the conference web site, [http://www.inceusa.org/nc11/Conf\\_Reg.asp](http://www.inceusa.org/nc11/Conf_Reg.asp). Online registration is open through May 30.

### Short Courses and Examinations

A selection of short courses in noise control topics will be available on the Sunday before the conference.

**Course #1:** Practical Aspects of Acoustical Enclosure Design, Daniel J. Kato, Instructor. This will be a half-day course focusing on the practical aspects of acoustical enclosure design and the prediction of acoustical enclosure performance.

**Course #2:** Noise from Information Technology Products, Marco Beltman and Eric Baugh, Instructors. This course provides an overview of IT noise, with in-depth examples and specifics, and will address many topics.

**Course #3:** INCE Fundamentals Exam Preparation and Optional Exam, James D. Barnes and Mark Storm, Instructors/Exam Administrators. If you are considering taking the INCE fundamentals exam as one way to become a full member of INCE, this course is aimed at helping you understand and prepare for the exam.

INCE Board Certification Exam will be held on July 24 from 7.30 a.m. until 4.30 p.m. Kenneth Kaliski will be the exam administrator. The deadline to submit the application and references is May 16, 2011.

More information on these short courses and the Board Certification exam can be found on the short courses page of the NOISE-CON 2011 web site, <http://www.inceusa.org/nc11/ShortCourses.asp>.

### Submission of Technical Papers

Technical papers in all areas of noise control engineering are welcome, so your paper need not be part of one of the special sessions. However, if there is synergy with a particular special session, please suggest it be part of that session when you submit your abstract. The abstract submission deadline is 2011, March 4. Planned special sessions are listed on the NOISE-CON 2011 web site at: <http://www.inceusa.org/nc11/Sessions2.asp>

If the submitted abstract is approved for the NOISE-CON Conference or the TRB ADC40 Committee Meeting, you will receive a notification by 2011, April 1. All abstracts will be included in the joint conference program.

Once the abstract is approved NOISE-CON 2011 presenters will be required to prepare a paper that will be included in the NOISE-CON 2011 Proceedings. Papers are due 2011, May 13. TRB ADC40 Committee presenters are not required to submit a paper but they may submit a paper and have it included in the NOISE-CON 2011 Proceedings if they so desire. please send an e-mail to [technical\\_chair@inceusa.org](mailto:technical_chair@inceusa.org) - the Conference Technical Co-Chairs if you have questions regarding your abstract submission.

## Social Events

On Monday and Tuesday Evenings, there will be receptions in the Exposition Area for all registrants. The cost of these events is included in the registration fee.

In addition, Institute of Noise Control Engineering's 40th Anniversary celebration event will occur on Sunday, 24 July 2011 and will include a dinner cruise down the Willamette River on the Portland Spirit. The cost for this event is additional to the conference fee and registration for the event can be made on the conference registration form.

The main conference social event will be held on Tuesday evening, 26 July 2011 following the Exposition Exhibitor's Reception. The event will take place at the Oregon Museum of Science and Industry (OMSI). There is no additional cost for this event to registered conference attendees and registered accompanying guests but pre-registration is required. Registration for this event can be made on the conference registration form.

## Social Events for Accompanying Persons

The social program for registered Accompanying Guests offers a variety of activities:

- All registered Accompanying Persons will have access to a Hospitality Suite, which will be located at the Portland Marriott Downtown Waterfront Hotel. Accompanying Persons can meet there and plan their day in Portland. Refreshments will be available every morning at 8:30 A.M. on July 25, 26, 27.
- All registered Accompanying Guests are invited to attend two Exposition and Exhibitor's Receptions (Monday, July 25 and Tuesday, July 26)
- All registered Accompanying Guests receive admittance into the Oregon Museum of Science and Industry (OMSI) Social Event (Tuesday, July 26)

## Special Events for Students

A student paper competition will take place at NOISE-CON 2011. Up to five outstanding student paper awards worth up to \$1500 each will be awarded. Student's papers will be judged on quality of both the written submission as well as the oral presentation at NOISE-CON 2011. Click on [http://www.inceusa.org/nc11/documents/NC11StudentPaperEntryFormv1\\_000.doc](http://www.inceusa.org/nc11/documents/NC11StudentPaperEntryFormv1_000.doc) competition rules and entry form for the NOISE-CON 2011 Student Paper Competition.

## Careers in Noise Control Luncheon

A "careers in noise control" student luncheon is scheduled at NOISE-CON 2011 to give students a chance to meet some of the more senior members of INCE. The speakers will discuss their careers in noise control engineering. Lunch will be provided. The exact date and time are to be determined. Look for flyers near the registration desk and the message board.

## EXHIBITORS

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## Venue

The venue for both NOISE-CON 2011 and the TRB ADC40 meeting is The Portland Marriott Downtown Waterfront. The hotel is located on the Oregon riverfront near Portland State University and several attractions in the downtown area.

## Room Rate Information

A block of guest rooms at discounted rates has been reserved for meeting participants at the Portland Marriott Downtown Waterfront. Early reservations are strongly recommended. **Note the special INCE/TRB guest room rates are not guaranteed after 22 June 2011.** You must mention the Institute of Noise Control Engineering when making your hotel reservations over the phone in order to obtain the special INCE/TRB guest room rates.

**Single/Double/Triple/Quadruple Occupancy: 149 USD**

**Limited number of Government Rate Rooms available**

**All rooms are subject to tax (currently 12.5%)**

**Reservation cut-off date: 22 June 2011**

Please make your reservations directly with the Portland Marriott Downtown Waterfront. Remember to mention the Institute of Noise Control Engineering/Transportation Research Board to obtain the special INCE/TRB room rates. Reservations can also be made directly online. Follow this [link](#) for a direct connection to the hotel reservation page. Contact information for the hotel: Portland Marriott Downtown Waterfront, 1401 SW Naito Parkway, Portland, Oregon 97201 USA. Tel: 1-503-226-7600, Toll Free: 1-800-228-9290, Fax: 1-503-226-1209.

## Travel to Portland

The Portland International Airport (PDX) is served by most major airlines and offers direct international service from Canada, Japan, Mexico, and The Netherlands. For more information about the Portland International Airport please visit their website at [flypdx.com](http://flypdx.com). And for more information regarding international arrivals please visit [http://www.portofportland.com/PDX\\_International\\_Travel.aspx](http://www.portofportland.com/PDX_International_Travel.aspx).

The conference hotel is about 12 miles from the airport. Taxi fare to the hotel is about 40-50 USD one way to and from the airport. There are two other options available for conference attendees to get to the hotel from the airport. Another option is the Blue Star Shuttle 14 USD one way. When guests arrive at the airport they can go to the transportation desk in the baggage claim area and the attendant will set them up with the shuttle that is coming most directly to the Portland Marriott Downtown Waterfront. On the way back to the airport the shuttle stops at the hotel every 30 minutes on the hour and 1/2 hour between 04:30 A.M.-7:00 P.M.

And the final option conference attendees can choose to get to the hotel from the airport is by way of the MAX (light rail system). The MAX is 2.35 USD one way to and from the airport. The MAX station is directly outside the baggage claim area. It runs every 15 minutes. The closest stop to the Portland Marriott Downtown Waterfront is 3rd and Morrison, which is 8 blocks (short blocks!) to the hotel. Going back to the airport, the closest stop is 1st and Yamhill, which is 6 blocks from the hotel. For more information about Portland's public transportation please visit <http://trimet.org/>.

All information regarding travelling to Portland will be available on the Additional Conference Information page of the NOISE-CON 2011 website at <http://www.inceusa.org/nc11/ConferenceInfo.asp>.



## INVITATION

Dear Colleagues,

INTER-NOISE 2011, the 40th International Congress and Exposition on Noise Control Engineering, will be held in Osaka, Japan from 2011 September 4 through September 7. The Congress is sponsored by the International Institute of Noise Control Engineering (I-INCE) and co-organized by the Institute of Noise Control Engineering of Japan (INCE/J) and the Acoustical Society of Japan (ASJ). The organizers and the Organizing Committee of the Congress extend a warm welcome to all prospective participants world-wide and invite all to join us in Osaka to discuss the latest advancements in noise and vibration control engineering and technology, focusing on our Congress Theme of "Sound Environment as a Global Issue".

INTER-NOISE 2011 will feature a broad range of invited and contributed papers, together with plenary and keynote lectures by distinguished speakers. There will be extensive exhibitions of noise and vibration control technology, measuring instruments, equipment and systems from all over the world. Technical papers on the Congress Theme will be accepted with a special acknowledgement. Research papers in all other fields of noise and vibration are welcome.

INTER-NOISE 2011 will be held at the Osaka International Convention Center (Grand Cube Osaka), directly connected to the Rihga Royal Hotel and easily accessible for international flights. Grand Cube Osaka is located close to the city centre of Osaka, which is the second largest city in Japan and is the center of commerce, culture, food, etc in the Kansai Area with many historical sites such as Osaka Castle. It is our pleasure to welcome you to INTER-NOISE 2011 and Osaka. We are sure you will enjoy all aspects of the Congress and Osaka. We look forward to meeting you in Osaka.

Sincerely,

Ichiro Yamada  
Congress President  
On behalf of the INTER-NOISE 2011 Congress Organizing Committee



*Ichiro Yamada,  
Congress President*

## CONGRESS VENUE

INTER-NOISE 2011 will take place at Osaka International Convention Center (as known as "OICC GRAND CUBE OSAKA"), which is located in Nakanoshima in central Osaka. Nakanoshima is in Kita-ku (ward), Osaka city, between the Dojima and Tosabori Rivers. There are many governmental and commercial offices, buildings (such as the Osaka City Hall), and facilities in Nakanoshima. This area has long served as one of Japan's primary bases for cultural as well as economic exchange, and offers the best of urban functionality. The Nakanoshima Area has a variety of transportation systems, making the area ideally suited to serve as a place where people from around the world can come together to meet and interact

OICC has ample space for the expositions, congresses, meetings and so on. Thus, the venue is big enough to hold the Plenary and Keynote Lectures and as many as 12 parallel sessions and other related meetings during the INTER-NOISE Congress.

### OSAKA INTERNATIONAL CONVENTION CENTER

<Address> 5-3-51, Nakanoshima Kita-ku, Osaka, 530-0005 JAPAN  
 <Phone> +81-(0)6-4803-5555  
 <Home Page> <http://www.gco.co.jp/english/english.html>

## ABOUT OSAKA

Osaka is located on Honshu (Main Island), roughly in the center of Japan. Osaka City, which was incorporated in 1889, has a population of 2.6 million and an area of 221 square kilometers. Osaka Prefecture, which includes Osaka City (its capital) and 42 other municipalities, has a population of 8.8 million and a total land mass of about 1,890 square kilometers. Although Osaka is Japan's second smallest prefecture by size, its population represents 7% of the entire nation, making it the second most populous prefecture after Tokyo. Furthermore, 15.6% of all non-Japanese residents live in Osaka.

Osaka historically functions as one of the command centers for the Japanese economy. The city has been known as "the commercial capital of Japan." Osaka used to be referred to as the "nation's kitchen" (tenka no daidokoro) because it was the centre of trading for rice, creating the first modern future exchange market in the world.

The greater Osaka Metropolitan Area covers a total of 7,800 square kilometers within a radius of 50 to 60 km from the center of Osaka. The population exceeds 17 million, making it one of the biggest metropolitan areas in the world.

Roughly 40 minutes' travel will take you to many of Osaka's famous neighboring cities, such as: Kyoto, the ancient capital; Nara, with numerous world heritage sites; Kobe, the fashionable, modern port city; and Wakayama, a nearby castle town.

## TECHNICAL PROGRAM

The technical program will feature a broad range of invited and contributed papers, together with plenary and keynote lectures by distinguished speakers. There will be extensive exhibitions of noise and vibration control technology, measuring instruments, equipment and systems from all over the world. Technical papers on the Congress Theme will be accepted with a special acknowledgement. Research papers in all other fields of noise and vibration are welcome. Plenary and keynote lectures at The INTERNOISE 2011 Congress will feature two Distinguished Plenary Lectures and six Distinguished Keynote Lectures.

## PLENARY LECTURES

### Dr. William W. Lang

President, Noise Control Foundation

### Prof. Tor Kihlman

Professor emeritus at Chalmers University of Technology  
*"Perspectives on Global Noise Policies"*

### Prof. Yang-Hann Kim

Professor, Department of Mechanical Engineering  
 Center for Noise and Vibration Control  
 KAIST(Korea Advanced Institute of Science and Technology)  
*"Sound visualization and manipulation: their theories and applications"*

## KEYNOTE LECTURES

### Dr. Hisashi Sano

Chief Engineer/Senior Chief Advisor,  
 Honda R&D Americas, Inc.  
*"Modern Advances in Passive and Active Noise & Vibration Control Technology in Automobiles"*

### Prof. Stephen A. Stansfeld

Professor, Psychiatry at Barts & The London School of Medicine & Dentistry, Queen Mary University of London  
*"New research on noise and health: outcomes from the European Network on Noise and Health"*

### Mr. Dominique Collin

Head of Acoustics, SAFRAN Group  
*"Reducing Aircraft Environmental Impact: The Role of Networks"*

### Dr. D. Keith Wilson

Physical Scientist, U.S. Army Engineer Research and Development Center  
*"Outdoor sound propagation: recent modeling developments and applications to noise control"*

### Dr. Franck Poisson

Deputy of the manager of the "Physics of the railway system and comfort" department, SNCF, Innovation and Research Department  
*"Acoustic of the railway system: environmental and interior noise"*

### Dr. Neil J. Mansfield

Reader in Human Factors Engineering, Environmental Ergonomics Research Centre, Loughborough University  
*"Protecting people from vibration"*

## CONGRESS REGISTRATION

All people wishing to attend INTER-NOISE 2011 should register online at the Congress website, <http://www.internoise2011.com/>

Only credit cards issued by VISA, MasterCard, AMEX, Diners, or JCB are acceptable for online payment. If you prefer other methods of payment, please contact the Registration Secretariat for guidance. All payments of registration fees must be in Japanese yen and all currency conversion fees, if any, shall be paid by the registrants. Payments by check cannot be accepted.

	Before June 09	June 9 to August 04	On-site
Regular Participant	58000	63000	68000
Student	20000	23000	26000
Accompanying Person	10000	10000	13000
Additional Paper	7000		
Congress Banquet	8000		

All fees in the above table are shown in, and are to be paid in, Japanese yen (JPY).

Registration fees for Regular Participants and Students include:

- Attendance at any technical session including poster sessions;
- Printed booklet containing Abstracts of all papers and Exhibitor Directory;
- Proceedings of the Congress on a CD-ROM;
- Attendance at the Opening and Closing Ceremonies and associated receptions;
- Attendance at the Exposition and at the Exhibitors' Reception (Monday evening);
- Daily service of coffee, tea and cold beverage;
- Light meal for lunch on Monday, Tuesday, and Wednesday.

Note - Students must show their valid student ID when registering at the on-site registration desk for the Congress

Registration fee of Accompanying Persons includes:

- Attendance at the Opening and Closing Ceremonies and at the associated receptions;
- Attendance at the Exposition and at the Exhibitors' Reception (Monday evening).
- Daily service of coffee, tea and cold beverage;
- Light meal for lunch on Monday, Tuesday, and Wednesday.

## ACCOMPANYING PERSONS PROGRAM

Several Japanese Cultural Activities are scheduled for the Accompanying Persons.

The lesson/activity will take place from 10:00 – 12:00.

Details including how to register will be announced on the INTER-NOISE 2011 webpage, [www.internoise2011.com/exposition/index.html](http://www.internoise2011.com/exposition/index.html)

September 5 (Monday):

Japanese Tea Ceremony

September 6 (Tuesday):

Ikebana (Flower Arranging) Practice

September 7 (Wednesday):

Calligraphy Lesson and Practice

## CONGRESS BANQUET

Time & Date:

19:00, September 6 (Tuesday)

Venue:

Rihga Royal Hotel Osaka 3F,  
Banquet Room "Korin"

Fee:

8,000 JPY / person

Buffet-style meals will be served.

Reservations are required.

Details: <http://www.internoise2011.com/exposition/index.html>

## ABSTRACT AND PAPER SUBMISSION

Manuscripts for complete papers are to be submitted as PDF files after Abstract Acceptance.

To submit a PDF file of a Paper, log-in to your "My Page" from the INTER-NOISE 2011 website, <https://amarys-jtb.jp/INTER-NOISE2011/>, and click the "New/Additional Application" button in the "Paper PDF upload" field. The PDF file for the Paper: the size of the PDF file shall not exceed 10 Megabytes. If it is necessary to replace a previously uploaded PDF file for a paper, please cancel the old Paper once and upload a new PDF file.

The option to modify the Abstract will be disabled once the manuscript for a Paper is submitted and accepted by the registration system.

As shown in the following Important Dates, the deadline for Abstract Submission is 2011 February 15, and the deadline of Full Paper Submission is 2011 June 1.

### IMPORTANT DATES

(Japan Standard Time)

Deadline of Abstract Submission:

2011 February 25

Notification of Abstract Acceptance:

2011 April 15

Deadline for Full Paper Submissions:

2011 June 1

Deadline for Early Registration:

2011 June 8

## PASSPORT AND VISA

A valid passport is required for entry into Japan. The Japanese Embassy or Consulate in your home country will be able to provide specific details about any entry visa requirements and applications. Depending on the country, visa applications can take up to three to four months to be processed. It is therefore recommended that participants contact their local Japanese Consular Offices to determine whether or not a visa is required. For information on obtaining a visa for Japan.

[www.mofa.go.jp/j\\_info/visit/visa/index.html](http://www.mofa.go.jp/j_info/visit/visa/index.html)

## EXPOSITION

A dedicated exhibition space will enable companies and other organizations to display the latest in technology and services in the areas of noise and vibration control. The area will be the focal point for coffee and refreshments during daily breaks in the schedule of technical presentations. Traditionally, over the last few years, conference registrations have been at around 1000 delegates.

### EXHIBITOR PACKAGE

Cost: 250000 JPY for 1 booth, 450000 JPY for two booths, 600000 JPY for three booths. Each booth(s) price includes at least 1 Congress Registration and 1 Exhibition registration.

Minimum exhibit unit (one booth): 7.5 m<sup>2</sup> = 3 m X 2.5 m.

The booth price includes:

- 50-word company description in the Congress Program, and the company logo and address in the Book of Abstracts
- The company logo and hyperlink on the inter-noise 2011 website
- Invitation of visitors\*

\*The exhibitor can invite its clients to visit the Technical Exhibition without paying conference fees. This one-day visitor pass gives only access to the exhibition. The number of invitation is limited to ten (10) for each exhibitor.

All fees in the above are shown in, and are to be paid in, Japanese yen (JPY). Additional Exhibition Registration is 25000 JPY.

### TECHNICAL EXHIBITION HALL HOURS:

September 5 (Monday): 9 hours (9:00 – 18:00), and Exhibitor Reception (18:00 – 19:00)

September 6 (Tuesday): 9 hours (9:00 – 18:00)

September 7 (Wednesday): 7 hours (9:00 – 16:00)

For further information, please visit EXPOSITION/SPONSORSHIP page on the INTER-NOISE 2011 webpage, <http://www.internoise2011.com/exposition/index.html>.

## HOTEL ACCOMMODATION

The Organizing Committee has reserved a block of rooms at different hotels at reduced prices for the conference attendees. Please note that the special prices are available only when booking is made through the INTER-NOISE 2011 website.

<http://www.internoise2011.com/contact/index.html>

Rank	Hotel	Room type	Fee (per person, per night)	Distance
A	Rihga Royal Hotel	Single	JPY13125	Adjacent to the venue
		Twin (West Wing)	JPY13125	
		Twin (Tower Wing/32 sq. m.)	JPY16275	
		Twin (Tower Wing/41 sq.m.)	JPY18900	
		Twin (The natural Comfort Towers)	JPY18900	
		Twin (The Presidential Towers)	JPY22050	
B	Hotel Hanshin	Single	JPY9450	10 min. on foot
		Twin	JPY8400	
C	Rihga Nakanoshima Inn	Single	JPY7350	15 min. on foot
	Hotel NCB	Single	JPY7000	3 min. on foot
		Twin	JPY6000	
	Hearfon Hotel Nishi Umeda	Single	JPY8500	10 min. by taxi
	Umeda OS Hotel	Single	JPY8000	10 min. by taxi
	Mitsui Garden Hotel Osaka Yodoyabashi	Single	JPY7875	5 min. by taxi
Twin		JPY6825		
D	APA Hotel Osaka-Higobashi-Ekimae	Single	JPY7000	15 min. on foot
	Super Hotel City Osaka Tennen Onsen	Single	JPY6150	8 min. on foot

## TRAVEL TO OSAKA

The closest International airport to the meeting venue is Kansai International Airport (KIX). However, Narita International Airport (NRT) in Tokyo and Central Japan International Airport (NGO) in Nagoya are suggested as alternative choices as the flights to KIX from North America, Latin America, and Europe are limited. Itami Airport (also called "Osaka International Airport") is the most convenient domestic gateway to Osaka City.

### From Kansai International Airport to Osaka City

- By train: about 65 minutes
- By airport bus: about 60 minutes (Buses for Osaka leave from the ground-level Bus Terminal number 5)
- By taxi: about 60 minutes (charge: approximately 18,000 JPY including highway tolls)

### From Itami Airport to Osaka City

- By airport bus: about 30 minutes (Buses for Osaka leaves from the Bus Terminal number 4 of the North Wing Building and

from Bus Terminal number 14 of the South Wing Building)

- By taxi: about 30 minutes (charge: approximately 5,500 JPY including highway tolls)

### From JR Osaka Station to Osaka International Convention Center ("OICC")

1. **Free shuttle bus** operated by RIHGA Royal Hotel Osaka. Takes about 10 min\*  
\* RIHGA Royal Hotel Osaka is located next to "OICC". The two buildings are connected through a corridor.

### RIHGA Royal Hotel Osaka Shuttle bus Schedule

Depart: Osaka station 7:45-22:15 (in every 6-15 minutes)

Depart: RIHGA Royal Hotel Osaka 7:30-22:00(in every 6-15 minutes)

Free shuttle bus stop at JR Osaka station is located east side of the Station. (Take "Sakurabashi-guchi" Exit.)

2. **Taxi** Costs about JPY1000

3. **Train** Change to JR Osaka Loop line Get off at JR Fukushima Sta. (Next to JR Osaka). Takes about 15 minutes on foot

## GENERAL INFORMATION ABOUT OSAKA

**POPULATION**

2,668,113

**CLIMATE**

Osaka's summertime climate is generally hot and muggy, with June the rainiest month. Cooling breezes are rare.

Average Temperature in Osaka (in Fahrenheit) :

August: Highest-91, Lowest-75,  
September: Highest-84, Lowest-68

**LANGUAGE**

Japanese

**TIME ZONE**

Japan Standard Time (UTC +9)

9 hours ahead of London, 14 hours ahead of New York and 17 hours ahead of Los Angeles.\*

\*The differences vary depending on Daylight Saving Time.

**CURRENCY**

Japanese yen

**CURRENCY EXCHANGE**

Foreign currencies can be exchanged at banks and money exchange facilities located in airports. Major bank branches also offer the exchange, however, the banks close at 3 pm in Japan, and operate only week-days (Mon – Fri).

**ELECTRICITY**

Japanese electrical current is 100V AC, a voltage that is pretty much unique to the world. Osaka is on 60 Hz. Most electrical items from other parts of the world will function reasonably well on Japanese current.

Plugs are identical to the two-pin type in North America. Appliances with three-pin plugs will require an adapter.

**OSAKA CITY WEBSITE**

<http://www.city.osaka.lg.jp/contents/wdu020/english/>

**TRANSPORTATION**

JR (Japan Railway Company) operates high-speed trains called "Shinkansen." Shin-Osaka Station is the Shinkansen terminal in Osaka. This station is connected to Osaka Station at Umeda by the JR Kyoto Line and the subway Midosuji Line. All Shinkansen trains including Nozomi stop at Shin-Osaka Station and provide access to other major cities in Japan, such as Kyoto, Nagoya, Yokohama and Tokyo to the east, and Kobe, Okayama, Hiroshima, Kitakyushu and Fukuoka to the west.

**JR WEST**

Connects most parts of the Kansai area (Osaka, Kyoto, Kobe, Nara and so on).

*Private Railways*

Several private railways run to/from and through Osaka City, such as Hankyu, Hanshin, Keihan, Kintetsu and Nankai.

*Subway*

Available in Osaka, Kyoto and Kobe, Useful when traveling within cities.

*Ticket machines*

Tickets are purchased at ticket machines near the gates. Refer to the price list next to the machine (usually listed in both Japanese and English). The machine takes only cash hardly takes credit cards.

**FOOD CULTURE IN OSAKA**

It's said that the people of Osaka are happy and openhearted. Since ancient times, the best of the land and sea has found its way to the great city, spawning Osaka's "kuidaore" (eat until you drop) culture, and creating countless excellent places to eat. A varied range of culinary masterpieces can trace their origins to Osaka. They include such standard fare as tako-yaki, okonomi-yaki, kitsune udon noodles and other "konamon" (flour-based foods) on the low end to tecchiri and sushi on the high end.

**LOCAL INFORMARION***Umeda (Kita)*

Kita means "north" in Japanese. Kita Section of Osaka, which is located at the north end of Mido-Suji Avenue, is the northern center of the city. It's a busy, trendy, and very high-energy district. JR Osaka Area

*Namba (Minami):*

Minami, "south" in Japanese, is a conglomeration of several distinct areas. This area is very energetic and a pulsing entertainment district.

- Namba Sta. on the Subway Midosuji Line (Take exit No.14)
- Approximately 10 min. from Osaka (Umeda) Station.

*Osaka Castle:*

Osaka Castle, which is a famous landmark, a popular sightseeing spot, and the symbol of Osaka.

- Osakajo-Koen (Osaka Castle Park) Sta. on the JR loop line (Take exit No.1 or 3)
- Osakajo-Koen Station is 4-station (Approximately 10 min.) away from JR Osaka Sta.

*Universal Studios Japan:*

There is a variety of exciting theme rides and shows inspired by world famous movies, animations and comic series spread out among nine distinctly designed areas offering unique experiences. Universal City Sta. on the JR Yumesaki Line Universal City Sta. is Approximately 12-min. away from Osaka Sta.

**TRADITIONAL CULTURE IN OSAKA, BUNRAKU**

Osaka is the birthplace of Bunraku, the most surprising and exciting puppet theater in the world. The large puppets are usually manipulated by three puppeteers, and such close control gives them the power to display an extraordinary human-like expressiveness. In November 2003, UNESCO declared Bunraku a World Heritage, a masterpiece of the oral and intangible inheritance of humanity.

**TOURS**

The tours listed below are arranged specially for this conference .It will offer you a very good opportunity to see Japan. For booking tours and more tour information, please view the INTER-NOISE 2011 website.

**(OP1) One Day Tour of Kyoto's World Heritage**

Date: September 5 (8:00-17:00)  
 Price: JPY12000

**(OP2) Half Day Osaka City Tour**

Date: September 6 (13:00-17:00)  
 Price: JPY7000

**(OP3) One Day Tour to Japanese Culture and Cruise in Kobe**

Date: September 7 (9:00-15:30)  
 Price: JPY11000

**(OP4) Post Congress Tour to Nara**

Date: September 8 (8:30-17:00)  
 Price: JPY11000

**CONTACTS**

**CONGRESS SECRETARIAT:**

Kobayasi Institute of Physical Research  
 3-20-41 Higashi-Motomachi Kokubunji Tokyo  
 185-0022, JAPAN  
 Tel: +81-42-321-2841  
 Fax: +81-42-322-4698  
 Email: secretariat@internoise2011.com

**GENERAL INQUIRIES**

c/o JTB Communications, Inc.  
 4F Umeda Dai Bldg, 3-3-10 Umeda Kita-ku,  
 Osaka, 530-0001, JAPAN  
 Tel: +81-6-6348-1391  
 Fax: + 81-6-6456-4105  
 Email: secretariat@internoise2011.com

**REGISTRATION SECRETARIAT**

c/o JTB Western Japan Corp.  
 11F Hommachi cross Bldg., 3-1-8  
 Minamikyuhoji-cho, Chuo-ku, Osaka,541-0058,  
 JAPAN  
 Tel: +81-(0)6-6252-2861  
 Fax: +81-(0)6-6252-2862  
 Email: secretariat\_internoise2011@west.jtb.jp



# Third CAETS Forum on worldwide product noise emissions

Janet Moss, Noise Control Foundation, Poughkeepsie, New York, USA

This forum was a follow-up to the 2008 June CAETS workshop on the design of low-noise vehicles for air, road, and rail transportation that was held at the Institute of Sound and Vibration Research, Southampton, U.K., and the 2009 August CAETS forum on global noise sources other than transportation that was held during INTER-NOISE 2009 in Ottawa, Canada.

The Forum was held on 2010 June 14-16 at the Conference Centre in Lisbon, Portugal in conjunction with INTER-NOISE 2010. Sponsors of the meeting were the Royal Swedish Academy of Engineering Sciences (IVA), the Royal Academy of Engineering, UK (RAEng), and the National Academy of Engineering, US (NAE). Tor Kihlman and Philip Nelson were general co-chairs representing national academies in Sweden (IVA) and the United Kingdom (RAEng), respectively. William Lang represented the NAE, and acted as Forum Secretary.

Sessions 1 and 2 focused on China and the Green Agenda as they relate to the technology for the control of product noise emissions. These issues are of particular importance to manufacturers producing new products as well as policymakers concerned with the regulatory aspects of product noise emissions. Sessions 3 and 4 focused on how the role of technology in controlling the emissions the world's dominant noise sources can be conveyed to the world's policymakers and to the public. The technology assessment phase of the CAETS Noise Study was addressed in the Southampton and Ottawa forums.

Each session commenced with panelist presentations on the topics followed by a discussion period. Participants in the forum included INTER-NOISE 2010 attendees as well as policymakers and other individuals concerned with product noise emissions who were invited to participate.

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## Session Descriptions

### Session 1: CHINA'S CHALLENGING DESIGN REQUIREMENTS FOR PRODUCTS

*Session Chair: Jing Tian, Director, High-technology Research and Development, Chinese Academy of Sciences, Beijing*

The opening session of the forum was devoted to the Chinese program at the national level to regulate the noise emissions of the principal products responsible for creating high levels of noise in exterior and interior spaces. The designs to produce low-noise products, the applicable standards and test codes, and the enforcement of requirements on these products will be discussed in detail.

### Session 2: THE WORLDWIDE GREEN AGENDA AND PRODUCT NOISE

*Session Chair: Jason Pei, President, Floating Wind Farms Corporation, China*

This session will be devoted to the Green Agenda. CAETS recognizes noise as a constraining factor in the sustainable

development of the world's urban areas. The UN's Director of the Division for Sustainable Development has emphasized in a statement highlighting the world's situation that: environmental pollutants "... include such factors as ambient and indoor air pollution, water pollution, inadequate waste management, noise, pesticides, and radiation." The UN statement summarizes aspects of the world situation that are the basis of the Green Agenda's demand for environmentally sustainable development. Steps to include the global noise issue on the worldwide Green Agenda were considered.

### Session 3: TECHNOLOGY AND PUBLIC DEMANDS FOR A QUIETER WORLD

*Session Chair: Raj Singh, I-INCE V.P. Technical Activities, Ohio, USA*

Noise control technology is available now to satisfy many public demands for a quieter world. The public is generally not aware of what noise control technology can do and cannot do. The distinction between noises that are generated by humans or are under human (man's) control and those that are generated by products, machinery and equipment is blurred in the mind of the public. This session will focus on how to inform the public on what can and cannot be done to quiet noise at its source.

### Session 4: ACTION ON CAETS NOISE CONTROL TECHNOLOGY ASSESSMENT

*Session Chair: Louis Challis, Australian Academy of Technological Sciences and Engineering*

An assessment of the technologies now available and those needed in the future to reduce the emissions of the world's dominant noise sources is being prepared for the CAETS council. The CAETS academies have a significant role to play in bringing noise control technology to the attention of the world's policymakers. How this new assemblage of information can be translated into action on the part of governments, manufacturers, and other interested parties is the focus of this session.

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## SESSION 1: CHINA'S CHALLENGING DESIGN REQUIREMENTS FOR PRODUCTS

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### Questions for Panelists

1. What are the lawmaking bodies in China relating to product noise, and what laws and regulations have been enacted? Where do the requirements for low-noise products originate?
2. What role is seen for low-noise products in quieting the environment in exterior and interior spaces?
3. What are the noise emission limits prescribed by regulation of different classes of noise sources, e.g. industrial machinery, construction equipment, building service equipment, household appliances, other consumer products, and transportation vehicles?
4. What standards and test codes are used to measure compliance of manufactured products with low-noise requirements?
5. What tools, software, and test facilities are used for noise prototyping and noise measurement of low-noise products?

6. Are noise measurements routinely performed in manufacturers' production control processes?
7. What are China's requirements for the labeling of products that emit noise?
8. How is the noise of aircraft, trains and road vehicles regulated? What are the emission noise limits on these moving noise sources?
9. Are the emission noise limits on transportation vehicles rigorously enforced so that the manufacture, sale, or import of these moving sources above the prescribed limits forbidden?
10. For low-noise products how important is the noise requirement compared to other performance criteria such as robustness, energy efficiency, design, and price?
11. Is there a system in place for eliminating outdated industrial and construction equipment that produces serious environmental noise pollution?
12. How are relations managed between the manufacturers of noise-generating components (motors, compressors, etc.) and the manufacturers of complex machines integrating them?
13. Is retrofitting in situ to reduce the noise emissions of older equipment that has an additional effective lifespan a feasible option for manufacturing plants?
14. How can the noise generated by machinery and equipment within commercial buildings and residences be minimized by a building code or other regulation?

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### Panelists

- **Jian Tian**, Chinese Academy of Sciences, Beijing, Session Chair *Overview of China's design requirements*

- **Xianwei Li**, Ministry of Environmental Protection, China *Noise emission assessment and control for industrial machinery in China*
- **Yadong Lu**, Institute of Acoustics, Beijing, China *National standards for noise emission of products in China*
- **Fenglei Jiao**, China *Noise emission control for household appliances made in China*
- **Dongxing Mao**, China *Subjective assessment for product noise emissions*
- **Jian Tian**, Chinese Academy of Sciences, Beijing *Noise emission control for vehicles and transportation in China*

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### Presentations

#### Jian Tian – Overview of China's design requirements

#### Prof. Dah-you Maa

Prof. Maa is a person of incomparable influence in and with greatest contribution to improving the acoustical environment, and promoting the establishment of noise policy system in China, both technically and politically.

- Born on March 1, 1915
- Received his PhD Degree in 1940 from Harvard University

#### History of "Modern Noise Control" in China

*Prof. Dah-you Maa's contribution*

- In 1958, the People's Congress Hall with outstanding acoustical characteristics successfully designed and built
- Since 1960s, noise has been recognized as an environmental pollution, and became a discipline with ever-increasing and well-trained people working on it.

- In 1970s, *Prof. Maa* invented *Micro-Perforated Panel* Absorbers and established the theory for MPP designing.
- In 1980s, *Prof. Maa* invented a series of *micropore mufflers* for high-pressure jet noise control that can shift the audible noise into ultrasound.
- In 1980s, *after the continuous effort of Prof. Maa*, noise was at last successfully listed as the 4th most important environment pollution source, after water, air and solid wastes
- In 1982, the Standardization Administration of China (SAC) - Acoustics (TC17, mainly corresponding to ISO TC43), a P-member of ISO, was established. Since then on, 136 basic standards (most in noise) were enacted and revised accordingly. *Prof. Maa* worked as the *Chief Director* for 25 years.
- In 1979, a trial implementation of the ENVIRONMENTAL PROTECTION LAW was enacted, and then adopted formally on 1989-12-26, in which noise was looked on as one of the most important pollutions.
- On 1989-9-6, the Regulations on Prevention and Control of Environmental Noise was promulgated by the State Council
- On 1996-10-29, the LAW ON PREVENTION AND CONTROL OF POLLUTION FROM ENVIRONMENTAL NOISE was adopted at the 22nd Meeting of the Standing Committee of the 8th National People's Congress, promulgated by Order No. 77 of the President of the People's Republic of China on the same day, and effective as of 1997-3-1

### Administration System for Environment Protection in China

- The Law Maker: the National People's Congress

- The Executive: the Central Government:
- The State Council and the competent departments of environmental protection administration under the State Council
- The local governments at or above the county level

Framework for national standard establishment on noise emission control and environmental acoustics

- SAC TC17 - Basic acoustic standards and measurement methods
- Ministry of Environmental Protection - Acoustic environment quality standards, immission
- Ministry of Housing and Urban-rural Development - Construction noise standards, emission
- Ministry of Health - Occupational exposure noise standards, immission
- Department of Industries and Information - Product noise standards, emission

### Noise Policies

The Environmental Protection Law (1989) produced the Prevention and Control of Pollution from Environmental Noise Law (1996) and the Environmental Impact Assessment Law (2003) which provided technical guidelines. The Prevention and Control of Pollution from Environmental Noise Law provided standards for acoustic environmental quality (Local governments), standards for noise emission (industry), and technical policies and regulations.

From these developed an environment quality standard for noise (1993-2008), an environment standard for aircraft noise around airports (1988), and a noise emission standard and measurement methods alongside railways (1990 – 2008).

### The Competent Departments of the Environmental Protection Administration

- Ministry of Environment Protection (MEP)
- State administrative department of marine affairs, the harbour superintendency, the fisheries,
- Environmental protection department of the armed forces
- Administrative departments of public security, transportation, railways and civil aviation at various levels

### A Short Summary

- The legislation and technological support system for noise emission control is complete and effective
- While the execution capability of competent departments is comparatively weak and ineffective,
- local governors often believe that, noise will not cause any death, unlike air and water pollution!
- One-half person is in charge of noise issues in MEP!

### Xianwei Li, Bin Shao – *Noise emission assessment and control for industrial machinery in China*

Strict regulations and new technology help to build a quiet environment in the vicinity of industrial machinery and equipment in China. The content of this presentation includes a review of the regulations and standards and examples from industry including power plants and converter stations, cement plants, and other large-scale equipment.

### Noise Standards for Industrial Enterprises

Three standards are applicable to industrial enterprises. One prescribes noise limits within the industrial buildings during daytime and nighttime. Two of the standards set limits on the noise at the boundary of the industrial enterprise for

daytime and nighttime. Noise limits are prescribed in terms of A-weighted sound pressure levels [dB(A)].

Noise limit at the boundary of industrial enterprises dB(A)

Area Type	Day	Night
0	50	40
1	55	45
2	60	50
3	65	55
4	70	55

Noise limits in buildings dB(A)

Room Type	A		B	
	Day	Night	Day	Night
0	40	30	40	30
1	40	30	45	35
2, 3, 4	45	35	50	40

### Low-noise Equipment for Source Mitigation

Low-noise machinery and equipment includes: variable-mounting airfoil blade low-noise axial flow fans, external rotor centrifugal air blowers, tri-lobe roots blowers, low-noise centrifugal fans without scroll, carbon-fiber low-noise blades, and low-noise valves and pipes. New technologies are incorporated in an array-type silencer and a liquid pipeline silencer for the mechanical and electrical industries.

### Integrated Treatment of Power Plants

The first gas turbine power plant designed and constructed according to the Class 1 environmental noise standard was the Beijing Sun Palace Gas Turbine Power Plant. Another is the Yinchuan Hanas Gas Turbine Power Plant. The principal sound sources in the Sun Palace power plant were evaluated using SoundPlan and its expert system. A database in octave-

band sound power levels was built for the principal sound sources for the Shen Zhen Moon Bay Plant. From these databases flowcharts for noise control were constructed, and the distribution of sound levels within the plants were measured and found to comply with the standard. It is important to emphasize that power plants as well as other industrial plants require an integrated noise treatment in which the contributions of each noise source to the noise levels both within and outside the plant are considered by the rank order of their sound emission.

### Noise Control of HVDC Converter Stations

The principal noise sources are the converter transformer, smoothing reactor, AC filter field, array of capacitors and inductors, and cooling towers. Corona noise is also a significant noise source. Mufflers and noise barriers are used for enclosed converter stations. Significant noise radiation from the conductors and inductors in the outdoor AC filter field has been reduced by 16-meter-high noise barriers at the Zhaoqing converter station. A removable enclosure has been used for converter transformers. The layout for converter stations is being carefully researched to minimize noise radiation.

### Noise Evaluation and Control of Cement Plants

A comprehensive environmental noise impact assessment was made for an extension project of the Chongqing LaFarge cement plant. Following the assessment an updated design was installed to replace the original design. A large silo canopy was installed to cover the extension project that works as a sound barrier in the close proximity to the plant boundary.

### Vibration Isolation of Large-scale Machinery and Equipment

Vibration isolation plays a major role in the reduction of the noise radiated by

large-scale machinery and equipment. Typical installations of vibration isolators include those for:

- L-piston air compressors
- Cooling towers
- Damping spring for a forging line (Dongfeng Company)
- 1,000-ton press production line (Dongfeng Company)
- 16-ton electro-hydraulic hammer (Tri-ring Forging Company)
- Large laser cutting machines
- Coordinate measuring machine (Changfeng Auto Company)
- Coordinate measuring machine (Dongfeng Company)

### Yadong Lu – National standards for noise emission of products in China

#### History of Standardization in China

1957: Standardization Bureau of National Technology Committee joined IEC  
 1972: National Standardization and Metrology Bureau was established and joined ISO in September 1978  
 1978: State Standardization Administration authorizes national specialized standardization technical committees

1980: Chinese Standardization Technical Committee on Acoustics (TC17) was established corresponding to ISO TC43  
 1996: Law of the People's Republic of China on the Prevention and Control of Environmental Noise Pollution approved by The National People's Congress with a view to preventing and controlling environmental noise pollution, protecting and improving the living environment, safeguarding human health, and promoting economic and social development.

2001: Standardization Administration of the People's Republic of China (SAC)

established and authorized by the State Council to exercise administrative responsibilities by undertaking unified management, supervision and overall coordination of standardization activities in China

### **SAC/TC17 and its Standards System on Acoustics**

The Chinese Academy of Sciences (CAS) and the SAC are on the same governmental level and have a working relationship with each other on establishing national standards. SAC/TC17 Technical Committee on Acoustics includes subcommittees paralleling the subcommittees of ISO TC43. TC17/SC1, Fundamental Acoustics, corresponds to the main committee ISO TC43 (Acoustics). TC17/SC2, Noise, corresponds to ISO TC43/SC1 (Noise). TC17/SC3, Building Acoustics, corresponds to ISO TC43/SC2. TC17/SC3, Ultrasound/Underwater Acoustics, has no counterpart within ISO TC43.

SAC/TC17 has both domestic and international responsibilities.

Domestically its responsibilities are to:

- Study and propose acoustic standardization technology policy and implementation recommendations, draft long-term planning and annual planning recommendation for national standards (NS) on acoustics;
- Organize and coordinate the relevant departments to draft and revise NS on acoustics, as well as carry out standardization-supporting research;
- Review the professional drafts of NS and regularly reexamine the published and implemented standards on acoustics;
- Be responsible for the interpretation of NS, organize the standardization publicity, education, and experience exchanges; and
- Provide leadership and guidance to technical committees and their working groups.

The representation of China in the international standardization activities of ISO/TC43 is entrusted to SAC/TC17 which undertakes relevant back-up research, puts forward proposals for adoption as international standards (IS), compiles comments on the NWIP, CD, DIS, FDIS documents of ISO/TC43 and its subcommittees SC1 and SC2, and exercises voting rights on these documents.

From 1980 to 2009 SAC TC/17 produced 131 new standards and established the National Acoustical Standard System covering fundamental acoustics (30 standards), noise (66 standards), building acoustics (16 standards including 5 national engineering construction standards), and ultrasound/underwater acoustics (19 standards). The objectives of the standards program except ultrasound/underwater acoustics are:

- to unify acoustical terminology, basic quantities, and units;
- to promote hearing conservation and subjective evaluation;
- to improve the evaluation and control of environment noise, the acoustical environment for people, and the acoustics of buildings;
- to regulate the measurement of product noise emission, labeling, and control; and
- to improve acoustical materials, the design of noise control products, and comprehensive noise management of industrial enterprises.

### **Standards for Acoustical Environmental Quality and Product Noise Emissions**

The Ministries of Environmental Protection, Housing and Urban-rural Development, and Health as well as some professional industry departments are responsible for enacting environment protection standards, engineering construction standards, and occupational health protection standards as well as product standards dealing with noise

emissions control. The Chinese standards below prescribe limits on product noise emissions and the quality of the acoustical environment. All the following standards set limits in immission sound pressure levels except for the last standard on the list:

- GB 3096-2008 Environmental quality standard for noise: Sets limits daytime and nighttime for five environment areas.
- GB 16170-1996 Limits of noise emitted by stationary road vehicles: Sets limits for five categories of vehicles.
- GB 1495-2002 Limits and measurement methods for noise emitted by accelerating motor vehicles: Sets limits for four categories of vehicles.
- GB 19757—2005 Limits and measurement methods for noise emitted by accelerating tri-wheel and low-speed vehicle: Sets limits for type approval and production consistency evaluations.
- GB 4569-2005 Limit and measurement method of noise emitted by stationary motorcycles and mopeds: Sets limits for three ranges of engine displacement volumes and vehicle types.
- GB 16169-2005 Limit and measurement method of noise emitted by accelerating motorcycles and mopeds: Sets limits for three ranges of engine displacement volumes and two maximum design speeds.
- GB 14097-1999 Noise limits for small and medium power diesel engines: Sets limits for low-noise, ordinary, and high-noise 2-stroke and 4-stroke engines.
- GB 18321-2001 Limits for noise emitted by rural vehicles: Sets limits for two vehicle types accelerating and at driver's position.
- GB 19997-2005 Limits for noise emitted by combine harvester: Sets limits for enclosed, unenclosed, and without driver cab.

- GB 9660-1988 Environment standard and measurement of aircraft noise around airport: Sets limits for special areas (dwelling, culture, and education) and living areas other than the special areas.
- GB 12523-1990 Noise limits for construction site: Sets limits for four different construction sites (earth and stone removal, pile driving, construction, and furnishing).
- GB 12525-1990 Emission standards and measurement methods of railway noise on the boundary alongside railway line: Sets limits for daytime and nighttime.
- GB 14892-2006 Noise limit and measurement for train of urban rail transit: Sets limits on subway (underground and over-ground) and light rail, inside driver cab and inside passenger compartment.
- GB 14227-2006 Acoustical requirement and measurement on station platform of urban rail transit: Sets limits for inbound and outbound trains.
- GB 12348-2008 Emission standard for industrial enterprises noise at boundary: Sets limits for five functional areas outside factory boundary.
- GB 20062-2006 Mobile crawler crane-Limits and measurement methods for operating noise: Sets limits for sound power levels for seven engine electrical power ratings.

## Summary

As the Chinese ancient philosopher Mencius (B.C. 372-289) said “The compasses and rulers set the most perfect examples for circle and square, the Saints set the most perfect examples for human ethic relations,” China has established an integrated framework of national standards on noise emission control and environmental acoustics. These standards behaving like the compasses and rulers

as well as the Saints will provide a correct guidance for the research and development works in noise emission control and environmental acoustics, and promote social developments in harmony.

## **Fenglei Jiao – Noise Emission Control for Household Appliances Made in China**

### Introduction

The Chinese people are very sensitive to household appliance noise. In 2003 when China joined the World Trade Organization, the Chinese government promised to open up its domestic market. How to respond to this challenge and improve product quality became urgent matters for the appliance industry. In recent years China has become a major manufacturer of household appliances. The production of some appliances now ranks first in the world. Standards and regulations related to household appliances have been improved and have helped to facilitate the development of low-noise products.

### National Standards Related to Household Appliance Noise

The Standardization Administration of the People's Republic of China (SAC) has overall responsibility for household appliance noise standards. The standards are developed by TC 46 (IEC/TC59, TC61) Household Appliances Standardization Technical Committee of China and its Subcommittee 10 on Noise of Household Electric Appliances and TC 17 (ISO/TC43) Acoustics Standardization Technical Committee of China. TC 46 follows IEC/TC59 and IEC/TC61, while TC 17 follows ISO/TC43.

The general standards and test codes follow those of the ISO and IEC and are used for appliance noise testing. For some household appliances, the noise test codes are contained in general performance test codes. These include refrigerators, refrigerator-freezers, freezers, electrical

washing machines, range hoods, room air conditioners, and fans and regulators. There are special noise test codes for vacuum cleaners, dishwashers, washing machines and spin extractors, electric shavers, and electric hair dryers.

In addition to the standards related to household appliances, there is a standard for the declared noise emission values of information technology and telecommunications equipment.

GB 19606-2004 prescribes the noise limit values for household and similar electrical appliances. This standard is a mandatory national standard, and presents noise limit values for six major classes of household appliances—refrigerators and freezers, air conditioners, washing machines, microwave ovens, range hoods, and fans. It requires that the noise levels be marked on the nameplates or included in instruction manuals for the appliance. The measured value should not exceed the noise limit value by more than 3 dB. There are no corresponding international standards for this standard.

A new standard is at the draft stage that prescribes mandatory requirements (for the sound power levels) for six classes of small household appliances, including humidifiers, food processors and blenders, dishwashers, vacuum cleaners, rug shampooers, and air purifiers.

### Appliance Manufacturers

Most appliance manufacturers have the latest laboratory facilities, tools, and software; and they cooperate with research institutes or consulting organizations.

### Green Directives

The China Energy Label covering all household appliances became a requirement in 2005, but no noise information is currently required on this label. An appliance recycling policy is in effect when household appliances are replaced. The government and

the manufacturers pay the bill for the recycling.

## Status of Major Appliance Noise

A survey was completed this year in Beijing for some common major brands of refrigerators, air conditioners, and fans. All of the products surveyed were equal to or below the limit prescribed by GB 19606-2004 standard.

## Problems and Solutions

1. *Lack of scientific evidence for the standards:* There is need to specify the representative operating conditions of the appliances, the noise limit values should be more practical, and there is need to modify and/or update some of the older standards.
2. *Lack of acoustical knowledge by the manufacturers:* There is need to increase the number of acoustical professionals in the manufacturing facilities, and the academic institutions should engage more with industry.
3. *Lack of coordination between the standards and their implementation:* GB 19606 is mandatory, but it is not included in the Product Compulsory Certification. Only a few appliances are included in Voluntary Product Certification.
4. *Manufacturer responsible for self-declaration with sampling by government-authorized institutions:* There is need to strengthen the credibility of manufacturers, need to establish a noise information registration system, and need to improve supervision and inspection by government.

## Dongxing Mao – Subjective assessment for product noise emissions

### Current Situation and Challenge

There is now more public awareness of subjective assessment of noise in China. Consumers are paying more attention to low-noise products, and manufacturers are getting involved in research and development toward this goal. But great differences exist between industries regarding the importance of low-noise products. Legislation, guidelines, and regulations are limited because of the lack of support from research and development groups working on noise reduction.

There are, however, some major industries currently engaged in sound quality (SQ) research and development. These are:

- Car manufacturers and those industries which support them
- Household appliance manufacturers, particularly those producing air conditioners
- IT product manufacturers
- China's challenge in noise subjective assessment exists for several reasons:
  - Lack of a set of metrics
  - Subjects interpretation of SQ parameters different to current definition made by western scholars (e.g. roughness, sharpness)
  - Hearing perception character different compared to westerners' perception. (e.g. ear canal infrastructure, loudness, language specialty)
  - Newly-arisen phenomena lack detailed study and, therefore, reliable data (e.g. high-speed train noise)

Solutions to these challenges may include further study of the subjective responses of the Chinese people and the development of new metrics.

## Car Noise Assessment

The current metrics for the assessment of car noise include general metrics (loudness, sharpness, roughness, impulsiveness, etc.) and specific sound character metrics (pitch, timbre, pleasantness, powerfulness, booming during acceleration, etc.).

- Metrics for different driving state
  - Low idle:  $A=f(L, \text{Low-freq.})$
  - Stationary operating:  $A=f(L, \text{Low-freq., } S, \text{Ton.})$
  - Acceleration:  $A=f(L, \text{Low-freq., } R, S)$
  - Coast down:  $A=f(L, \text{Low-freq., } R, AI)$
- Development of new combined metrics
  - Borrowing + developing new metrics
- Using descriptive Chinese vocabulary
  - Collection of Vocabulary by questionnaires
    - *Imaginary description of certain character*
    - *Imaginary description of overall perception*
    - *Listening response from sound stimuli with certain pre-defined character*
  - Subjective test with collected vocabulary
- Developing new metrics suitable for Chinese people
  - Correlate verbal space with metric space
  - Modification of current metrics
  - Developing new metrics based on combination of current metrics
- Example: Development of the "Dichen" metric

## Subway Induced Low Frequency Noise

The low-frequency character of subway noise is described as below 200 Hz and a

peak at 40~80Hz. China has three related regulations:

- GB 22337-2008 Emission standard for community noise
  - Special clause for structure excited low frequency noise
  - 1/1 Octave level limits for 31.5Hz~500Hz, adopting NR curve
- JGJ/T 170-2009 Vibration and noise limit induced by rail transit
  - Z weighting for Vibration, VLz
  - A weighting for noise, but more strict limit value
- DB31T470-2009 (Shanghai Local Standard)
  - due to negotiating value of JGJ/T 170
  - Changed limit value, but NOT quantities

Problems are found in the noise limits in regulations because there has not been enough relevant studying, but simply reference to international standards. These limits are not in good correlation with subjective responses from residences, and they have caused conflicts and even demonstrations.

Solutions to these problems may be found in stricter noise and vibration mitigation measures in subway construction, and removal or rebuilding of residences incorporating damping measures, and the further study of annoyance characters of subway-induced noise.

## Summary

In summary, both the government and the public are aware of the importance of a subjective response to noise. There is a tremendous growth of relevant facilities for subjective assessment research, but the progress in different industries and departments are unbalanced.

The subjective assessment of car noise has improved with the development of a specific new metric, "Dichen." The annoyance of subway-induced, low-frequency noise has been studied and a

new weighting network is proposed. This proposed network seems applicable to the assessment of annoyance from other kinds of low-frequency noise.

## Jian Tian – Noise emission control for vehicles and transportation in China

### Overview of Transportation Development

By 2009 there were 3.7M km of roads in China of which 65K km are highways. By 2020 it is projected that there will be 85K km of highways. By 2009 there were 87K km of intercity railways, and that is expected to exceed 110K km by 2012. In 2008 there were 158 airports in operation of which 53 have in excess of 10K aircraft per year. The number of airports is expected to exceed 244 in 2020. By 2009 China had 30 light rail lines in operation in cities, subways, and elevated rails totaling about 933 km. Fourteen-hundred km are currently under construction with 2610 km expected to be built in the next five years. China is not the country with most motor vehicles, but with the greatest percentage of increase. In 2009 China produced and sold the most motor vehicles including 13.6M cars and 2-3 times that number of motorcycles and farm vehicles. The monthly sales rate of automobiles at the end of 2009 approached 1M. And the total number of vehicles in Beijing now exceeds 4M.

### Current Status of Transportation Noise

In busy sections of highways the noise levels are 65 to 75 dB(A) (daytime) and 65 to 70 dB(A) (nighttime). On urban roads in 113 cities 17 percent of daytime levels exceed 70 dB(A) and 50 percent of nighttime levels exceed 55 dB(A). The average nighttime noise level was approximately the same as that in daytime. For intercity railways, noise levels were recorded at 30m from railway embankments. In 2007 15 percent were in the highest range of 65 to 70 dB(A). For

light rail in cities  $L_{eq}$  was up to 55 dB(A) during nighttime. In 2006, the people exposed to high levels of noise around airports was estimated to be 5,000 for noise levels exceeding 85 dB(A) and up to 715,000 people exposed to noise levels in the range 70 to 75 dB(A).

### Standards for Transportation Noise

The transportation noise management system was put in place by the Environment Protection Law in 1989. It consists of the Prevention and Control of Pollution from Environmental Noise Law enacted in 1996 and the Environment Impact Assessment Law in 2003. The former consists of standards for environmental noise (1993, 2008) and for aircraft noise around airports (1988) as well as emission standards and measurement methods for railway noise on the boundary alongside risky line (1990, 2008). It also includes a technical policy for the prevention and control of noise pollution from ground transportation (2010). The second law includes technical guidelines for noise impact assessment (1995, 2010).

Standards prescribing upper limits and measurement methods issued between 1997 and 2005 cover the noise emissions of stationary and accelerating motorcycles and mopeds, accelerating three-wheeled and low-speed vehicles, and stationary and accelerating motor vehicles.

Environmental noise limits are prescribed for five functional area categories. The limits prescribed for the quietest category are 50 dB(A) daytime and 40 dB(A) nighttime and for the noisiest category, a railway area, of 70 dB(A) daytime and 60 dB(A) nighttime. For aircraft noise around airports, two area categories are defined. For special residential, cultural, and educational areas the upper limit is 70 dB(A); and for other urban areas, 75 dB(A). This standard is currently being revised, and the assessment index has been changed to  $L_{DN}$ .

For railway noise two area categories are prescribed. For areas along existing railways upper limits are  $L_{eq}$  equal to or less than 70 dB(A) both daytime and nighttime. For areas along new railways the daytime limit is the same but the nighttime limit is reduced to  $L_{eq}$  equal to or less than 60 dB(A).

### Transportation Noise Control Technologies

Land-use planning is an effective way to reduce noise impacts. Transportation corridors have been marked off by authorities in large cities such as Beijing and Shanghai where noise-sensitive buildings are prohibited. In China, passenger and freight trains run on independent lines with the passenger trains usually located between freight train lines. Despite land-use planning, some noise-sensitive buildings have been built near transportation corridors.

Experiments have shown that low-noise pavement made of asphalt can reduce the noise of road transportation by 3 to 8 dB(A). For source noise control of railways the following reductions are possible:

- Locomotive whistles: 3 to 5 dB(A)
- Sound of broadcast systems: 1 to 3 dB(A)
- Locomotive design improvements: 4 to 10 dB(A)
- Seamless steel rails: 1 to 3 dB(A)
- Rails with damping: 2 to 4 dB(A)
- Cement-based, noise-absorbing material on ballast-less track: 1.2 to 2.6 dB(A)
- Streamlined bodies, pantograph barriers, and bogie skirts: not available

Noise source control for the Shanghai subway has been accomplished with the installation of improved fasteners

and track dampers. In Shanghai and the three other subways in China (Beijing, Guangzhou, and Shenzhen), improvements have been made with elastic bearing blocks and elastic rubber sleepers as well as rubber-floating and spring-floating slabs.

Noise barriers are widely used in China with improvements reported of 3 to 15 dB(A). By 2006, barriers had been built on approximately 1,000 km of highways and about 100 km of railways. It is expected that more barriers will be used in the rapid development of high-speed trains. For light rail and city roads, no statistical data are available; but some barriers have been erected.

The outer circle road in Shanghai (98 km in length) has a design speed of 80 to 100 km/hr with peak traffic flow of about 8,000 vehicles per hour and a total of 1K vehicles per day. Within 60 meters of the road the noise level was 9 to 16 dB(A) above the nighttime standard level of 55 dB(A). About 16 km of noise barriers with a height of 3 to 6 m were built in 2007 and 2008. The Guangshun community provides an example of the installation of noise barriers. Monitoring points were on the second, fourth, and sixth floors of an adjacent building 48 m

from the barrier. The reductions observed on these floors were about 14, 12, and 9 dB(A) respectively.

The roles of the entities involved have been clarified. The government is responsible for organization and supervision. The road investor and real estate developer are responsible for reducing the noise in dwelling areas before the road was built.

### Some Achievements in Traffic Noise Control

During the years 1990 to 2005, the average road traffic noise level in China dropped from over 72 to 69 dB(A). In Beijing the road traffic noise level from 1988 to 2006 has dropped from 72 to 69.5 dB(A). During the same time period the traffic flow increased from just above 1,000 vehicles per hour to more than 5,000 vehicles per hour.

### Prospects

In considering the prospects for future transportation noise control, it is recognized that the reduction of noise emissions is becoming more and more important. Low-noise vehicles will become common as more stringent upper noise limits will be applied gradually. The noise emission control of vehicles



First discussion session (left to right): Fenglei Jiao, Dongxing Mao, Yadong Lu



Second discussion session (left to right): Jian Tian, Xianwei Li

will be backed by the route selection of transportation corridors away from noise sensitive buildings as well as land use planning. Reserved zones will be delineated with appropriate distances from transportation corridors. Noise sensitive buildings should not be constructed in these reserved zones.

## Discussion

### Enforcement

**Question:** The legislation in China appears to be well-prepared, but the enforcement staff is now one-half person. Are improvements to be expected?

**Answer:** I am sorry to tell you but I am not optimistic. Last year I submitted a proposal to the government through the China Political Consultant Conference, but received no response.

**Question:** It's a similar situation in the United Kingdom with a lot of legislation, rules, and regulations in place but very few people in government working on noise. What are the reasons so few people are working on noise in China?

**Answer:** As indicated in my presentation, the government thinks that noise will

not cause any deaths; but air and water pollution are very severe.

**Question:** How are the products kept off the market that don't meet the noise limit? What sort of regulatory agency is involved, and how is that responsibility carried out?

**Answer:** The limit value standard is a stricter standard than that of other countries.

**Question:** Is there a trade organization that has responsibility for this?

**Answer:** Yes. In China most of the enterprises have their own standards for the noise levels of household appliances; and in most cases the enterprise's standards are stricter than the national standards. You can see that most of the products are quite a bit lower than the level of the national standards. Therefore in competition, the household appliances with the higher noise levels will be pushed out of the market not only because of government regulation but also because of consumer demand.

**Question:** Are the Chinese noise standards strictly enforced for

manufacturers who import products from other countries into China?

**Answer:** Yes, for products imported there is a government-authorized organization which does the testing. But I'm not sure if they are regulated or if they verify the noise label on the product. There is no difference for the domestic-made and the imported products.

**Question:** It was stated that the reason why there were limited personnel for checking that all regulations are fulfilled is that you don't die from noise. Now we have a lot of recent data about the correlation between the environmental noise of transportation vehicles that you have given and cardiovascular diseases and death. Are these relations not considered in the discussions in China?

**Answer:** It is a relative result compared with air and water pollution which causes a quick and immediate response from authorities. Even though most of the complaints about environmental pollution concern noise, but some of the governments feel it is not so urgent compared with air and water. With the rapid development of the country, the air and water pollution are very severe now.

### Classroom Noise

**Question:** What is the nature of the "dotted line" connection between SAC and CAS? Are the noise limits for classrooms being met in general?

**Answer:** SAC means the Standard Administration of China and CAS means Chinese Academy of Sciences, so that is quite different. Up to now there are no classroom limits for noise.

**Comment:** In another standard assessment, we have noise limits for the classroom, but in the Ministry of Urban Construction they have limits for different school rooms, hospitals, and other such buildings. But this is not part of the work of the SAC.

## Product Requirements

**Question:** Concerning the standards for products, have you established standards for machines or categories of machines that were not addressed in international standards? I expect you may have sought an adaptation or transcription of most of the standards, but you may have found that some are not adapted to your situation for various reasons. You may have also have found that there is a lack of standards for some types of products.

**Answer:** Some standards are adopted international standards. There are some other standards that are made to accommodate the Chinese situation.

**Comment:** Do you find that we have some different corresponding situations? For this one we modified ISO standard, for this one is identical, and for this one we do not agree with.

**Question:** The noise limits seem to be in terms of sound pressure, not sound power. If so, why? And how do you determine the distance?

**Answer:** The distance is one meter. One meter is the standard distance.

**Comment:** For the air conditioner it is not easy to measure the sound power because it is partially outside of the building. It is not easy to measure the sound power, so they use the sound pressure level.

**Question:** Are Chinese noise emission standards the same as international standards?

**Answer:** Mostly the same, but not all.

**Question:** Are Chinese requirements for noise emission of outdoor equipment the same as European Union requirements?

**Answer:** Yes, they are the same.

**Question:** Are you developing noise

measurement standards and regulations for wind turbines?

**Answer:** Not yet, but we are interested in doing so.

**Question:** Is there any legal obligation to reduce the noise of machines at the source?

**Answer:** Yes, but only for some of the products, for example cooling towers and blowers.

**Question:** Are the standards for household products the most stringent in the world? What happens to manufacturers who don't meet them?

**Answer:** I only know the limit values for China and not for other countries. According to our survey, we find no known value that exceeded the limit value.

**Comment:** Actually if their products cannot meet the requirements of the noise limits, they cannot bring their products to the market. This is the reason they must do their best to control their product noise—to bring it to the market. I also believe that Chinese noise standards are not more stringent than other countries because of available technology that determines how low the noise levels of your products can be. Up to now for many Chinese products, the noise label is a little higher than the products of other countries.

## Product Declarations and Certification

**Question:** How are the levels of noise publicized on products? Are they on labels?

**Answer:** According to the standard issued in 2004, the manufacturers should mark the sound level on the product label; but not all of them obey that. By August 1, 2005, the government said that they should do this; but some manufacturers still haven't complied.

**Question:** How are the levels of the noise of products certified and controlled?

**Answer:** Generally the manufacturers send some samples to the authority's laboratories, and most of the products were made on-site in the factories. They can send several of the samples and then use the number as the base.

**Question:** Is there any law in China to require machine manufacturers to provide a noise emission declaration?

**Answer:** Only some of the manufacturers have noise emission declarations for the blowers in industrial applications, but not for all of the machines. Also, for cooling towers we have regulations.

**Question:** Is there a product register or database giving decibel levels?

**Answer:** A database, yes for sample products. There is an authority laboratory that measures and enters into the database the noise levels for different manufacturers. But it does not cover all of the products because they only get samples. The factories send only their products with a lower level of noise. The manufacturers can compare, but the public is not given the numbers.

**Question:** What is the number of the CAS standard or regulation that requires the manufacturers to put the sound levels on the nameplate.

**Answer:** Only for household appliances now and for some industrial products such as blowers and cooling towers. Household appliances there are six types. There is a new standard issued in 2004 covering all of these six. Originally we had several different standards, but since 2004, they are united.

## Operating Conditions

**Question:** It was said that more needs to be done on defining operating conditions

during noise measurements. Do you think operating conditions have to be harmonized between countries?

**Answer:** Yes, as a member of the World Trade Organization China should harmonize with other countries on these standard conditions. That's why most of our standards used today are equivalent and nearly identical to international standards.

**Question:** The noise limits for vehicles shown on some of the slides were taken at what distance?

**Answer:** The distance was 7.5 meters from the center line of the road.

### Low-frequency Noise Sensitivity

**Question:** Do you think the Chinese people are more sensitive to low-frequency noise?

**Answer:** I believe so based on our research. And also testing by others show that the Chinese people are more sensitive at low frequencies.

**Comment:** Your presentation was very interesting about Chinese people hearing noise in a different way, particularly at low-frequencies. There is work being done in Japan with low-frequency noise. Do you think this means that Japanese people, like Chinese people, are more sensitive to low-frequency noise than perhaps European people?

**Comment:** I would like to think that Asian people are more sensitive compared with Western people to low-frequency noise. When you take a look at the equal loudness curves in ISO 226 and compare the version of 2003 with that of 1987, we have found a big difference. I would like to think the difference is because they added a lot of results for the Japanese people. So there is a big difference in comparison to the 1987 version. I would

like to believe that Asian people are quite different from European people.

### Quiet Vehicles

**Question:** What quiet vehicles are being developed with more stringent requirements?

**Answer:** The quietest vehicle will be a purely electric motor vehicle, but China has no standards yet. Now we are developing some traditional motor vehicles just under the limits of the national standards.

**Question:** You mentioned near the end of the presentation for railroad noise control, different track fasteners, and floating slabs. It is also true that the maintenance of the rail—keeping the rail smooth—is equally important. Is that something being considered?

**Answer:** Yes, I agree with you. Maybe the track maintenance could be effectively used, but for how long these measures are effective depends on a number of factors.

### Greentech Company

**Question:** I worked at many power plants, cement plants, and converter terminals. I have met with the Greentech Company. Please tell us more about the Greentech Company.

**Answer:** The Greentech Company is a high-tech company working mostly on acoustic solutions, and it is originally from an institution in the 1990s. After that it did not restrict itself to Chinese acoustic solutions and is now consulting in other areas.

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## SESSION 2: THE WORLDWIDE GREEN AGENDA AND PRODUCT NOISE

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### Questions for Panelists

1. What are the components of the Green Agenda?
2. How has the worldwide Green political movement defined the Green Agenda?
3. What is the relationship between the Green political movements in many countries and their individual interpretations of the Green Agenda?
4. How could the development of low-noise products fit into the Green Agenda?
5. What actions are necessary to convince the Green movement that noise control is necessary for a sustainable development?
6. The Green Agenda includes such factors as air pollution, water pollution, inadequate waste management, pesticides, and radiation. Where does noise fit into this hierarchy of environmental pollutants?
7. What aspect of the Green Agenda could include noise as a constraining factor in sustainable development?
8. Can we link noise control to the emerging Green energy industry?
9. What evidence is there that a Green building may be bad for acoustics and noise control?
10. For industries that cannot adopt the Green Agenda, should the emphasis be placed more on usage reduction (by regulation?) and less on technology?

11. Could an agency of the United Nations enact a UN convention similar to the anti-smoking convention that requires the consideration of noise on the global agenda for sustainable development?
12. How does the noise issue fit into the Brundtland Commission definition of sustainable development: “A form of development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”?
13. Is the term “sustainable development” an oxymoron because development inevitably depletes and degrades the environment? Would the term “environmentally sustainable development” be more appropriate?

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## Panelists

- **Jason Pei**, Floating Wind Farms Corporation, China  
*Overview of the global noise issue and the Green Agenda*
- **Joel Shon**, Tanan University of Technology, Taiwan  
*Asia-Pacific Economic Cooperation (APEC) and the Green Agenda*
- **Bill Lang**, Noise Control Foundation, U.S.A.  
*The Green Agenda, sustainable development, and noise*
- **Greg Watts**, University of Bradford, U.K.  
*Integrating noise control into the emerging Green Agenda*
- **Ralph Muehleisen**, Illinois Institute of Technology, U.S.A.  
*Acoustics as an integral factor in an indoor Green environment*

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## Presentations

### **Jason Pei – Overview of the global noise issue and the Green Agenda**

#### **Green Building: the Technology Integrator**

As an innovative space provider, the challenges for green buildings are:

- to remain in harmony with Mother Earth through the use of music, reduction of pollution (air, water, waste, thermal, NOISE, pesticides, and radiation), recycle and reuse resources (solar, wind, water, and bio), and build with green materials;
- to control the indoor environment including thermal, air movement and quality, water quality, humidity, light, and quiet spaces; and
- to be smarter (in efficiency, communication, information, entertainment, storage, and acoustics), safer (reduce hearing loss), and more economic than the non-green counterparts.

Also important are safer environments where workers are not exposed to high levels of noise which might cause hearing loss. The use of noise control measures will reduce these risks and, therefore, become more economic in the long run. It is also important to educate building owners and constructors in the advantages of noise control.

### **Joel Shon – Asia-Pacific Economic Cooperation (APEC) and the Green Agenda**

#### **What is APEC?**

APEC is an economic cooperation organization along the Pacific Rim: Asia, America, and Oceania. APEC currently has 21 members, including mega powers in this area: USA, Russia, China, and Japan. It is not a tight international organization like the EU or UN, nor is it a free trade area

like NAFTA or ASEAN. It is a platform for the U.S. to exchange ideas with the Asia-Pacific region. The primary goal of APEC is to support sustainable economic growth and prosperity in the Asia-Pacific region.

#### **APEC Sustainable Development**

The APEC High-Level Meeting on Sustainable Development was held in Santiago, Chile, on 20-21 July 2006. Major conclusions include:

- encouraging APEC Working Groups to coordinate their work on sustainable development through the exchange of information and ongoing cooperation between and among APEC economies;
- improving the exchange of information between APEC and other international organizations, such as UN-CSD, WTO, OECD, and the World Bank; and
- considering civil society participation and dialogue in future work on sustainable development.

APEC has a combination of countries and regions with different income levels – from 1,000 to 47,000 USD GDP per capita. The sensitivity and tolerance of noise is quite different across the regions.

#### **Noise is not too big an Issue for APEC**

APEC nations have already discussed common reactions on the EU Emission Trading System, but not on noise emission issues. The culture differences between east and west have also made noise a difficult pollution to define. A Michelin 3-star restaurant can be as quiet as 65dB in the EU, but the most popular restaurant in Hong Kong can be as noisy as 105 dB. Next door Karaoke, religious activities, dogs barking, even false alarms are common background noises in most Asian nations. As a result, only a limited number of countries in the APEC region have noise related acts, laws, or regulations—Australia, New Zealand, USA, China, Taiwan, Japan, Korea, and Singapore.

## Individual Actions

What is the noisiest mobile source?

Aircraft movement is probably the noisiest mobile source. High speed rail may produce similar high noise levels which may attract more attention in the future.

Compared to stationary sources, moving sources are more difficult to regulate.

Economic incentives are a popular tool to regulate moving sources, but not necessarily effectively. The questions to be answered are:

- Question No. 1: What measure of noise emission can be used as a base for noise emission charges?
- Question No. 2: What is the unit price for noise emission?
- Question No. 3: What are we going to do with the money?

## An Example

Landing fees based on noise levels are charged in Australia (1 airport), Japan (3), Taiwan (11), and other airports have night surcharges and charges based on aircraft weight and type. The funds resulting from these charges are used in home insulation schemes, in acquiring land, and for remuneration of households within a certain noise contour.

## Individual Actions + Economic Incentives = Questions Marks

There are problems with economic incentives. Effectiveness is the most critical issue of economic incentives. In practice, we found a lot of emission sources pay to produce noise: the fines paid and punishments are taken as permits for noise emission. In economic theory, those who cannot afford the emission permits will withdraw from the market hence the total noise emitted can be reduced. This is not likely to be true in some APEC nations—if I can't afford it, I simply don't pay it.

There are also social costs and social justice to be considered. In the least developed countries, some people are

willing to get paid for noise exposures—life has a price tag on it. Most developed nations have health care systems. People pay taxes and fees to support the system, but noise is destroying the system. If the negative impacts of noise on human health are clearly defined, none of the residents exposed in the noisy area should be compensated monetarily. People get paid for exposing themselves to noise, but the whole nation is paying the medical bill.

## A Call for Global Action!

Could a global or regional trading scheme be a future incentive for global action? The total amount of the social cost could be too expensive for any single noise emitter to afford—a quiet world without economic growth? The incentives should be able to change the behavior of noise emitters. Trade-offs must be obvious able to move emitters from “pay to emit” to “reduce and save.” For example, smokers and tobacco manufacturers should both be blamed. A regional, if not global, scale of trading barriers against “noisy products” should be considered.

Multi-national organizations have needed functions to perform. Global actions need to be taken but not only for a specific region, otherwise there won't be environmental justice and fair competition. Multi-national organizations need to trigger the first shot—you should not be able to sell your noisy product in the EU and APEC if you produce too much noise during the manufacturing process. Increased production costs would not be surprising, but more R&D funding to reduce noise can also be expected. There should be no more cheap solutions in the future involving labor, land, green house gases, renewable energy, and noise. If less noise equals better performance and less energy consumption, there might be an opportunity for noise emission trading.

## Bill Lang – *The Green Agenda, sustainable development, and noise*

### Quiet is Green—the Current Green Agenda

A Green Party is a political movement that inter-relates its philosophy from four different social movements—the peace movement, the civil rights movement, the labor movement, and the environmental movement. It is Green Party involvement with the environmental movement that is the focus of our current attention.

The Green Parties of the world are important components on the political scene in many countries, particularly in Europe. At present the European Green Party (EGP) has 46 members who are also members of the European Parliament. This represents 6.3 percent of the total membership of the European Parliament. Although sometimes covered by the media, the U.S. Green Party has no representatives in the U.S. government.

In the report that was issued following the UN Commission's Third Session on Sustainable Development in 1995, it was emphasized that rapid urban growth can outstrip society's capacity to protect the environment. Environmental pollution as a result of energy production, transportation, industry, and lifestyle choices adversely affects the quality of life in urban areas. In describing environmental pollution, the UN Commission includes such factors as ambient and indoor air pollution, water pollution, inadequate waste management, noise, pesticides, and radiation. These are threats to sustainable development.

A foundational statement that establishes the basis for many worldwide Green parties is that relating to ecological sustainability. Sustainability in a broad sense relates to the potential for long-term maintenance of well-being. That, in turn, depends on the well-being of the natural world.

The concept of sustainable development is sometimes viewed as an oxymoron because development inevitably depletes and degrades the environment. Consequently some definitions used by the Greens emphasize the environmental component by referring to environmentally sustainable development. The concept of living within environmental constraints yields another definition of sustainability: “Improving the quality of human life while living within the carrying capacity of supporting eco-systems.”

### **The Green Agenda and the Copenhagen Summit (2009)**

The EGP expressed regret on the outcome of the Copenhagen Climate Summit which fell far below even the most modest expectations. The EU’s currently pledged emissions target is clearly inconsistent with the scientific recommendations and with the responsibility and capacity to deliver emissions reductions. The EGP urges the EU to increase its emissions pledge to an unconditional 30 percent reduction target below 1990 levels by 2020.

What impact has the Copenhagen Summit had on the Green Agenda? It appears that there has been minimal impact on the Green Agenda. In Europe the programs of the Green Parties have been largely unaffected. There has been a trend in recent parliamentary elections for the Green Parties to suffer some setbacks, but they still represent up to 10 percent of the members in the individual parliaments of the 27 EU member states and over 6 percent of the members of the European Parliament.

Noise is different from other pollutants. It is a seldom-negligible by-product of products in our industrialized world. Noise-emission reduction is product-specific. Each noise source requires a specialized design for that product, e.g. an automobile, aircraft or diesel generator.

New quieter products require highly-skilled designers.

The adverse effects of excessive noise are well-understood. There is the possibility of damage to hearing due to prolonged exposure to high levels of noise as well as other effects on health and the quality of life. These include interference with sleep, interference with communications, interference with learning, decline in productivity, general annoyance, and cardio-vascular disease.

The World Health Organization has ranked noise as the third most hazardous pollutant after air and water. The European Union has made the following statement: “Noise is one of the environmental pressures that is closest to the citizens. In public surveys, problems with noise are rated at the highest level together with global warming.”

Current noise “management” procedures lead to the excessive consumption of natural resources due to excessive land and materials usage to decrease noise impacts. Many airports are located far distant from the cities they serve. Urban sprawl results in increased land use. The expanded network results in long commutes between jobs and dwellings with increased fuel consumption. Heavier materials are needed to increase sound insulation in dwellings.

Noise also presents a demographic problem. The populations in poor countries and the poor in developed countries are more exposed to environmental noise. The wealthier of the world may “buy” themselves out of noise problems while all segments of society share the negative effects of CO<sub>2</sub> emissions and other pollutants.

### **CAETS and the Green Agenda**

CAETS is the International Council of Academies of Engineering and Technological Sciences. At its Convocation in Tokyo in 2007, a wide

range of global energy and environmental issues was reviewed. Professor Tor Kihlman, on behalf of the Royal Swedish Academy of Engineering Sciences (IVA), proposed that environmental noise be recognized by the Convocation as a constraining factor in sustainable development. CAETS agreed with IVA’s position and has assumed a leading role in bringing all aspects of noise pollution to the attention of the world’s policymakers. Noise control is a necessity for sustainable development, particularly in urban areas.

### **Quiet and the Green Agenda**

The Green Agenda supports initiatives for the generation of renewable energy that includes solar, wind, biomass, and geothermal sources and promotes increased energy efficiency and mass transit. In so doing, the energy consumed by the principal noise sources—machines, equipment, and vehicles—will be reduced. Hence the Green Agenda directly and indirectly works towards a quieter world.

### **Conclusions**

Control of noise sources is necessary for sustainable development and deserves a place on the Green Agenda. Lower noise levels are needed to reduce occupational hazards, adverse health effects, and improve quality of life. Lower noise levels produce lower fuel consumption, better land use, lower-road traffic densities, and improved traffic safety.

### **Greg Watts – Integrating noise control into the emerging Green Agenda**

Epidemiologic studies indicate that exposure to noise may lead to increased levels of stress hormone discharge, cardiovascular disease (hypertension, blood fat) and increased risk of myocardial infarction (heart attack). However can noise control alone lead to the creation of tranquil spaces?

“Tranquil area” is perhaps used more

widely than “Quiet Area” referenced in the EU Environmental Noise Directive (END) which is concerned purely with mapping noise levels. A survey has shown that a “tranquil area” is where there is:

- peace, quiet and calm
- “nature” and “natural features”
- Wildlife

Tranquil environments are important in that they provide people in cities with a place to relax, unwind and escape from the rigors, stresses and strains of day-to-day life. This factor is recognised by the London Health Commission assessment on the Ambient Noise Strategy which states that “green environments and quiet places are needed to provide respite from stressful urban living and allow for recreation.” Tranquil spaces are “restorative” environments holding attention lightly (“soft fascination”) and reducing mental stress and fatigue and allowing reflection. Studies have shown the beneficial effects on the recovery rates of patients.

To understand the factors influencing the perception of tranquil spaces research was conducted at the University of Bradford, UK. Video clips of a wide range of environments from city centres, residential areas, parks, countryside, moorlands and seaside environments were replayed in a quiet listening room (anechoic chamber) equipped with large plasma screen and headphones. Tranquillity ratings (*TR*) were obtained from 44 subjects (a wide range of ages) using a rating 0-10 scale. A model was developed to express the relationship between visual and acoustical features. A practical form of the equation is:

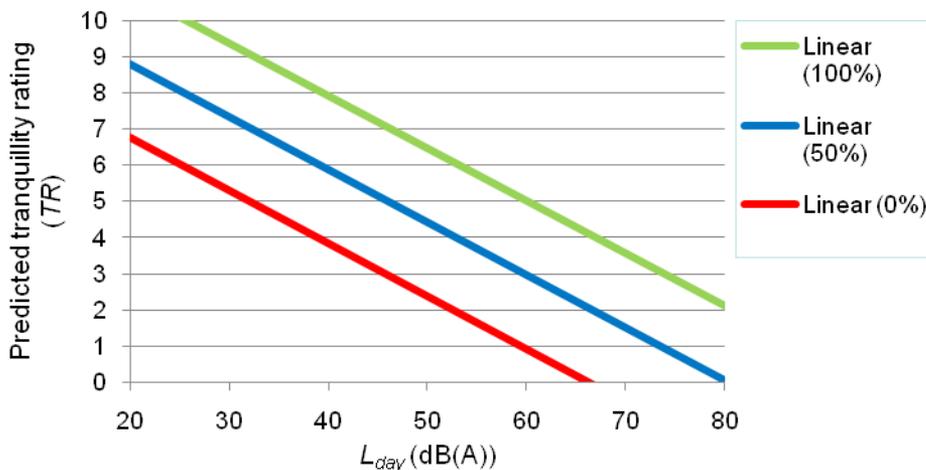
$$TR = 9.68 + 0.041 NCF - 0.146 L_{day}$$

where NCF is the percentage of natural and contextual features (%) and  $L_{day}$  is the predicted average daytime noise level (0700-1900) from the major noise source

(usually road traffic). A contextual feature is an object that can be considered to enhance the natural landscape, e.g. old dry stone wall dividing fields in the English countryside or a medieval castle built on a rocky promontory.

Figure 1 shows how tranquillity varies with both noise level and the percentage of natural and contextual features in the visual scene. For example it can be seen that at a noise level of  $L_{day} = 53$  dB the tranquillity rating can vary from 2.0 where there are no natural features present to 6.0 where there is 100% natural features. This illustrates the importance of nature in providing noise control that has the maximum beneficial effect.

**Figure 1:** The role of natural and contextual features in the visual scene contributing to effective noise control solutions (lines represent NCF at 0, 50 and 100%)



Because of the importance of visual factors to obtain acceptable levels of tranquillity it will be necessary to consider:

- Reducing transportation noise, and
- increasing the percentage of natural features or contextual features

It will be more cost effective to concentrate efforts on producing tranquil areas away from noise sources and in the middle of vegetation. However in city parks it may be necessary to consider

- Diversion of heavy traffic and the use of low noise road pavements,
- screening of the noise sources both locally and at the roadside,
- use of walled gardens built in natural materials, trellising and additional plantings and earth mounds,
- eliminating litter, graffiti, dirt and ugliness, and
- introducing appropriate water features such as ponds, ducks and birds.

One example of a noise control solution that could benefit from a consideration of factors creating tranquil environments is the use of traffic noise barriers. Public acceptability is a major issue reducing their overall effectiveness as a noise mitigation measure. The use of “green” barriers may improve acceptability particularly if the barrier is perceived more as a natural feature in the landscape rather than an imposed man-made construction

In conclusion, it can be considered that reducing noise is only one aspect of creating

tranquil spaces. Tranquil spaces are important especially in urban environments as they can be considered “restorative” and therefore important for health and well-being. This novel approach to introducing noise control into the Green Agenda should be considered because increasing the percentage of natural and contextual features is important for creating tranquil spaces. Improving tranquility in cities can be affected by a consideration of both noise mitigation measures and additional plantings of appropriate vegetation. “Natural” noise barriers may reduce opposition by improving perceived tranquility. On the other hand, land based wind farms, although engineered to be quiet, may compromise tranquil spaces because of visual intrusiveness and non-natural appearance including flicker effects with a low sun. It will be a challenge to fit wind farms into the landscape so that they are considered a natural or contextual feature.

### **Ralph Muehleisen – Acoustics as an integral factor in an indoor Green environment**

As the world realizes the environmental impacts of building construction and operation, a strong movement to building more sustainable, i.e. green buildings has developed. In general green buildings hope to

- Have lower energy use during construction and operation,
- use less water use in construction and operation,
- use fewer virgin resources during construction and operation, and
- provide a better indoor environmental quality (IEQ) for better occupant performance and satisfaction.

It is in this last goal that acoustics plays a role.

In order to achieve the design and operation goals, green buildings have

a number of design changes from conventional buildings including

- More use of natural ventilation,
- more use of daylight and passive solar heating,
- more use of radiant heating/cooling,
- more use of wood and stone materials and less use of fiberglass and mineral fibers, and
- Fewer interior walls and partitions.

These design changes lead architects to propose buildings with far more glass, far fewer absorptive wall and ceilings and far more open floor plans with very short, if any, partitions between occupant work spaces. While the overall IEQ of green buildings is significantly improved, the acoustical performance of these buildings is usually worse, with there being major problems of speech privacy and sound isolation.

In order to provide good airflow for natural ventilation, walls and windows must have large openings which result in poor sound interior-exterior isolation. Within the building, partitions are reduced in size or eliminated to promote airflow which reduces sound isolation. One acoustical benefit of natural ventilation is reduced ventilation noise.

In order to provide good daylight and passive solar heating, building envelopes have much higher amounts of glass. The glass reduces isolation of outdoor noise and provides highly reflective wall surfaces which increases interior noise levels and can reduce speech privacy through the introduction of new acoustic reflection paths. The poor acoustic performance of glass buildings has led to market transparent acoustic absorbers. As green building design increases, the cost of these new materials should drop.

The use of radiant heating and cooling requires exposed piping and concrete slabs and walls. This in turn means the

reduction of sound absorbing materials which increases interior noise levels and the introduction of new reflective paths which can decrease speech privacy. This trend has led to a market for the development acoustically absorptive radiant heat exchangers which will reduce the acoustical problems associated with bare concrete and metal.

With the increase in radiant heating/cooling has come a return to the use of thermal mass as a part of heating and cooling design. With high thermal mass design, large amounts of concrete or masonry are used as walls and floors to provide a structure that acts as like a capacitor to store thermal energy. In order to absorb and reradiate that energy, the thermal mass materials need to be exposed directly to the building interior which results, again, in highly reflective surfaces. One great acoustical benefit of thermal mass is the increased sound isolation that can accompany a large physical mass. Similarly, the use of vegetated roofs and walls results in higher physical mass and therefore the potential for better sound isolation.

The use of sustainable materials means a return to recycled or recyclable materials such as wood and steel and away from synthetic plastics. But this also means a reduction in fiber glass and mineral fibers that are used in ceilings and acoustic absorbing panels and a reduced use of carpeting in buildings which lead to increased interior noise levels. This change in design philosophy has led to a new market of sustainable acoustical treatments.

One of the most important design changes of green buildings is not the design itself but the way in which buildings are designed. The design of a high performance green building requires very high amounts of coordination between all the design disciplines. Design teams work together to ensure building design

goals are met. Often these design goals are dictated by the building performance rating system. Unfortunately, acoustics is minimized and even absent in many green building performance rating systems so acoustics are often simply ignored in design. On the other hand, the close design coordination is fantastic opportunity to ensure good acoustical performance if the design team is actually aware of the acoustic implications of their design and have set good acoustical performance as one of the design goals.

In summary, while the design changes that are common in green buildings tend to make acoustical performance worse, especially with regard to sound isolation and speech privacy, the design changes have created markets for new and innovative acoustical treatments. The use of high mass construction provides an opportunity for good sound isolation. Perhaps most importantly, the close collaboration of design teams can ensure that acoustic performance is maintained as long as it is a design goal.

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## Discussion

### Green movement in the U.K.

**Comment:** I chair the U.K. Noise Association which is a lobby group within the U.K. covering all aspects of noise. In recent years I have been working particularly on noise at Heathrow Airport. As an organization, we were very much opposed to a new runway at Heathrow which is now not happening. It's not so much a question as a comment on the Green NGO movement because I think, certainly in Europe, it's more influential than in Taiwan. Although the small number of Green members of parliament both in individual countries and in the European Parliament do not reflect the strength and vitality of the wider Green movement. The wider Green movement is partly NGOs like Greenpeace and Friends of the Earth, but it is also made up of many individuals; and the driving



*Third discussion session (left to right): Joel Shon, William Lang, Greg Watts*

force behind it these days is really climate change. It's changed over the years, but in the last ten years it's been climate change. To give you one example, in the U.K. until the last election we had no Green MPs at all; but we now have one in Parliament. Nevertheless the Green movement persuaded the last Labour government, which wasn't a particularly Green administration, to introduce very tough emissions targets for CO<sub>2</sub> emissions. CO<sub>2</sub> in the U.K. must be cut by 80 percent by 2050 from its 1990 levels. It's a very tough target. This was a result of the Green movement rather than Green MPs having quite an influence.

What is also interesting is that the Green movement, while very focused on climate change, is not particularly interested in noise. They don't see the two as related. One of the tasks we try as a noise lobbying organization is to interest the Green movement in noise because the same solutions which will help deal with climate change also help with noise. It's a question of working the two together. Very briefly, the one area where we did try to do this was in opposing a third runway at Heathrow. There were strong CO<sub>2</sub> reasons to oppose a third runway at Heathrow. If it had gone ahead, Heathrow would have been the biggest emitter of

CO<sub>2</sub> in the U.K. But there are also very strong noise reasons because of the huge number of people (up to a million) living under the Heathrow flight paths. A few years ago when this proposal first came on the agenda, we decided to work very closely with the Green movement in the U.K. It was the first time that a noise proposal wasn't just opposed by local residents' groups or noise experts. It was a mixture of the two which brought a very big success—the stopping of this proposal to expand aviation in the U.K. So there are ways of working together, but one of the real challenges is to persuade the Green movement that noise is an environmental issue. My last point on how to deal with noise on a worldwide basis: What's happening with CO<sub>2</sub> emissions is, although politicians are actually thinking about how to deal with CO<sub>2</sub>, on a worldwide basis. There are things like the European Emissions Trading Scheme. There are also other schemes that have been considered, but we haven't got nearly that far with noise. How would you view noise on a worldwide basis? I like what you are saying about a noise reduction trading scheme because right now we've got some of the technical solutions; but we haven't yet got the political economic instruments to tackle noise and give incentives to manufacturers to produce quieter products.

## Green Movement in Taiwan

**Comment:** In Taiwan there are difficulties in putting noise in trading relationships. It's not like carbon dioxide which is easy to monitor or make tradeoffs. If one has to pay for it, there will be a lot of improvements. This is the kind of idea that results in tradeoffs. But noise is quite difficult to tackle, especially in a specific individual country. It cannot be done, so it has to be through national or multi-national organizations. I believe many of the politicians don't have a sense of how noise could affect quality of life. Much of the social costs and health care money is wasted on such things. Before we can establish tradeoffs, the first step is to let all of the people, including the politicians, manufacturers, and consumers, know how much money has been spent or wasted, if they cannot control the noise. They have no idea—only the people at this conference may be interested. But most of the people at an INTER-NOISE are technical people. So if you would like to introduce a policy or an economic incentive, you have to find a different way of presenting the issue other than through technology.

## APEC and OECD

**Question:** Some years ago the OECD had quite a bit of interest in noise and wrote a book published around 1991 called "Fighting Noise in the 90s" which was a rather pessimistic outlook for the future of noise control. I have two questions. Could you discuss a little more the relationship between APEC and OECD? Do you think that OECD could be interested again in some of these global noise issues?

**Answer:** These organizations appear to be quite similar, but the OECD is an organization of economic cooperation in different countries—not under the United Nations—such as the EU, the U.S., and some Asian nations. The APEC had only 17 nations in the beginning, back in the 1990s. It was dominated by the U.S. at that time because the U.S. saw the

future growth of China and Japan and the possible conflicts of interest within the APEC area. So the U.S. tried to lead the organization in the late 80s and early 90s. After that, many countries wanted to join—including Oceania, Australia, and New Zealand. Then Russia said that this organization is not just between the U.S. and the Asian nations; Russians are also Asians because there is a place called Vladivostok which is on the Pacific Ocean. So many nations are in OECD including India and the South American nations along the Pacific Ocean which includes Chile and Argentina. Argentina has a tiny little island called Tierra del Fuego which is at the point where the Pacific Ocean meets the Atlantic Ocean. Most of the countries along the Pacific Rim including Asia, North America, South America, and part of Russia are also members of APEC. The organization is growing quite fast—from 17 to 41 countries. One of the things APEC is doing is promoting common actions between the nations. But it is something like the United Nations because the differences between countries are many. Currently the poorest country in APEC is Vietnam. Annual income average per capita is something below 2000 USD.

We do have Canada, the U.S., and Japan where the average income is something like 47,000 USD annually. So the differences are many, and common actions are hard to reach because different nations have different interests. Because multi-lateral agreements are difficult to reach, we are trying to do bi-lateral agreements. But these agreements are not really free-trade agreements but agreements between members of APEC. There would be some economic issues and two or three nations would sit down to discuss the next move. One of the most important issues in the last three years is CO<sub>2</sub>—the greenhouse gas. Many discussions have been held on how to deal with the carbon dioxide issue. Some nations try to kick off new issues within this international organization because they would like it

to be known that their country is also important and capable of promoting new policies. China is a leader on the noise issue. They have had a noise act since 1992. As many Chinese tolerate noise, not too many people have been punished during the past 20 years. India could be another good leader. The U.S. would not likely be the country to initiate action because in the past 20 years they have done little on this issue. Probably Japan, China, and India, especially Japan, have the initiative to tackle the noise issue. If you know the history of Narita Airport during its development, for five years local residents fought with the airport company; and there was at least one person who committed suicide during the Narita Airport development because of environmental issues. So APEC is different from OECD because OECD was mostly trying to promote economic development in the 70s and 80s. In the 90s OECD became concerned about some environmental issues. The role of OECD is similar to that of the World Bank of Asia—the Asia Development Bank. It is not like APEC. APEC is not really a tight organization; it is a club, the only members are the presidents of APEC countries.

## Tranquility Rating

**Question:** Prof. Watts, I was very interested in your talk, and I think the concept of tranquility and tranquility rating (TR) was very interesting. But as we know the indoor environment has some noise problems. We may have heard this from Ralph Muehleisen. So the question: Is there any application of the concept of tranquility to the indoor environment—offices, classrooms, business spaces, and factories?

**Answer:** That is the next research project because we're sure there is an application there. We could include things like recovery rooms or waiting rooms in hospitals where you need to create a tranquil environment to reduce stress; and

also in office spaces where more natural surroundings may be beneficial. The question is that we don't really know how it's going to work indoors. That's all we need to do in a future research project.

**Question:** I'm Colin Nugent from the European Environment Agency. First of all thank you both for your very interesting presentations. My question is for Greg. It's in two parts. First, the Green Agenda for noise in Europe at the moment is driving competent authorities in countries to declare quiet areas as you mentioned in your presentation. I wonder with your tranquility rating, has there been any willingness from competent authorities in the UK or elsewhere to put that into practice and test it in relation to the requirements of the Environmental Noise Directive? Second, we recently experienced a situation in noise control in Europe which we are unlikely to experience again in our careers and that was the closure of European airspace for up to six days in April. I wonder if you have had any opportunity to apply your tranquility rating before, during, or after that period at a major airport; and if you didn't, do you think it would have made a major effect on the tranquility rating value?

**Answer:** Yes, to answer the last question first, I'm sure there would have been a significant reduction simply because the overall noise level would have been reduced by the restriction on the overflying aircraft. As far as the first question, we are working with the Parks Department in Bradford City in carrying out the surveys of parks and green spaces; and they have shown some interest. I've also presented a survey technique in Hong Kong and Christchurch, New Zealand; and we're waiting for the results of a grant proposal to look at the application in Hong Kong. We've got our fingers crossed so, hopefully, we can extend it into a very dense urban environment. Christchurch is very interested because they like to think of themselves as a "garden city," and they

were quite taken with the idea of doing a tranquility audit of their green spaces and seeing whether they come up to the mark and, if not, what improvements could be made to make the spaces more livable for the city dwellers. There are a lot of apartments going up in the center of Christchurch; and both for residents and visitors, it is important to consider their experience of tranquility. Do the green spaces provide tranquility and do they enhance the experience of people visiting Christchurch? So things are moving. It's early, but we're hoping to find more applications and do useful work.

### Cost of Noise

**Question:** One of my jobs is to edit a magazine, *NOISE/NEWS International*, and I received a report from Australia a while back that said that the cost of noise in Australia is something like 1.4 percent of GDP. I don't know the details of that study or how they got that number, but I'm wondering if there are other countries in Asia that have looked at the cost of noise as some fraction of GDP.

**Answer:** One of the things the economists are trying to do is called a map-of-hedonic-pricing method. They are trying to interest some of the debtors in a model that includes the price of the land, price of the house, the income, and other data. Then a number will result of how much money has been lost due to noise. This was calculated based on the price of the household—the price of the house and the price of the land. This model is not that accurate, but probably one of the only solutions we can find in economic theory. That is simply because we cannot get the other data. There were too few people involved, so we don't have the data. One of the things I tried to do was to find the complete data from people living in the area with average noise over 100 dB, but I could not get the data from the medical care system. This is highly protected, personal privacy data; one cannot get it. But it is needed for research

on how much money was lost in this area. Based on this research, we do have some data on this; but it is not based on accurate methodology for a map-of-hedonic-pricing. Most of the value in the model comes from the price of the house, the price of the land, and the annual income in the area, so a model exists for this economic theory. But we need more input. For instance, one of the things I do care about is the medical system and the Asia system. If the Asia system takes the noise into consideration as an important factor in the Asian GDP, then a lot of this would change. The Asian insurance companies that recognize that one is living in a noisy area would double the insurance rate. Some are living in an area which is much more quiet and where one might live for 120 years, and some others are living in the downtown area where every night trucks pass by and one would not have a good quality of sleep and would only live to an age of something like 68. Then some have disease, problems with hearing, mental problems—that kind of thing—and their insurance rates will increase. Public pressure can be promoted right now through the insurance companies. If they increase rates for the people living in noisy areas, the public will demand change.

**Comment:** By charging people more for insurance, some people can't move; so therefore you are penalizing a huge amount of the population who can't afford—can't afford to be ill, can't afford to be well. So there is a slight flaw in the concept.

**Comment:** We don't have enough pressure for noise level meters. As long as something like 1.5 million residents here are pressured by an increase in insurance rates, then they will have enough power to encourage the use of meters. Nowadays, those exposed to noise don't have enough influence to put pressure on the creators of the noise sources. Only governments are asking that noise sources be quieted, otherwise producers of noise will be punished. So they continue

to produce noise as long as they are only warning and there is no penalty. But if it comes to a conflict of interest, there will be solutions. Nowadays there are no conflicts of interest and the producers of noise are not hurt economically.

**Comment:** That's right. Conflicts of interest need to be created. But if you're imposing the costs through insurance, you're actually imposing it on low-income communities. The alternative conflict of interest would be to impose costs on the train companies, the aircraft companies, and auto companies; and then they, in turn, will have a real incentive to produce quieter products. That might be a more equitable solution than what which will inevitably penalize the poorer areas where noise is most prevalent.

**Comment:** One final comment. The jurisdiction system has to do something. If you are raising my insurance rate, then I will sue the producers of noise because they create noise and make my life shorter. They make me live with poorer quality of life, so I have to sue. This is how the system is working, but now nobody's taking action. That's what we do in Taiwan—we create conflicts of interest, then action is taken. Otherwise it's not possible because there's only the government to pressure the manufacturers. The manufacturers of aircraft and the transportation companies are all big enterprises that have their own lobbying power. If only the government is applying pressure, the government will not have sufficient support from the public. The people have their votes. They have to tell the government "If you are not responsive to our needs, we'll try to change to a new government." Then everything comes together. The jurisdictions then suggest that the producers of noise be sued. Then the airlines will increase the fares to the passengers, and everybody will know that there is no cheap solution. If they increase the fares, then there is a conflict of interest between the airlines and passengers.

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## SESSION 3: TECHNOLOGY AND PUBLIC DEMANDS FOR A QUIETER WORLD

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### Questions for Panelists

1. How do we motivate the public to action regarding noise in all areas that affect their quality of life?
2. What should the public know about noise, especially exposure to hazardous noise?
3. What measures can individuals take to limit the exposure to and the effects of noise in their daily lives?
4. What is being done to send a clear message that excessive noise is not just annoying, but a significant health threat?
5. What tools do people need to help them achieve quieter communities?
6. How do we educate the public on all impacts of noise, particularly the detrimental effects of excessive noise on the education of children and the need for quiet classrooms to avoid learning difficulties?
7. How do we inform the public of the potential damage from the noise of loud toys and music that may prevent future NIHL?
8. Is it possible to take action against intrusive noise without regulations?
9. How to get the best coverage when using the press, radio, and/or TV. What is newsworthy? What "trigger" could be used and why now?
10. How can product noise levels be best presented to the consumer? Perhaps a Global Eco-label which is clear without use of decibels.

11. How do we create public desire for quiet products? Such a demand will naturally generate market forces to provide such products?
12. How can product noise declarations be part of a "buy quiet" program?
13. How do we use the Internet as a rich source of information about noise? If the public can effectively be reached by other than the mainstream media, the Internet will be an important tool.
14. How might public information on noise inspire civility and mutual respect between neighbors?

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### Panelists

- **Raj Singh**, I-INCE VP Technical Activities, U.S.A., Session Chair *Technology and public demands for a quieter world*
- **Gloria Elliott**, Noise Abatement Society, U.K. *The NGO role in bringing about national legislation for a quieter world*
- **M. L. Munjal**, Indian Institute of Science, Bangalore *India's perspective on technology and public demands for a quieter world*
- **Ed Clarke**, Association of Noise Consultants, U.K. *The consultants' role in amplifying public demands for a quieter world*
- **Yang Hann Kim**, KAIST, Korea *Korea's perspective on technology and public demands for a quieter world*
- **Peter Wagstaff**, CEREMH, France *The evolution of the collaboration between educational and industrial establishments working in the field of noise control in France*

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## Presentations

### **Raj Singh – Technology and public demands for a quieter world**

#### **Personal Perspective: Complications from the Public Information and Policy Perspective**

Noise control is a multi-disciplinary subject and addresses multi-functional events. Thus it is hard for the public and policy makers to fully appreciate the significance. There is a lack of clear noise descriptors or labels (difficult for public and news media to understand dB(A)s, etc.). In some societies, noisy events (including racing events, gun fire, wedding celebrations, and political rallies) are part of recreational, social and religious events and thus part of life. Unusual noise reduction becomes a news item: Low noise hybrid vehicles creating a safety hazard. Big events or disasters often propel action on policies and legislation! The introduction of jet noise in 50s and 60s and OSHA legislation in the 70s in the USA provided impetus to intense research.

#### **How to Inform the Public and Policy Makers?**

Noise is not currently mentioned in the "top 100" online "science" documentaries. One needs to find independent film makers or television science documentary producers (such as NOVA in the US) to produce a documentary. Another suggestion is to embed "noise control" issues in creative or popular works (books, films, cartoons, etc.). More "noise control" videos could be uploaded onto internet sites including youtube.com, etc. As Al Gore has become the public face for global climate change, we need to find a public face for noise control. Finally, elements of noise control should be part of undergraduate engineering, physics or environmental science curricula.

### **Challenges in Designing Low-Noise Products**

Some contemporary design trends that pose problems in designing low-noise consumer products, machines, equipment and vehicles are:

1. Energy efficient devices (some are just noisier);
2. Faster operations (higher speeds or power densities);
3. Compact devices (lower weights);
4. Switchable modes (leading to transients);
5. Cost reduction (without adequate engineering work);
6. "Easier" assemblies (rattle and squeak type problems); and
7. Fast, lean manufacturing; lower costs; etc.

### **Challenges in Source Noise Predictions**

Simple models are often used for source studies involving linear system theory with well-defined input and output. However, complications may arise when these simple models are applied to noise and vibration sources. Many internal sources exist and interact with each other. The source regimens may include amplification elements that, for example, would be produced by resonances. The spectra of the sources are often modulated with multiple periodicities. There may be deviations from linear system theory due to non-linear elements such as dry friction and clearances or due to time-varying parameters such as those provided by springs and damping. Moreover, sources may interact with structure-borne paths.

### **Challenges in Conducting Noise Control Research in Academia**

There are several impediments to conducting noise control research. The cost of educating and mentoring students has become a challenge. For example, the education costs for a PhD student are

approximately from 150,000 USD (for purely analytical studies) to 400,000 USD (with extensive experimental work). The government funding agencies, in general, do not seem to favor fundamental "noise" research as fashionable and expect industry to support such projects. But industry tends to place emphasis on short term projects and deliverables (schedule and cost driven). Fewer institutions currently have a critical mass in noise control engineering (in terms of qualified faculty and researchers and modern facilities). Yet, the marketplace wants trained noise control experts without providing any funds for their advanced training.

### **Gloria Elliott – The NGO role in bringing about national legislation for a quieter world**

#### **What is the Noise Abatement Society?**

The NAS is an NGO whose mission it is to abate excessive and unnecessary noise from all sources to benefit the public and the environment. The NAS was founded in 1959 and in 1960 lobbied parliament regarding a noise statutory nuisance for the first time in the UK. They have the only dedicated national noise help-line which is now active 24 hours a day. The goal of the NAS is to raise awareness of the harmful effects of noise through public education, campaigning, and lobbying to promote sustainable resolutions. The Noise Abatement Society also offers support to the above UK organizations by empowering the public with information and encouragement. The NAS 24-hour helpline complaints highlight the noise issues that concern the public. This complaint data provides evidence to those organizations concerned with the reduction of community noise.

#### **Noise Law in the UK**

Environmental Health Practitioners enforce noise law in the UK with support from the Environmental Protection Act, the Anti-Social Behaviour Act, and the Noise at Work Act.

## Engagement

*Delivery noise:* A series of complaints were received by the NAS from all over the UK concerning delivery noise. At present there are no satisfactory benchmarks or standards for quiet delivery in the UK. NAS contacted some retail outlets causing the noise and the Local Authorities in which they were located to better understand the whole logistical and procedural aspects of these problems.

*Emergency service sirens:* The constant shrill blaring of emergency service sirens is another public concern, giving the impression that our town and city centres are crime ridden and engendering a sense of unease, sometimes fear amongst residents and pedestrians. NAS contacted the Home Office, and many individual area Police, Ambulance and Fire Service Trusts to gauge the reasons behind the present use of sirens and how this situation was reached.

*Hearing damage in young people:* Worry about the future of our children's hearing is voiced because of listening for too long and too loud to MP3 players and i-pods. There is a real possibility of premature deafness as a result, instead of hearing impairment occurring in the 60s and 70s it is likely to occur in the 30s and 40s. NAS engaged with the Mary Hare School for the Deaf and Ascent Hearing to fully grasp understanding of this impending health problem amongst the young.

*Wind turbines:* Wind turbine noise is another deep source of concern by the public. The industry is relatively young and progress needs to be made in the understanding of the possible effects of turbine activity. NAS has been in discussion with turbine developers and acoustic engineers to fully understand the implications of vibration, blade flutter, and noise impact over time on residents and wildlife.

## Source Solution

Encouraging different agencies and departments to work together.

*Delivery noise:* The NAS successfully trialed its 'Silent Approach' initiative, a quiet and sustainable out of hours delivery scheme involving collaboration between Local Authority, Retailer and credible Independent Monitor, to ensure that the quiet standards achieved would be maintained, thus protecting residents from noise disturbance in the long term. The scheme uses PIEK certification for vehicles and equipment operating under 60 dB and quiet behavioral training for staff and drivers.

Having a standard in place which puts pressure on stores to deliver quietly in order to achieve saving gains, will, in turn, create a market for manufacturers to supply quiet vehicles and equipment, ultimately reducing delivery noise disturbance to residents. Quite simply, the aim is to change delivery culture so that it becomes not only quiet, but efficient, smooth, professional, reducing noise pollution by day as well as by night. This in turn will help to reduce congestion and emissions in urban areas, reduce fuel use and decrease waste.

Last year, the NAS signed a memorandum of understanding with the UK Freight Transport Association to work together to progress these aims, and a consortium was formed with the Department of Transport to carry out further quiet delivery trials all over the UK to produce a field guide for industry and local government which will be published in spring 2011.

To extend awareness internationally, the NAS approached the British Standards Institute with this new standard for delivery and was invited to present it as a new work item proposal to the ISO TC43 Plenary meeting in Korea last November.

*Emergency service sirens:* Most of the present shrill sirens universally used are simply not fit for the purpose. These sirens are excessively loud and confuse the by-stander as to their source, causing many accidents. It has been reported that police concentration is affected by the reverberating noise within the cab from their sirens. NAS presented a second new work item proposal for an ISO standard for a safer, directional emergency service siren to reduce the noise pollution in our streets.

*Hearing damage in young people:* A campaign 'Love Your Ears' was launched by the NAS to inform youngsters at school between 10 and 18 of the dangers of premature hearing loss by informal visits to schools during lunch breaks and offering to test the level at which they were listening to their MP3 players and I-pods to help them make informed choice about listening habits. The results were quite horrifying, 80% tested listened at 85dB or over, up to 115dB. NAS is now working with suppliers to look at improved limiters and new forms of safer earplugs.

*Wind turbines and EVs:* NAS is working wind turbine manufacturers to encourage use of quieter technology and asking government for a review of the UK ETSU-R-98 guidelines. A recent concern for the NAS is the danger of electric vehicles not being heard up to 30 mph. It is vital that any sound used to make pedestrians aware should not exacerbate highway noise pollution. NAS is talking to industry about what sound should be applied to be effective yet non-intrusive.

## Awareness Raising

*Annual John Connell Awards:* The annual NAS John Connell Awards are held at the House of Commons to encourage and reward both Local Authority Noise Teams and Industry. They encourage innovative ideas to reduce noise nuisance in the community and to help disseminate them.

Some of these ideas are bold and gutsy, some are straightforward and cheap, but all are effective. Every year the number of entries to the John Connell awards in all categories rises steadily. This is a clear indicator of the escalating importance of responding to the need to reduce noise pollution to protect the community.

*Internet magazine "SoundScape."* To raise awareness through the Internet, the NAS is to publish an on-line magazine called *SoundScape*, its a wide readership drawn from government, industry, schools, hospitals, professional bodies, institutes and the general public.

Articles, information, news, ideas and discussion will fill attractively laid-out pages, a one-stop shop to celebrate the aural landscape whilst helping to improve the environment.

*Lobbying Government:* Encouraging all Government departments to take noise effects as a prime consideration in their policy making and providing data from the helpline to give evidence of public concerns, is a vital role of the NAS, as is also raising the question with government of how much noise is costing the nation in areas of health, education, lost productivity, and policing

*Quiet: Industry's unique selling point:* NAS encourages industry to make "Quiet" a unique selling point for their products and is launching a *Quiet Mark* that will identify clearly the products' quiet credentials to potential buyers and help introduce them to the main stream so that one of the prime considerations when devising a new product will be to make it quiet.

### **Do we Need More Legislation?**

Enforce existing law: Rather than looking for more legislation, peer pressure, community pressure and incentives are the natural ways to improve the situation, backed up by enforcement of the existing

law when necessary. Behavior changes evolve from a response triggered by authority, by employer, through PR advertising and media coverage...probably the most powerful force for change. Noise is now being recognized as an escalating world-wide problem, there has never been more demand for research and development to find technological sound solutions.

### **M. L. Munjal – India's perspective on technology and public demands for a quieter world**

#### **Noise Environment in India**

Indian society is traditionally a noisy society. Windows and doors are kept open due to the tropical warm climate. Ambient levels are about 10 dB higher than those in the developed countries. There was a sea change in 1991 with the introduction of globalization and reforms. This resulted in growth in public consciousness about hazards of excessive noise exposure. The Ministry of Environment and Forests (MoEF) of the Government of India issues gazette notifications that have the authority of law. The Central Pollution Control Board (CPCB) is the executive wing of the MoEF. The National Committee for Noise Pollution Control (NCNPC) advises the CPCB.

#### **National Committee for Noise Pollution Control**

The National Committee for Noise Pollution Control (NCNPC) was set up by CPCB in 1997 with the author as its Chairman. It has representatives from MoEF, CPCB, industry and experts in technical acoustics. Over the years, NCNPC has addressed the noise issues concerning diesel generators, portable gasoline gensets, two-wheelers, three-wheelers as well as the four-wheeler vehicles, fire-crackers, public address systems, and the environmental noise. NCNPC has been adopting a policy of framing simple rules. The Committee is

now planning to take up issues of airport noise, earthmoving equipments noise, off-road vehicle noise, and noise labeling of appliances and machines.

#### **Facility for Research in Technical Acoustics**

The Facility for Research in Technical Acoustics (FRITA) was commissioned by the Department of Science and Technology (DST) of the Government of India at the Indian Institute of Science (IISc) in 1997 with the author as its convener. Its mandate includes applied research and development (R & D) in Technical Acoustics, industrial consultancy in noise control, development and teaching of graduate-level courses, continuing education (short-term) courses for industry, helping industry in setting up the in-house acoustic test facilities, advising CPCB and MOEF, and the development of quieter technologies or designing for quiet. The workings of FRITA are reviewed periodically by a steering committee.

#### **Noise Pollution (Regulation and Control) Rules, 2000**

The Noise Pollution (Regulation and Control) Rules, 2000 were notified by MOEF in 2000, and have been amended from time to time (last amendment in January 2010).

These rules seek to:

- Prohibit the use of loudspeakers or public address systems at nighttime except within closed premises;
- Limit the increase in SPL at the boundary of a public place due to a public function to 10 dB;
- Limit the increase in peripheral SPL due to a privately owned system at the neighbor's premises to 5 dB;
- Prohibit the use of horns and noisy construction equipment during nighttime.

#### **National Ambient Noise Monitoring Network**

The National Ambient Noise Monitoring Network has been designed on the lines of similar networks that exist in India for monitoring of air pollution and water pollution. A road map has been prepared for its implementation as follows.

- From September 2010, noise monitoring will be installed in seven metropolitan cities (Delhi, Kolkata, Mumbai, Chennai, Bangalore, Hyderabad and Lucknow) with 10 stations in each city.
- The network will be extended to additional 18 cities in 2011 with 5 stations in each city.
- The setting up of network and development of infrastructure for noise mapping in the entire country is expected to be in place within 5 years.

The proposed network will create baseline data for policy makers in planning noise control at the regional as well as national level.

### **Socio-religious Habits**

Socio-religious habits of the Indians involve noisy celebrations, marriage processions, religious functions and processions, the early-morning wake-up calls from religious places on public address systems, political gatherings and speeches on loudspeakers, and honking on the roads. Public awareness campaigns have been conducted in the media. There has been some success of late; however a lot remains to be done in the area of environmental noise control in India.

### **Ed Clarke – *The consultants' role in amplifying public demands for a quieter world***

#### **What is This Quieter World Which You Seek?**

Is it one in which all sound is turned down a bit? Is it like a big global volume knob that will turn down everything? Or is it one in which we target specific noise disturbances, address, and resolve them?

If noise is unwanted sound, it's like a weed in our sound garden. The wrong sound in the wrong place is what we seek to address. Perhaps noise consultants are the gardeners in our sound garden.

We need to differentiate between omnipresent transportation sources and site-specific issues. So there's a difference between the global effects and the weeds in the garden.

Perhaps, like health care, you need to apply noise control triage for interventional treatment of problem matters, for addressing the weeds, as opposed to a population-wide sound reduction which would be more like immunization. Any effective healthcare policy would include both population-level action (immunization, public health programs) in combination with interventional treatments of individuals who are suffering.

#### **Is Noise Really a Pollutant Anyway?**

Noise pollution is rather special. It's not the same as all of these other pollutants. There's no physical accumulation of sound over time. Sound isn't a thing; it's a term used to describe fluctuations in another thing; in the air. If there's no receptor, there's no effect.

#### **So What can Consultants do?**

We have vast experience of real-world solutions to practical noise control problems. And insight into which resources can be best used to bring about maximum benefit.

The Association of Noise Consultants provides an independent expert voice, with credible practical views. The findings of impartial experts may be more credible to policy and decision makers than the opinions of pressure groups.

Our society can't cease all development to which anyone objects on noise grounds, so the process has to get the right balance between development and the protection

of amenity. Growing the crops that we need while controlling the weeds where there are problems.

#### **Is any of This About Noise Anyway?**

Noise is used as a proxy for other concerns. Objectors sometimes use noise as a flag of convenience under which to rally doubt and suspicion over development or activity they dislike for other reasons. In doing so they undermine the process and prejudice the treatment of those cases which are more significant as noise impacts.

### **Yang Hann Kim – *Korea's perspective on technology and public demands for a quieter world***

#### **Number of Noise and Vibration Disputes**

There are a number of vibration and noise disputes in Korea, and they are related to Gross National Income (GNI). The GNI per capita is correlated with the increase in the number of disputes but tends to have time lag of several years, perhaps 5 years. It means that if people live well, then the expectation for quieter world increases. The percentage of the number of vibration and noise disputes compared with the total number of disputes is very high, often as high as 90 percent. The per-capita GNI decreased in 1998 and 2007, when Korea suffered from the International Monetary Fund (IMF) and the subprime mortgage crises.

#### **Noise Policies in Korea**

Noise policies in Korea are implemented by the Noise and Vibration Control Act that has four different regulations—Traffic Noise and Vibration Regulation, Living Noise and Vibration Regulation, Factory Noise and Vibration Regulation, and Aircraft Noise and Vibration Regulation. Article 1 describes the purposes of the Noise and Vibration Control Act: "The purpose of the Act is to enable all citizens

to live in a calm and tranquil environment by preventing any damage due to noises and vibrations generated in factories, construction work fields, roads, railroads, etc, and by controlling and regulating, such noises and vibration properly.”

The traffic noise regulations in Korea are compatible with the EC (European Commission) regulation (Council Directive 70/157/EEC). It is noteworthy that in Korea it also regulates exhaust, and horn noise for different vehicles, which cannot be found in EC regulation.

It is interesting to note that the noise regulation of motor vehicles has been gradually decreased from 1991 to 2006. The difference is about 5 dB for a passenger car and 4 dB for a freight vehicle.

The limits of road traffic noise and vibration are given in terms of the areas or the regions in which they are applied: residential areas, commercial and industrial areas. The limits are given for daytime and nighttime, which are defined as between 06:00-22:00 and 22:00-06:00. Similarly the railroad noise limits are also given.

The noise level limits in residential area are specified as well as the noise level limits in the workplace and construction areas which have been reduced by 5 dB between 1991 and 2004.

Noise level limits in the vicinity of factories are prescribed during day, evening, and night for five different areas—exclusively residential, general residential, agricultural, commercial, and industrial. Aircraft noise limits around airports are under WECPNL 90.

### **The Manpower for Noise and Vibration Control and Associated Education**

One way to look at the manpower available for noise and vibration control is to look at a typical professional society:

how many members it has and how many publications? A representative society in noise and vibration engineering is the Korean Society of Noise and Vibration Engineers (KSNVE), founded in 1990 with about 250 members. The membership of KSNVE is now 3000 or more. The society has grown rapidly and continuously regardless of economic growth. For example, Korea suffered with a shortage of foreign currency exchange, and eventually got help from the International Monetary Fund in 1997; but this did not affect the increase in KSNVE membership. In 2003 when Korea was seriously affected by the subprime mortgage crisis coming from U.S., the membership did not fall significantly. Not only is the total number of members more than we expected, but also the number of annual publications in the journal of KSNVE and the papers which appeared in two annual conferences of KSNVE. At present the KSNVE publishes 150 peer reviewed papers per year and about 250 conference papers for each meeting, one at the spring meeting and the other at the autumn meeting, therefore a total of about 500 conference proceeding papers. The number of members that hold B.Sc., M.Sc., and Ph.D. degrees is almost equal. This means that about 100 Ph.D.s participate in the society activities.

These interesting statistics can be understood by looking at the annual number of graduates of the Center for Noise and Vibration Control (NOVIC), which has six full professors and is part of the Korea Advanced Institute of Science and Technology (KAIST). From 1989 to 2009, the NOVIC has produced 149 Ph.D.s and 283 M.Sc.s. for a total of about 430 graduates, which is just under 15 percent of the KSNVE membership.

The center also runs two short courses: one for vibration control and another for noise control for industry. These courses have educated about 13,000 persons with about 87 percent coming from industry.

However, the number of participants in these short courses has recently decreased. It could be because the manpower in the field of noise and vibration control is approaching a saturation point.

As we have recognized, the manpower associated with noise and vibration control is extraordinarily large compared with the total population of the Republic of Korea, which is about 50 million. Considering its GDP, which is about 2/3 of Canada and 1/5 of Japan, leads to questions such as what has been the role of noise and vibration control engineers in Korea, why there are so many noise and vibration control engineers, and how they contribute to industry. Unfortunately, it is not easy to find relevant data to answer these questions. Indirect data can be found by looking at how the Korean automobile and home appliance industries have grown.

### **The Automobile and Home Appliance Industries**

Hyundai has been developing its skills in noise and vibration control engineering since 1976. The noise and vibration levels of the Pony and Genesis models, which were exported to North America starting in 2009, defy comparison. One reason is that a car was regarded as luxury vehicle in early days in Korea; therefore, it is expected to be very comfortable, and of course quiet. This might have led the automobile industry to hire an unusually large number of noise and vibration control engineers because reducing noise and vibration often requires good and precise manufacturing, quality control, sometimes new and innovative design. Very similar things have been happening in the home appliance industry. Because, many first-time buyers of refrigerators, air conditioners, and washing machines live in relatively small apartments, they want to have quieter machines. They sleep with the refrigerator, for example.

### **Summary**

- Noise and vibration regulations have

been reinforced gradually.

- Noise and vibration problems are major issues in environmental disputes.
  - The number of noise and vibration disputes has increased greatly.
  - Noise and vibration disputes are about 90 percent of total environmental disputes.
- Perspectives on the noise and vibration field
  - The number of researchers in noise and vibration is increasing.
  - Automobile companies in Korea excel at NVH research to meet regulations and customers' needs.

**Peter Wagstaff and Jean-Philippe Roux – *The evolution of the collaboration between educational and industrial establishments working in the field of noise control in France***

**The French Higher Education System**

The French higher education system has evolved greatly over the last few years particularly in engineering and science. This has led to a change in the way engineers and technicians are trained and increased the collaboration between education and industry. Previously engineering was only studied at the prestigious Engineering Schools which offered 3 years of study for an “engineering diploma” to those capable of succeeding their competitive entrance exams. These exams require two years of preparation following completion of the baccalaureate at the end of high school. University studies were initiated straight after finishing the baccalaureate with no selection at entry. No engineering diplomas or degrees were offered at university; only the 3 year bachelor’s degree or “license” in sciences. This offered few possibilities of working in industry without completing further studies at masters or PhD level. Universities later integrated University

Technical Institutes or IUT’s awarding two year diplomas for technicians in their structure and have more recently introduced a third year of studies to obtain a technical bachelor degree. In the sixties some new institutes in applied sciences (INSA) were created to train engineers and award diplomas in engineering and later a new type of university was introduced with the foundation of the University of Technology of Compiègne (UTC) in 1973. UTC was both an engineering school and a university and was the first in France to offer an engineering diploma specialized in acoustics and vibrations. This led to an increased interest in the area of acoustics and the integration of two internship periods of six months in the five-year program of studies at UTC led to closer collaboration with industry in this area. Another significant change nationally was the creation of the CIFRE system which has provided funding for 12000 PhD research projects with industry over the last 30 years, many of them in acoustics. More recently universities have also been creating their own engineering schools, often with integrated co-op or internship programs and many programs of study include options in acoustics.

**Influence on Noise Problems**

The availability of study programs for engineers, interns and technicians in acoustics has increased public awareness of noise problems and industry has made faster progress in their solution. Over the last few years annual science open days have been introduced at universities such as UTC, institutes like the CEVAA and industrial centers with demonstrations for schools and the public which feature all areas of science but also enable the visitors to learn more about acoustics and noise in the increasing number of centers dealing with these problems. The legislation banning flights over Paris in 1948 showed an early political awareness of noise problems and legislation to reduce noise levels in

buildings, towns and transport systems has led to increased work in this area. The increasing influence of European legislation such as the 2002/49/CE European regulations on assessment and management of environmental noise in 2002 has facilitated international collaboration and research in these areas. Main National Organizations Dealing with Noise

The government has intervened through the ministries of health, environment, transport, industry and defense to inform, legislate and encourage research in the area of acoustics and noise control. Consumer associations such as “60 million consumers” and agencies such as the “Centre for Information and Documentation on Noise” (CIDB) inform and educate the public on noise problems. The Agency for the Environment and Conservation of Energy or ADEME supports research, development and legislation to reduce energy consumption, emissions and noise levels. In 1992 European Commission regulations to label the energy efficiency of domestic machines (Directive 92/75/CEE) in classes A to G also included noise levels and increased public awareness of noise in their home.

**Examples of Regional Projects**

Many regional organizations such as “Bruitparif,” an NGO for noise problems in Paris and the surrounding region are extremely active. In 2009 with the CIDB they studied 20 high schools in the region. Only 60 percent had good or average acoustics. Dosimeters showed that 50 percent of the students and 25 percent of the staff were exposed to average noise levels greater than 80 dB(A). Since new regulations were introduced in 2003, 145 major renovations have been carried out and 14 additional schools are to be modified to improve the acoustics. As high school students were more at risk, classes were given on the dangers of noise, since 54 percent of these students

listen to MP3 players at levels greater than 85 dB(A). Bruitparif is also testing noise level warning panels at musical events and terraces of restaurants to alert the public to excessive noise levels with limited results so far.

The city of Rouen where the CEVAA is situated is another example. Rouen established a Commission on Noise Sources as a strategy of prevention to limit disturbance and avoid conflict. The goal was to guarantee tranquility for all without reducing the animation in the town. The Rouen policy permitted intervention when the noise is assessed as bad for health and provided a guide of the different possibilities to find and apply solutions at a local level urging collaboration and mediation to take all objections into account. It encouraged all to assess the noise they make as well as the activities of others and provided tools to better evaluate the noise produced by others.

### **The Centre d'Etudes Vibro-acoustique pour l'Automobile (CEVAA)**

In 1995 a steering committee from 15 major automotive companies was formed followed by the founding agreements with the Region, State and Europe in 1998 and initiation of NVH activities in Rouen in 1999. ISO 9001 certification was obtained in 2003 followed by the extension of activities to other NVH domains (transportation, electronics, machinery ...) in the period 2005-2007. Since 2008 a new development strategy has been developed with a much wider value chain including aeronautics, the space industry, materials, and electronics.

The CEVAA intervenes in various transportation domains (road, rail, water and air vehicles) as NVH experts by testing and delivering industrial solutions. It supports automotive manufacturers and suppliers within all domains of activities to solve day-to-day issues in

the areas of acoustics and vibration. The CEVAA provides standard methodologies, industrial solutions and shared data tools/ language to these clients. Their expertise and facilities can be used for diagnosis of any other kinds of machines and noise sources.

The CEVAA provides training for students through technical and scientific projects and technical presentations of NVH activities at the universities.

The CEVAA's activities vary from simple methods such as measurements according to the ISO 3745 standard to sound pressure level evaluation of bigger machines and more advanced techniques, such as acoustic and dynamic force measurements, characterization of materials and reliability testing and measurements. The introduction of hybrid and electric vehicles will change the nature of automotive work in the future and the CEVAA will work through its network including the Energy Research Network GRR, MOV'EO Cluster, CARNOT ESP Institute, GIE Everest Team, Normandie AeroEspace, Seinari, and the Technopôle du Madrillet to respond to the challenges of the future in the areas of NVH and to help create a quieter world.

## **Discussion**

### **Industrial Revolution and Noise Awareness in India**

**Question:** Prof. Munjal, that was an interesting remark you made about how noise "turned the corner" in 1991 with the onset of globalization. I want to think a bit more about that because, presumably, from then on market forces were able to be a key way to control noise. But the other thought that went through my mind, the other thing that globalization has brought is more cars on the roads and more planes in the air. So it's an interesting topic. If you would say a bit more, that would be great.

**Answer:** Up to 1991 an automobile was officially considered a luxury in India. The taxes and duties on that were such that you'd think twice before you bought a car. Another thing that was done was that gasoline was very highly taxed as compared to diesel. In fact, the money from gasoline was used to subsidize diesel. The presumption was that gasoline was used in cars, and cars were a luxury, whereas diesel was used to run public vehicles which were a necessity for the people. It's not that there was no merit



*Fourth discussion session (left to right): M.L. Munjal, Gloria Elliott, Rajenda Singh, Yang Hann Kim, Ed Clarke, Peter Wagstaff, Jean Philippe Roux*

in this approach; but it was overdone for the sake of populism, I won't say popularity—populism. The government would overdo it. For example, take liquor. Liquor is undesirable; that's okay. But there was a 700 percent duty on it. For income tax every country has different rates. During Mrs. Indira Gandhi's time as Prime Minister, the highest income tax was 96 percent. Would anybody in this room like to earn a dollar if 96 cents had to go for income tax? The whole thing went to completely ridiculous limits. Then, in 1991, the country was almost broke. Many people may not know that the Indian government had to mortgage tons and tons of gold with the British to get the cash to run the country. That is when Dr. Manmohan Singh (an economist), who was the Finance Minister at that time, intervened. He was able to persuade Mr. Narasimha Rao, the Prime Minister, that we'd had enough. Either you go completely bankrupt or you see the reality and come to your senses. That was when the reforms were started. Fortunately the country hasn't looked back ever since, and our foreign exchange reserves have grown consistently to enable us to be able to import 70 percent of the entire requirement of petroleum.

That is one thing. But let me talk about noise. You are asking how the noise decreased. What happened was that because of the protectionism that the government exercised, manufacturers enjoyed a seller's market in India up to 1991. They would produce vehicles, and there was no competition. Because of this there was no incentive at all for anybody to reduce noise. I'll give you one instance. In the 70s we developed a new engine for a local company, and in the process we also gave them the design of a good muffler for that and gave it free—we did not charge any consultancy for that because it was not a part of the contract. But that was not put into practice because the total cost of that muffler was 30 cents more than the existing muffler.

But noise did not matter at all; they would not spend 30 cents more for a more efficient muffler. However, after 1991 they found that they could not export their engines, vehicles, bulldozers, etc. because these were noisier than what the European market was looking for. Soon they found that because of globalization they would be elbowed out from even the Indian market. Then the same party came to us and paid us something like a 50,000 USD consultancy fee to develop a new muffler. The same person who was not ready to spend 30 cents earlier! So, when you open the market and everybody has to compete globally, the whole game changes. Everything changes in the process. So that's how, for example, now that all industries are able to compete well within the country, they are able to export. That's how our earnings have increased to many times of what they were in the 90s. The situation is much better now. That's how the Indian currency (rupee) is getting stronger against the dollar.

**Comment:** First was the export consideration. They found that all the machines or vehicles that were made in India would not be able to be sold abroad if they were not silent. That was a major thing. The government has come up with gazette notifications according to which they have now specified the noise limits of pass-by noise for all vehicles. Any vehicle that is noisier than what is specified will not get a type-testing certification from the Automotive Research Association of India and, therefore, cannot be put on the market; it cannot be sold. This is how we have been able to control all the new vehicle noise. But the real problem is noise emitted by the existing vehicles, the in-use vehicles; and for that we have been measuring exhaust noise of all new vehicles at half a meter from the tailpipe per ISO standard. Then we will be specifying that this 'X plus 3' is the maximum exhaust noise allowed for in-use vehicles. But still the data is being collected; it will take some time.

The government is contemplating noise labeling which will bring in the market forces. Manufacturers know they have to compete in the market; and if their product is noisy, it will not be bought by anybody and cannot be exported. That would make a lot of difference.

**Question:** Ed, how do you apply sound gardening to India?

**Answer:** You've got to start somewhere. I suppose gardening and weeding out the biggest problems is the first part—use the term “noise control triage.” It's a question of looking at the resources available and deciding what are the biggest problems. The biggest problems in a society where everything is 10 dB noisier than we're used to are related to those noise sources which are prejudicial to health rather than a bit disturbing. For example, I would consider open windows next to a generator and try to work out how to address those most important problems first. It sounds like a lot of gardening to do.

### **U.K. Noise Abatement Society**

**Question:** Gloria, I'm very interested in what you had to say technically and socially to lower the noise and engage the public. But for your organization, just how big is it and how do you get your funding?

**Answer:** We are quite a small organization, but every single penny counts. We place our energies into what we know can be fruitful, what we know can actually achieve something positive. Our funding is from subscription, from public subscription. It's also from corporate donation and from legacies when people who are members die who have been members of our society since it was started by my father in 1959. Those loyal members are actually subsidizing all the work we're doing now. We find ourselves in a position that, because we are independent, we have quite an influence. We have no axe to grind; we

have just a remit to protect the public. So we can go to local authorities and encourage them to enforce the law. They have real difficulties because they don't have enough budget, they have a huge mountain to climb and have not enough support for all the remit for what they have to do. We can go to industry and ask them to find quiet answers and market it out there. We work with them. There's no point in telling them they are too loud and to stop it. That's no good. We all have to work together now. I think this is what everybody is realizing that by working together we can actually achieve something. We have all the research in the world, we need that data and all that evidence; but we have to be able to do something with it. That's what we'd like to do.

**Comment:** What is good is that the production of quiet products is industry-led. That is so incredible. If industry has that kind of responsibility, it is very exciting. I wish that other industries would be stimulated to be so responsible.

Quiet Vehicles and Pedestrian Safety  
**Comment:** I get upset when I hear about the quiet hybrid cars that have to be supplied with more added noise for safety reasons. To me it's absolutely crazy when we have got the quiet car that could be used in residential areas at nighttime without disturbing residents. We have a solution, we have a quiet car—the hybrid car—why isn't the reaction to demand that all cars have to be as quiet as the hybrid cars. Make all cars that quiet. If all cars were that quiet, would we then have a safety problem?

**Comment:** I have worked with the disabled. One of the big problems in Paris is the number of old people who are knocked down by existing cars because they don't hear the cars coming. This problem is going to be even worse in the future. The majority of pedestrian deaths in Paris are old people, and it's just because they don't hear the cars

coming, even petrol-engine cars. This is going to get worse, and we're looking at ways to solve it. In fact I'm hoping to put more old people into cars so they can drive themselves because, when they are pedestrians, they're more vulnerable than when they are driving. The difference is a factor of five or six to one in the number of deaths of old people driving, even at the age of eighty, than being pedestrians.

**Comment:** I mentioned our concerns about the quiet vehicles which we're delighted are coming onto the roads. We're talking to Brigade Electronics about producing a broad-band sound which is easier on the ear and which will not be too intrusive and it's directional as well, so it's safer. It will be a sort of "shhh shhh" as opposed an "eek eek," that kind of thing. But I think what concerns me is when there are many vehicles all doing "shhh shhh", will we be able to discern where they're coming from. Yes, we will turn towards it; but we'll be turning towards so many. I think this is a real problem, and I think there should be some concentrated effort to get this sorted out and quickly before the worst scenario happens.

**Comment:** I share your concern about putting noise into cars. I do understand the problem of a completely silent car; but I think, as Gloria says, we need to debate this in the round because the main reason in cities why people are seriously injured and killed by cars is the speed at which cars are going. It seems to me that we should look at not just the noise of the cars but the speed of the cars, certainly that which is permitted in residential areas. The main point is that we need to look at all these factors first before we start introducing noise into cars because there are other ways of protecting the public. For example, by reducing the speed of cars in residential areas.

**Comment:** That same subject came up in our *Technology for a Quieter*

*America* study at the National Academy of Engineering (USA). It was brought up in 2005 in an initial meeting by a person from the Access Board. That's a board in the government that enforces the Americans with Disabilities Act, and they insisted that there should be noise from cars to benefit those with hearing impairment. We had no discussion of that in our report until it went to review. One reviewer said that there should be something in there about quiet cars and noise. All we put in the report was that, if there was going to be noise, it ought to be designed by a person familiar with warning signals and with sound quality. We know that the technology is available to make a quiet car sound like a Ferrari or a Harley Davidson; but if it's a Ferrari on Monday and a Harley Davidson on Tuesday, you are going to have a big problem.

**Comment:** I think we need to put into perspective 110 years ago when the first motor car came out, there used to be a guy with a red flag running in front of the car to warn people it was coming. I think that's where we are at now.

**Comment:** Just an observation I made at Heathrow Airport two days ago. The little carts that carry people who are disabled back and forth through the airport are specifically noted because of the tone on the cart. It didn't quite run me over because I heard it. The sound was engineered to be softer—it wasn't very harsh. It's a broad-band sound, but it's even better than the previous broad-band sounds I recall their using at Heathrow. So there is obviously work going on there. Hopefully it's the same type of technology that we use rather than trying to make the cart sound like a V-8 or whatever the noisiest sounding car might be.

**Comment:** We question the idea of creating a sound because there is another project being developed which is a system for the detection of pedestrians in front

of cars which would be introduced for all cars. In fact some cars are already on the market which can detect pedestrians. This would be a better solution obviously, but it's quite an expensive solution. Maybe making a noise is a cheaper solution in the short term.

**Comment:** The problem has existed for nearly one century for bicycles. There is a very simple way to prevent a bicycle collision with a pedestrian and that is to just a ring a bell, and it doesn't cost much money. But there is a need to develop a better relationship between pedestrians and automobiles and other types of motor vehicles.

### Implementing Regulations in Korea

**Question:** I'm going to ask a very self-serving question in regards to my country, the United States, which is very regulation-averse. I'd very much appreciate a perspective from my international friends on how your governments manage, either city-wide or country-wide, to get some of these great regulations through that make the public aware of noise issues and make sure certain requirements are met. We certainly do not have that in the U.S., and any guidance you can offer I would very much appreciate.

**Answer:** I do not have solid data or knowledge to answer directly the question you raise, but I can tell you what has happened in the past years in Korea. In Korea, as you know, industry has developed very rapidly so we did not really have a chance to have, for example, town hall meetings. It did not exist in Korea. So, for example, automobile companies would produce a car and try to sell it in the U.S. or in Europe. Then the politician would look at what is happening in Japan or Europe, and they found that they were regulating noise. So they started to make laws to regulate noise. I think what happened in Korea was

not to raise the problem with the public, but they accepted the regulation from our side in Japan or in Europe. If you look at our regulation, it is very similar to the regulations in Japan and in Europe.

**Comment:** In Korea floor-impact noise is a really big problem—boys and girls running around—there is a big dispute concerning the floor-impact noise. We are now regulating floor-impact noise very seriously. That comes from public demands. Also we are installing the SP dB(A) measurement system in the cities so that we can have a real-time noise map in areas such as the Taejon area and the Pusan area. The number of measurement points is not so many at the moment, but we certainly will be able to draw real-time noise levels in the city.

### Educational Strength in Korea and France

**Question:** Dr. Kim, you mentioned that the 4,000 members of the Korean Noise and Vibration Society exceed the total membership of INCE/USA and INCE/Japan (say about 3,000). Many young people today do not join societies of any kind, so how can they be convinced to join and how do we keep them as members?

**Answer:** I've never thought about that. According to my experience in teaching students in the noise and vibration field at my school, if you are trained in noise and vibration, it is easy to get a job. We have many calls from companies which mean that they can easily get the job they want to have. Another thing is that noise and vibration needs practical experience. A genius cannot find a solution for a noise and vibration problem, so the knowledge lasts long compared with designing an MP3 instrument. Those are the two major reasons. Our society has been doing very well in the sense of getting financial support from companies. Many experts in the noise and vibration field perform well not only in the university but also in the companies. In a company they get very

high positions. So young people look at their vision for the future by looking at their predecessors.

**Comment:** Compiègne was the first university to introduce specific teaching in acoustics and vibration in France. This assured all our students of being hired as soon as they graduated, and that has continued until today. It's a way of ensuring a job for them when they get out. They will not necessarily stay in that area for all their lives, but certainly for the first five or ten years they will have something that nobody else will have, although other schools have been catching up. It's a good argument for getting a job when they graduate.

**Comment:** I was quite impressed when you said there were 500 people working in the NVH field. I know quite well the automotive field, and for example, about 150 people are working now at Renault in the NVH development. Fifteen years ago, when I started working at Renault, we were 10 to 15 people for NVH engine development, and ten years ago it was multiplied by 10. So it's the same trend as mentioned.

**Comment:** It is very good to know that there are so many engineers in the NVH departments of car manufacturers which means that the automotive industry has the capacity and knowledge to produce cars and trucks that will be much quieter than those today. They have the expertise. Quiet Products in Korea

**Comment:** Koreans live in rather small spaces compared with, for example, those in which Americans live. They live with the refrigerator, they sleep with the refrigerator, and they sleep with the washing machine. So they do require that the washing machine and refrigerator be rather quieter from what Americans require. The public demands on the home appliance industry in Korea are very high. Also, ten years ago, when Koreans

bought a car, they regarded a car as not just a vehicle, but something that showed their success, their social status. Now they know how to enjoy a car, so the noise-related issues of a car are rather different what others experience. Koreans expect that the car has to be very comfortable, no noise, like home. So public expectations concerning car noise are extremely different compared to those in western countries.

### **Construction Noise in Korea**

**Question:** Dr. Kim, I was very impressed with your limits on construction noise. How did you manage that? What about the persons who do the construction and know how much noise they are making? What does it actually show?

**Answer:** On the construction sites, dB(A) levels. The regulations regulate the construction noise; so if there is a construction site near an apartment, there will be some debate. The people will voice their dissatisfaction, writing down their complaints, and then submit the complaints to the government. Then the government calls the construction people as well as the apartment people and tries to come to an agreement. Because the construction people create a disturbance to the neighborhood, they may be fined. That sort of negotiation is very popular in Korea. But to do that takes about one year, so I suggested that the government put a digital sound monitor on the construction site. Then the construction people can see how much sound they generate and also the neighborhood people can see how much sound they hear. It's like a thermometer. Then the construction noise will be self-controlled. I suggested this last year at a construction noise control meeting in Daejeon-shi, and the company accepted the idea. I hope it will work.

**Comment:** From how far away do you take the readings? You got very low readings. I wonder where they were taken from.

**Comment:** The distance and height is written in the regulation, but unfortunately I cannot remember the specifics. We have to use a certain height and certain position to measure construction noise.

**Question:** I was also very impressed by the level. From what you are saying it is not an absolute level. The government set those as regulations, but I think you said that they can be negotiated. So it's not as if the 65 dB(A) is an absolute level that's always enforced. It can be negotiated upwards. Am I correct?

**Answer:** It is an absolute level in terms of regulation; but if somebody violates that regulation, the law or anything associated with the government regulation does not state how much or how long you should be penalized. So we don't have a regulation that provides feedback. We have to call meetings between those who made the noise and those who were disturbed by the noise. So in that sense it has to be negotiable.

### **Public Noise Monitors in Paris**

**Question:** Peter, I was fascinated by the noise warning signs you showed us in Paris. At the café, with the cocktail party factor smoking outside, the cacophony builds up. I wonder if Parisians are more sophisticated than Londoners. We suggested this on a particular, very controversial issue; and it was decided that it was much more likely that the patrons of this particular establishment would try to make the sign go off and be noisier than to control the noise. Any comments on the sophisticated Parisians?

**Answer:** Of course Parisians are very sophisticated, being a Parisian myself; but I think people in Paris are probably worse than Londoners in that respect. It is experimental. In fact the café is called the Café des Avocats which means lawyers. So if there were any problems, the lawyers would be able to answer them. I'm not sure how it is actually working. I can

find out next week if the experiment is working, whether people are obeying the rules. But it is probably something for show. Some people do take notice of it, but not everybody.

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## **SESSION 4: ACTION ON CAETS NOISE CONTROL TECHNOLOGY ASSESSMENT**

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### **Questions for Panelists**

1. What can be done to direct the attention of policymakers to technical solutions to many of the world's noise problems?
2. How do we proceed to influence legislatures worldwide—through the U.N. or independent of the U.N.—to adopt a global noise policy?
3. How do we get the message across to international NGOs on quieting product noise emissions?
4. How can the CAETS Council encourage recognition and understanding of CAETS technology assessments by the world's policymakers?
5. What's the most effective way to bring CAETS technology assessments to those parties in industry who are most affected?
6. What actions are currently being taken by CAETS' member academies to bring technology assessments to the attention of the policymakers in their countries?
7. What can be done to involve the CAETS' member academies in actions to pursue a quieter world?
8. What will attract the attention of legislators at all levels and motivate them to take action against the

adverse effects of excessive noise?

9. What lessons have been learned in the preparation of the NAE's "Technology for a Quieter America" report?

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## Panelists

- **Tor Kihlman**, Royal Swedish Academy of Engineering Sciences, Session Chair
- **Nina Renshaw**, European Federation for Transport and Environment, Belgium  
*Getting the message across to international organizations on quieting vehicle noise emissions*
- **John Stewart**, U.K. Noise Association  
*Noise: A world-wide problem, with solutions. So, why aren't the policymakers listening?*
- **Bill Salmon**, CAETS, U.S.A.  
*CAETS – history, objectives, and current programs*
- **George Maling**, NOISE/NEWS International, U.S.A.  
*NAE Report: "Technology for a Quieter America"*
- **Wolfgang Schneider**, DG Enterprise and Industry, E.U.  
*New requirements for noise emissions of motor vehicles in the European Union*

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## Presentations

### **Nina Renshaw – *Getting the message across to international organizations on quieting vehicle noise emissions***

#### **Introduction to T&E**

T&E is an independent pan-European association with scientific and educational aims, with no party political affiliation and devoid of any profit making motive. Established in 1990, T&E has grown to become the principal environmental organization campaigning on sustainable

transport at the EU level in Brussels.

Our mission is to promote a policy of transport and accessibility based on the principles of sustainable development, which minimizes negative impacts on the environment and health, use of energy and land and all economic and social costs, maximizes safety, and guarantees sufficient access for all. Our primary focus is on European transport and environmental policy but our work in Brussels is supported by around 50 member organizations working to promote an environmentally sound approach to transport across Europe. Our main work areas at the moment are clean vehicles, low carbon fuels, transport noise, road charging for lorries, aviation, and shipping.

#### **Key Role for International Organizations in Noise Policy**

Historical background for noise standards: harmonization of product standards for European internal market, either via EU or UNECE. To ensure no barriers to markets exist due to differing national standards on noise emissions. International organizations are increasingly important with regard to regulations to address noise sources

#### **EU Tire Noise Legislation – Lessons Learned**

T&E set up a campaign coalition which worked for the new standards, which will come into force from 2012. The resulting standards are much tougher for car tires than heavy duty tires – but nevertheless substantial progress, especially in urban areas. They are less useful regarding motorways with a high proportion of commercial traffic (trucks) especially at night.

Phased in from 2012, full effect before 2020—after complete replacement of all tires on the market. New vehicle regulations will take longer to filter into market—vehicle replacement cycle ca. 12 years, vs. ca. 4 years for tires.

Huge industry opposition, supported by many European countries, meant that the good results from the European Parliament were watered down. Nevertheless, the European Parliament and parliamentarians played a very active role on this issue. Turning point in the debate: T&E organized for recognized experts to meet the politicians at a Parliament hearing. Myth-busting regarding safety vs. noise trade-off that industry claimed would be relevant, and demonstrating that noise is a public concern. + Co-benefits: Climate & Road safety.

Opportunity for experts to meet MEPs and show their knowledge—ensure politicians feel comfortable trusting their judgment, rather than industry claims. Experience: MEPs are naturally skeptical, know that they hear versions of the truth and need help to find out who to trust!

#### **EU Tire Label**

The label, including noise level, will also be mandatory for Europe in 2012. At the outset, the European Commission only planned to introduce an energy label for tires. It was clearly not the intention nor interest of the Commission to include noise as a parameter in the label.

T&E established a first-mover advantage in this process by commissioning a key report "Tire labeling in Europe" (VTI-Sandberg, 2008), which became a central source for the Commission proposal and convinced the Commission of the importance of including noise. The Commission was persuaded to include it, which was then confirmed by Parliament and Council, and developed to include a grading system (using sound waves on the pictogram) as well as the dB(A) level from type approval.

T&E demonstrated (to the EC) the feasibility of a multi-criteria label – which could be understood by consumers. It

exploited the co-benefits of quiet, safe and low-carbon transport.

Noise pictogram—2nd stage also pictograms for fuel and wet grip— Consultation on understanding of noise picture – Plus dB level in the final version that will be on all tires sold in Europe from 2012.

EC will also introduce explanatory website, fuel savings calculator and explanatory leaflets —Consultants in touch already with T&E regarding effective communications, explanation, and marketing to the public for introduction by 2012.

### Tips for Success

Set up a campaign network of NGOs, members, technical experts, cities and regions, and retired tire industry advisors—all committed and available to advise.

Timing and tips for policy input—public consultations, Parliamentary hearings in particular, with ample warning for experts to be able to get involved.

Definitely, shortage of experts that the EC can/does call on for independent advice. In contrast to the US EPA for example. Possible role for CAETS experts?

### New EU Vehicle Noise Standards Coming Up

An opportunity in 2010-2011—for the first time in 15years!—to revise the standards for noise emissions of vehicles, and for the very first time, with the objective of really cutting environmental noise of road traffic! After 40 years of ineffective regulation! All of the time that limits have changed, so has the test method, meaning that today's cars aren't much quieter than the cars our parents drove.

A milestone, this decision was previously taken by WP29 on Harmonization

of Motor Vehicle Regulations of the UNECE, but the Commission is frustrated by lack of progress and will propose its own regulation. The Commission is also looking at EU and national possibilities for tax incentives to promote cleaner and quieter vehicles.

### Look For New Allies

Including, notably health and finance ministries! = *Every 1 dB(A) traffic noise reduction from source measures saves €100 million on remediation measures!* (Netherlands Government, *Noise Innovation Programme*). Arguments on our side:

- Benefits vs. costs
- Who pays? – local authorities, taxpayers
- Who suffers? – taxpayers, residents, etc.
- State of technology—quiet is possible
- Public interest and media interest

### Recommendations to CAETS

Set objectives: Which policies and organizations do you want to be involved in and influence? This then dictates what resources are needed and how to allocate them. Recommendation to base coordinator in Europe, because:

1. Biggest potential to influence policy-making globally—many other regions increasingly follow EU example from EU and/or UNECE
2. Most open policy-making process (contrast to China, Japan or inside experts at US EPA)
3. Regular public consultations, hearings, etc. Many opportunities for input and recommendations to be taken on board
4. As an expert network, views would be heard and valued

### John Stewart – Noise: A worldwide problem, with solutions. So why aren't the policymakers listening?

#### Noise is a Problem Which is Widespread and Worldwide

Indeed, more people are affected by noise in their day-to-day lives than by any other pollutant on earth. But noise is not a problem without solutions—some more straightforward than others. The question, therefore, is why are policy-makers not doing something about noise? Most governments have allowed the problem to become worse in recent decades. Noise has become a global epidemic. It affects millions of people across the world and it poses a very real threat to the planet's natural sound systems; to its oceans, forests and deserts. Yet there have been no international summits involving presidents and prime ministers; no global talks; nothing to compare with the Copenhagen Conference on climate change. Why is this?

*Firstly, noise is not seen by most decision-makers, at a local, national or global level, as a pollutant which does lasting harm to people or the planet. There has been nothing to match the huge number of scientific papers that have been produced on climate change or air pollution. Of course, it is not true that noise does not do lasting harm. Millions of people have damaged hearing because of noise, particularly occupational noise. A huge number are so stressed by noise that it affects their health and can lead to early death. And the sound systems of our natural world are being damaged by the intrusion of "man-made" noise. Yet the perception of decision-makers, politicians and probably much of the public remains: noise is a largely a local phenomena which doesn't do irreversible harm to people or the planet. As long as that view remains, it will be difficult to persuade decision-makers to get serious about putting in place real solutions to tackle noise problems.*

*Secondly, noise is often regarded as an individual's problem.* The fact that some people are more noise-sensitive than others gives many policy-makers the chance to imply that the real problem is that certain individuals can't really cope with the modern world. In effect, they blame the victim. By doing so, it allows them to avoid the key question: what should they be doing to tackle noise.

*Thirdly, and linked to the second point, there is a widespread view that these noise-sensitive individuals are in some ways inadequate.* They are regarded as the people who can't fit into the modern world with its noisy cars, planes and household gadgets. Policy-makers imply that these people (even though their numbers run into tens of millions) should learn to cope with the inevitable noise of modern society. Progress, the argument goes, means more noise and we all need to accept that.

*Fourthly, there is an increasing number of people who don't mind or even enjoy the noises of our consumer societies.* The noise is coming from gadgets which people like; things which bring pleasure and value to their lives. Fewer and fewer of us any longer identify with a church, an ideology, a political party, a trade union or even our neighborhood or extended family. We define ourselves by what we have. If many of our possessions are gadgets that make noise, then that noise, far from being disturbing, is associated with things which increase "convenience", give us pleasure and help define our identity. Thus noise becomes something positive, something that has good associations and something which is an integral part of us. It doesn't, of course, mean that we haven't all still got our pet hate irritating noises—the scraping of the nail file, the high-pitched whir of the fan—but it does suggest a quite new attitude to mechanical noise has emerged. An attitude shaped by the consumer society. Oliver James wrote in *Affluenza*

(2007): "The great majority of people in English-speaking nations now define their lives through earnings, possessions, appearances and celebrity." Many have accepted and even welcomed noise as part of our embrace of the consumer society.

But we have not just embraced the *constant* noise from consumerism; many of us have also taken on board and indeed learned to love the *loudness* of the noise. The noise in modern clubs, cinemas, restaurants, and even on our home stereo-systems is of a decibel level unimaginable even forty years ago. This is not a specifically youth thing. It applies across the age spectrum. Barry Blesser and Linda-Ruth Slater argue in *The unexamined rewards for excessive loudness* that "when a culture accepts loudness as being a legitimate right in recreational sound venues, that acceptance tends to legitimize all forms of noise pollution. As a culture with advancing sonic tools and amplification, there are increasing opportunities to be immersed in destructively loud sound fields. We believe that acceptance of loudness in entertainment then carries over to a tolerance of disruptive noise from airplanes, jackhammers, powered garden equipment, and so on. Loudness becomes the cultural norm." If this argument is correct, it has profound implications for tackling noise. Will decision-makers feel under the same pressure to deal with noise if loudness has become the cultural norm for at least a percentage of the population? This new attitude which is emerging towards noise, certainly in the consumer societies of the rich world, could be a major barrier towards policy-makers feeling any need to seriously examine solutions to noise problems. There is a related problem here. Most developing societies are eager to buy into the consumer society. Many of their policy-makers seem to accept that noise is a price worth paying to do so. China is one of the few countries developing a different approach. It understands that,

unless a strategy is in place to curb noise, the rapid development of the country will cause unacceptable noise problems for its people.

*Fifthly, tackling some noise problems would require policy-makers to take on some powerful vested interests.* A lot of the noise in the modern world comes from transport: planes, motor vehicles, ships and, to a lesser extent, rail. Not only does each of these industries have powerful lobby groups behind them, but the increased movement of people and goods, particularly by plane and ship, is seen as an integral part of the globalized economy. If this growth continues at the present rate, then any technical improvements which reduce the noise from planes and ships will be off-set by the sheer increase in numbers. Motor vehicles may turn out to be less of a problem if the rising price of fuel leads to more hybrid or electric vehicles but it is difficult to see how transport noise generally can be significantly curbed unless there is a move to more localized economies.

The other areas where powerful vested interests are involved are in drilling at sea, logging and construction activities on land and in the sonar tests carried out by the military. These raise big global problems for policy-makers. And at a more local and national level, the noise on many construction sites and in a huge number of factories and call centers would be met by resistance from local business interests. But there is evidence this can be dealt with by effective regulations properly enforced.

*Sixthly, a lot of noise victims are powerless, at the mercy of outside forces.* I don't necessarily mean they are poor. A wealthy older woman, for example, can feel trapped if her neighbors are making constant noise which the authorities refuse to do anything about. But poor people—particularly those in the poorer world—are more likely to be trapped by noise.

They are usually the people most exposed to the noise—living beside busy roads or under flight paths—and least likely to be able to escape or even benefit from mitigation measures. There is no double-glazing in the shanty towns. Powerless people are much less likely to be listened to by policy-makers.

In conclusion, there are solutions to most noise problems but there are a number of strong reasons why policy-makers choose not to take them up. The challenge for noise lobbyists and campaigners is to find effective ways to persuade policy-makers to adopt a different approach.

**Bill Salmon – CAETS – History, objectives, and current programs**

**Introduction**

The International Council of Academies of Engineering and Technological Sciences (CAETS) was founded in 1978 by the following academies: the Australian Academy of Technological Sciences and Engineering (ATSE), the Mexican Academy of Engineering (AI), the Royal Swedish Academy of Engineering Sciences (IVA), the U.S. National Academy of Engineering (NAE), and the U.K. Royal Academy of Engineering (RAEng). CAETS was incorporated as a non-profit US corporation in 2000.

**Objectives of CAETS**

CAETS is an independent nonpolitical and non-governmental international organization of engineering and technological science academies that is prepared to advise governments and international organizations on technical and policy issues related to its areas of expertise. CAETS contributes to the strengthening of engineering and technological activities in order to promote sustainable economic growth and social welfare throughout the world and fosters a balanced understanding of the applications of engineering and technology.

CAETS also provides an international forum for discussion and communication of engineering and technological issues of common concern, and fosters cooperative international engineering and technological efforts through meaningful contacts for the development of programs of bilateral and multilateral interest. CAETS encourages the improvement of engineering education and practice internationally and fosters the establishment of additional engineering academies in countries where none exist.

**CAETS Structure**

The CAETS Council is comprised of one representative of each member academy. The Board of Directors consists of the officers—president, president-elect, secretary-treasurer, past president—and eight Members; and the CAETS Executive Committee consists of the four officers. All officers, except the secretary-treasurer, have one-year terms; Board Members serve for two years; all are nominated by their member academies and elected by the Council.

**Membership in CAETS**

One academy per country, representative of a nation’s engineering community, may become a member of CAETS. Peer-elected membership to an academy must be based on outstanding contributions to engineering, and the academy must be governed by its elected membership. The academy must be non-political and non-governmental and have a five-year program which is compatible with CAETS.

In addition to the five original founding academies of CAETS, the following organizations are also members:

Argentina	ANI - National Academy of Engineering
Belgium	BACAS - Royal Belgium Academy of Applied Sciences
Canada	CAE - Canadian Academy of Engineering
China	CAE - Chinese Academy of Engineering
Croatia	HATZ - Croatian Academy of Engineering
Czech Republic	EA CR - Engineering Academy of the Czech Republic
Denmark	ATV - Danish Academy of Technical Sciences
Finland	FACTE - Finnish Academies of Technology
France	NATF - National Academy of Technologies of France
Germany	acatech - German Academy of Science and Engineering
Hungary	MMA Hungarian Academy of Engineering
India	INAE - Indian National Academy of Engineering
Japan	EAJ - Engineering Academy of Japan
Korea	NAEK - National Academy of Engineering of Korea
Netherlands	AcTI.nl - Netherlands Academy of Technology and Innovation
Norway	NTVA - Norwegian Academy of Technological Sciences
Slovenia	IAS - Engineering Academy of Slovenia
South Africa	SAAE - South African Academy of Engineering
Spain	AIE - Real Academia de Ingenieria
Switzerland	SATW - Swiss Academy of Engineering Sciences
Uruguay	ANIU - National Academy of Engineering of Uruguay

## Convocations and Symposia

CAETS has been holding convocations since its initial convocation in 1978. The topics are timely, addressing issues of current concern and interest. Recent convocations covered such topics as *Oceans and the World's Future*, *Environment and Sustainable Growth*, and *Global Natural Resources-Management and Sustainability*. In the years without convocations, shorter CAETS symposia are held in conjunction with annual Council meetings and the symposia also address topics of current concern. CAETS publishes reports of all convocations and symposia.

## CAETS Statements

Since 2005 CAETS has been issuing four-page statements for distribution to the world's policymakers. The statements issued to date are:

- 2005 Oceans and the World's Future
- 2006 The Role of Hydrogen in Our Energy Future
- 2007 Environment and Sustainable Growth
- 2008 Delta Technology for a Sustainable and Habitable Planet
- 2009 Global Natural Resources—Management and Sustainability

## CAETS Noise Study Committee

A CAETS committee to study the global noise issue was established in 2007 in response to a proposal by IVA. Its mission was to assess the state of technology for the noise control of the world's principal noise sources. Two technical assessment forums were held—2008 in Southampton, UK, on the noise of transportation vehicles and 2009 in Ottawa, Canada, on other noise sources (*See the March and June issues of this magazine, respectively—Ed.*). In 2010 a third CAETS forum (reported in this article) was held in Lisbon, Portugal, on how to convey the results of the assessments of noise control technology

to the world's policymakers. On June 30, following the Lisbon forum, the CAETS Council accepted the committee's report. The committee was renamed the CAETS Noise Control Technology Committee and will work in the future to convey the technology assessments to the world's policymakers using the findings of the Lisbon forum for guidance.

The CAETS noise study was carried out in cooperation with International INCE and this cooperation will continue in the future.

## George Maling – NAE Report: "Technology for a Quieter America"

### Timeline for Study

In 2005 September, a scoping workshop was held in Washington, DC, with representation from the private sector and by more than a dozen federal agencies. The following January the planned program for the study was approved by the National Academy of Engineering (NAE). In 2007 workshops were held on cost-benefit analysis, on noise and competitiveness, and on education. These were followed in 2008 by workshops on new technology, on public information, on hazardous noise, and on metrics. A committee of 10 experts, primarily from the private sector, and several subcommittees prepared the report. The years 2009 and 2010 were devoted to writing, editing, and peer review of the Technology for a Quieter America (TQA) report. The final report was published on October 7, 2010. This report was prepared for the Lisbon Forum, and does not contain the recommendations in the report because they were not final at the time of the presentation.

The report is available in hard copy or in PDF format. Individual chapters can be downloaded, and there is no charge for reading the full report online. Go to [www.nap.edu/catalog.php?record\\_id=12928](http://www.nap.edu/catalog.php?record_id=12928)

## Technology for a Quieter America – Metrics for Measuring Community Noise

The use of the day-night average sound level (DNL) metric has helped policymakers but has both strengths and weaknesses as a measure of environmental noise. Development of noise metrics more transparent and more reflective of impact noise on an affected population is needed. FAA has recognized this problem, and has held a series of workshops devoted to development of a roadmap related to noise and annoyance as well as noise and sleep. A summary of FAA activities appears in the 2010 September issue of *NNI*.

## Technology for a Quieter America – Hazardous Noise

Costs of compensation for military veterans and federal workers are approaching 1 billion USD annually while costs to private industry are unknown. Research is needed on impulsive noise which is generated by many consumer products including toys. "Buy quiet" is the way forward. One of the issues related to hazardous noise is the "100 dB Directive" from the Occupational Safety and Health Administration (OSHA). It allows industry to count on 10 dB of attenuation before engineering controls are needed. Thus, levels can be 100 dB in industrial plants before engineering controls are needed. In the October 19 issue of the *Federal Register*, OSHA proposed to redefine the word "feasible." This action would again make the use of engineering controls the primary means of noise reduction when levels exceed 90 dB over an 8-hour day.

## Technology for a Quieter America – Highway Noise

The total cost through 2004 for noise barriers was 3.4 billion USD (2004 dollars). At highway speeds the tire/road interaction noise dominates and is the subject of current research to reduce this noise source. Cost-benefit analysis is needed. Two of the issues that need to be

addressed in more detail is the durability of road surfaces and the effects of time on the noise reduction provided by surfaces.

### **Technology for a Quieter America – Railway Noise**

About 10 million persons are affected by railway noise (including 6.5 million from train horns). Guidelines from DOT modal agencies have been published and technology is available to reduce railway noise. The expansion and renewal of rail systems will require careful consideration of noise emissions.

### **Technology for a Quieter America – Aircraft Noise**

Very significant progress has been made in reducing aircraft engine noise over the past four decades. And progress has been made in reducing other aircraft noise sources. But progress in reducing community noise around airports has been slow due to increased air traffic. The program to insulate homes and schools in the vicinity of airports is expensive. For example, 180 million USD had been spent through 2004 at O'Hare Airport (Chicago). In June, 2008, a CAETS workshop was held in Southampton, UK, on transportation noise sources. One session on aircraft transportation covered the technology available to reduce aircraft noise and future developments. American and European manufacturers are competing to produce quieter aircraft to meet international requirements. A summary of the presentations at the CAETS workshop was published in the 2010 March issue of *NNI*.

### **Technology for a Quieter America – Role of Government/Public Education**

In these two chapters, the structure of several governmental organizations organized for cooperative efforts are described. These include the Federal Intergovernmental Committee on Aircraft Noise (FICAN), the Partnership for Air Transportation Noise and Emissions Reduction

(PARTNER), and the Joint Project Development Office (JPDO). One recommendation is that the Environmental Protection Agency (EPA) fulfill its role defined in the United States Code to coordinate the activities of the many government agencies involved with noise. To include private industry in a cooperative effort will require new legislation.

EPA could also lead an effort to provide more public information on noise, and could assist in developing a noise labeling program that would have international acceptance.

### **Technology for a Quieter America – Noise in Buildings**

In the home, noise from appliances a significant issue. In buildings, Post Occupancy Surveys have shown that acoustics (noise, speech privacy) is at the top of the list of building problems. Poor classroom acoustics inhibit the learning process. The design of green buildings presents many challenges from the standpoint of acoustics and seldom offers a low-noise environment. HUD guidelines for external noise and for building construction need revision.

### **Technology for a Quieter America – Urban Noise**

New York City has a noise hotline which registered 410,000 noise complaints from June through August, 2004. The noise sources about which complaints were made were: car alarms, honking horns, car stereos or boom cars, rowdy passersby, neighbors' activity or voices, highway or street traffic, sirens, neighborhood music, TV, or radio, motorcycles, and construction or repair work. New York City put into effect a new building code in 2007. This code could serve as a model for other large cities.

### **Technology for a Quieter America – Noise Emission Standards and Requirements**

There is a wide variety of noise emission standards available within the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). American manufacturers would benefit from more involvement in the standardization process. Manufacturers which wish to compete internationally will have to meet foreign noise requirements, and having these requirements harmonized internationally will be of benefit to all. The National Institute for Standards and Technology (NIST) could assist by making information available to American manufacturers. NIST could also be more proactive in laboratory accreditation.

### **Technology for a Quieter America – Two Issues of International Importance**

Product noise labeling. The U.S. Environmental Protection Agency (EPA) noise labeling program of the 1970s failed. International INCE and INCE/USA have studied or are now studying the labeling issue. Leadership by EPA could help the private sector develop a noise labeling system that could have international acceptance.

Laboratory Accreditation. The National Voluntary Laboratory Accreditation Program (NVLAP) has fourteen corporate, government, and independent testing labs accredited for one or more noise emission standards in U.S., one in Canada, and one in Japan. A more proactive role by NVLAP is needed as well as more international involvement. This would include the International Laboratory Accreditation Cooperation, the International Accreditation Forum, the Asia-Pacific Laboratory Accreditation Cooperation, the Inter-American Accreditation Cooperation, and the European Cooperation for Accreditation.

## **Wolfgang Schneider – New requirements for noise emissions of motor vehicles in the European Union**

### **Type-approval of Motor Vehicles**

There are directives and regulations regarding the noise emissions of cars, trucks and buses, 2- and 3-wheel motor vehicles, tractors, and tires. Between 1970 and 1995 the maximum sound levels for trucks and buses decreased from 91 to 80 dB; for cars from 82 to 74 dB.

The decrease in traffic noise levels has been slow because the noise limits were not sufficiently low, the exchange rate in vehicle fleet is slow, and there has been a trend to larger, heavier and more powerful vehicles, especially diesel. Tire/road noise has a strong influence, there are weak points in the test method with allowances, test detection, defeat devices, and the method does not reflect real driving conditions.

#### **New Test Method and new Limit Values for Cars, Trucks and Buses**

The amended Regulation 51 of the UNECE which is equivalent to the European Directive 70/157/EEC as amended better represents urban driving conditions instead of worst case conditions but needs to be repeatable and reproducible. The test method is design independent, applicable to new technologies (CVT [continuous variable transmission], hybrid), requires the condition of the test vehicle to be similar to that of the road vehicle, includes cycle by-pass and off-cycle provisions, and avoids allowances as much as possible. It is a combination of full throttle acceleration and cruise-by which leads to the final vehicle sound level. The PMR (power to mass ratio) of each vehicle determines the required target/test acceleration, the test gear depends on target acceleration, the measured sound

levels are rounded, and the test uses real market tires with tread depth greater than or equal to 80 percent of full depth.

Additional sound emission provisions cover operating conditions not included in type-approval test. It has to be ensured that noise emission outside the defined test conditions are not significantly higher than expected. Other provisions in the new method minimize cycle-beating possibilities and detect devices which would increase noise emissions.

A new test method has been developed, including Additional Sound Emission Provisions (ASEP), but new limit values are still missing. A noise monitoring study is now underway where the test results of both the existing and new method are recorded, but only the results of the existing method are relevant for type-approval. The basis for this study is to assess the new test protocol and provide possible new limit values. The study is carried out based on the data coming from measurements according to UNECE Regulation 51 and Directive 70/157/EEC.

The interim results of the study for a total of 900 vehicles tested, including 650 passenger cars, showed no real equivalence between the two methods. The resulting measured values are lower for the new method with the exception of trucks [+ 0.7 dB(A)]. No allowance for diesel engines is needed anymore. There are allowances for off-road vehicles of all categories without distinction for vehicles greater than 150 kW and for sports cars greater than 200 kW and PMR greater than 150 kW/t. There is no accumulation of allowances, and there are different policy options (no change, new method + old limits, new method + equivalent limits, new method + new limits, new method + two steps). There will be a technical economic impact of the new method in design, engineering, testing, and production; and there will be a social economic impact in willingness to

pay, house prices, and health costs. Most beneficial would be a new method with new limit values in two steps.

An interim report of the study was presented on 11 June 2010 and the final report was completed in fall 2010. There will now be discussion in UN/ECE and EU with participation of all interested parties. The European Commission will prepare Impact Assessment which will be submitted to the Impact Assessment Board that examines and issues opinions on all EC impact assessments.

### **Development of new Legislation**

Once the impact assessment report is finalized the draft legislative proposal will be submitted for EC inter-service consultation. The draft will then be sent to the College of Commissioners. The official proposal will then be transmitted to the European Council and European Parliament following the co-decision procedure. The amendment may then be adopted.

### **Requirements for Tires**

The current tire legislation (2001/43/EC) covers rolling noise. Instead of revising the existing Directive, all tire provisions were incorporated in the new "General Safety Regulation" (GSR), adopted in July 2009. Beside requirements on rolling resistance and wet grip, a reduction of noise limits was introduced [average 4 dB(A)] with allowances for non-standard tires (snow, reinforced, traction, special use, extra-load) the definitions for which are not included in the GSR. Amendment of UNECE Regulation No. 117 on tires is necessary with more precise definitions which are based on physical and/or performance requirements. This was adopted in Geneva in June 2010.

For labels on tires EC Regulation 1222/2009 specifies rolling resistance, wet grip, and rolling noise with measurements in accordance with UNECE Regulation

No. 117. For the noise label (measured value N, limit LV)

- $N \leq LV - 3 \text{ dB(A)}$
- $LV - 3 \text{ dB(A)} < N < LV$
- $N > LV$

### Noise of Motorcycles

There has been discussion in UN/ECE GRB expert group (Regulation No.41) on new test protocol. Major items covered in this discussion were acceleration, off-cycle provisions, and limit values. Following agreement in GRB, application within European Union is foreseen. Presentation and discussion of results was expected during September 2010 in Geneva.

### Further Noise Aspects

Although hybrid and electric vehicles are more energy-efficient, there are unintended consequences of such vehicles. One such consequence is that they are quieter, thus removing a source of audible signal that is used by blind and low-vision people. The UN/ECE set up an ad-hoc working group on minimum sound levels for silent vehicles (EU, US, Japan). Under discussion are the vehicle speed, sound level, and type of sound.

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## Discussion

### U.K. Universities Working on Vehicle Noise

**Question:** Nina, which universities in the U.K. who are now looking at the quiet problem of vehicles?

**Answer:** Warwick University, they have a Center for Acoustic Research, Paul Jennings in particular. And Southampton University as I'm sure you know. Maybe also Birmingham because they have the automotive hook-up also. But it's the people at Warwick that I've been talking to most closely.

### Noise Mapping

**Question:** What will we get in terms of new limit values? The mapping that has



*Fifth discussion session (left to right) Wolfgang Schneider, Nina Renshaw, John Stewart*

been carried out by the END directive should be convincing that we have an environmental noise problem in Europe. There is a substantial gap between allowed emissions and possibilities to reach reasonable immissions. What links do we have between the results of the END and the demands for lower emissions? Will the results of the END really influence the limit values that are set with the new emission legislation?

**Answer:** The results of the noise mapping were one of the reasons why it was initially decided that new legislation was needed, that new methods and new limit values were needed. The results of the noise mapping were taken into account to see the number of people who live in noisy areas and how many people are concerned by noise. So in that respect the noise mapping is very useful. But in the future it will probably be difficult to quantify noise levels because it depends on how quickly changes are made and how far infrastructural measures have been carried out and what influence they have. To relate years later to the reduction of the noise of certain vehicles will be very difficult because it's only part of what is happening in the noise mapping.

**Comment:** I think that very few of

those who work with traffic noise in this conference believe we would have any other development than an increase in the number of exposed people through the next several decades.

### Limit Values in dB(C)

**Question:** In the early 70s it was proposed that we should have limit values also in dB(C). Now 40 years have elapsed since that idea was first proposed. The idea has been discussed now and then. For immission reasons, it is very important to limit the low-frequency noise. But what would be the time perspective to get also dB(C) into the limit values?

**Answer:** It's difficult to say something about time perspective, but up to now it has not been considered to use anything other than dB(A) levels. If we would have to change the legislation, this is not excluded. But up to now nothing, no proposal has been discussed to introduce dB(C) levels as well.

**Comment:** I just want to stress what has been said concerning the possibility to have a replacement for the dB(A). Some are waiting for a metric which takes into account a much more important aspect—the low-frequency content of traffic noise and engines of all types—not

only traffic noise but also outdoor machinery noise. The main reason for not having success to date is the lobby of the manufacturers of machines as well as those of the automotive industry. It is a great simplification for everybody to use only the dB(A), but the dB(A) does not give a very good perspective as to what will be the effect of the noise inside dwellings or behind barriers or in the far field where most of the population lives. So the relation between immission and emission is not good if you don't take into account the low-frequency content. It is a very important aspect, and we have to stress that here.

### Outdoor Machinery Noise

**Comment:** The mention of outdoor machinery noise triggered something in my memory. Although we don't work with it specifically, obviously with Transport and Environment it's outside the topics we deal with. There's a public consultation going on at the moment until the end of June, possibly extended, on exactly that—outdoor machinery noise. The Commission is currently consulting on how that could be revised and updated—the outdoor machinery noise regulation. So if you are interested in that aspect in particular or know people who are, then again the DG Enterprise website has an opportunity to comment on that right now.

### New Plants are Quieter

**Comment:** I think it's fair to say that industry nowadays when building new plants is doing a remarkably good job of reducing the noise emissions and the noise immissions. We are far quieter in our new, large industrial plants than we ever were 20, 30, 40 years ago; and I think industry and transport have made great progress. Perhaps it would be useful to look at industry and see what major steps they've made in designing and operating rather quiet, large industrial facilities.

**Comment:** Absolutely right. Certainly in the western world that is absolutely

right. What was interesting yesterday was that some of our Indian friends were saying how they are using market forces to create a quieter situation in India. What you are saying is that industry, through market forces, has become much quieter. I definitely believe that market forces have an important role to play in creating quieter products. That's not to say that some big industries as you've discovered, like the tire manufacturers, will fight their corner in a way that has been very unhelpful; and that needs to be challenged. I do believe that market forces have an important role to play in stimulating inventiveness and creativity in producing quieter products.

### Noise Level Information for Consumers

**Question:** Nina, my interest in particular is in consumer products not transportation noise and particularly how to publish noise-level information to consumers on products. It is interesting to see the label for tires and rating of tire noise. We've looked at many different methods of publishing the information—the EU with the multi-colored bars, the little symbol with the loudspeaker and the three bars. One thing we are focusing on is to actually state the range of levels of similar products that are out there. For instance with a personal computer if the published value is 72 (I won't say dB or dB(A) or power or whatever it is), but if you see the number 72 and next to that you see the number 62 to 73, right away the public knows that 72 is one of the higher values, one of the louder products. The question, was this considered from the information designer who looked at the tire label to put that into the actual rating of tire noise?

**Answer:** Good question. This was the ideal scenario that we put forward to the information designer, and he came up with something that looked like a dial so you could see the lowest value, the highest value, the range going green to red; and it could be somewhere on this

scale. I'm trying to remember why that didn't fly in the process. We did take that to the commissioner at some stage. I think the idea was that then you would have too many conflicting graphics, different kinds of information; and this would be too complex for the consumers. For me this was the ideal kind of pointer to the consumer, by combining the colors with also the range from best to worst, something like that. We probably should have tried to push this harder through the process.

**Comment:** In reality to do something for tires might be difficult because of the frequency of production changes. When we put something in the labeling to say the range is from that to that level, one or two years later the range could be completely different but you'd still have the old label which would be in the legislation needing time to change it. Maybe that would have not been so practical. But with regard to the labeling, my experience with the tire industry is the following. They are not so much concerned with not being able to fulfill the limit values. That, in fact, is no problem. What they are concerned about is that their competitors really put the right noise level on the tire and that they are better or under it. It could be that the labeling directives achieve more from the environment than our limit values directive. In fact, economics is a driving force. To be under a certain level is easily possible for industry. The market forces are important, absolutely. The labeling directive is one way to bring down noise levels.

**Comment:** Do you think we can expect the manufacturers to look at each other and; if they're not producing the noise levels they claim to be on the label, I imagine there will be some whistle blowing going on between the big manufacturers.

**Comment:** There would be definitely tests by organizations. I'm not sure if

T&E does tests, but maybe member organizations do it. So that will be public information. And, of course, competitors will test the other tires and see if noise level claims are accurate. When we discuss limit values which have to be fulfilled, all manufacturers claim that they are able just to fulfill them. Now when it comes to labeling, they want the labels as low as possible. These are two things which do not really go together. But what is more important to them is fulfilling the labels levels and having the market forces show how good they really are.

**Question:** John, your presentation was a good summary of how useful this whole session is, but I would take slight issue with your summary about how we are filling a vacuum in our lives with loud noise. I would suggest that there's a behavior problem. The reason cinemas are so loud is that people eat during the cinema, and the movies have to be louder than people eating. That behavior has to do with people not talking to each other and not having dinner around the table anymore. What I'm suggesting is that maybe we should go back to education to change habits. The fact that MP3 players are so loud and listened to so much is why children have to speak more loudly in the classroom and why they can't hear so well now. I felt it was quite sad and negative, and I hope there's a positive way through with education and behavior change.

**Answer:** I would hope there is a positive way, and I know the Noise Abatement Society is trying to work with the schools. My fear is that nothing very much will happen on the worldwide stage until we see how deaf people are becoming at a young age. I know we have to try to prevent that, but if we see that people are becoming deaf in their 30s and 40s, then governments might take action. It's when governments began to realize the real effect that smoking was having and action was taken. I worry that despite all the good efforts we need to make, it may be

that governments have to see the effects of noise happening before action is taken.

## CAETS

**Question:** Bill Salmon, with regards to setting up the mechanisms to present your organization and the resources you have in it to policymakers, do you already have an idea of the resources you have available for that and the kind of engagement you plan to have in terms of people, time, this kind of thing? If resources don't allow, maybe it's worth doing a bit of a tour and going to meet key policymakers just to introduce the organization. Maybe set up some workshops to present the results of the technology. In my experience the policymakers from the Commission and some parliamentarians would be only too glad to hear this kind of thing and get to know you on a personal level.

**Answer:** The CAETS Noise Study Committee is the source of the response on what resources we put on the subject of noise. But as far as the resources of CAETS, we would take the objectives of the noise committee (and I hope these will come out and be the product of our discussions in Copenhagen at the end of the month) is to engage the interest, to engage the talent of the membership of the academies where you can and use that as the talent. That is the resource that CAETS offers. It's not just in the case of noise; it's not going to be the whole story. There are a lot of additional resources that need to be added to this mix.

## Technology for a Quieter America

**Question:** George, can you please tell me about the report that's being published soon about hospital noise so I can find it.

**Answer:** The report will be called "Technology for a Quieter America." It will be published by the National Academies Press and will be available in three forms. First, it will be online; and you can read the report at no charge.

That's the current procedure for many reports, and I'm assuming that will happen. It will also be available on the National Academies Press website for download (full text or by chapter), and will also be available as a paper copy. I don't know how long it will end up because I don't know what format they are using to publish it, but it had about 500 pages of double-spaced type. It's a fairly long report. There is a small section on hospitals in the report. (The book, 211 pages, is available at [http://www.nap.edu/catalog.php?record\\_id=12928](http://www.nap.edu/catalog.php?record_id=12928)—Ed.)

**Question:** George, regarding the FAA's new metric on aircraft noise and the work they're doing on that, have you any idea what the time scale on that is?

**Answer:** I'm not sure. I know of three meetings. A year ago in San Diego last March there was a session on the FAA's study. There was also a paper in the U.S. NOISE-CON meeting in April; and if you contact me, I can send you a copy of that. I think this is going to be a long process and it's going to be more of a research process. They're worried about criteria for nighttime noise, not the European  $L_{eq}$  all night, but something that might be different. They're not really sure what they're going to do. They're trying to put out a roadmap on how to get to some conclusion, and it will be a long time before things change. (See the article in the September issue of NNI.—Ed.)

**Question:** George, is there a follow-up action plan with the NAE to engage policymakers with the report, or is the report the end of the study?

**Answer:** The National Academies have a Congressional Liaison Office, and they have offered to help us to get Congressional attention. There are a couple of people at EPA that are interested in doing more, and we know them. But there is a ceiling there above the working level that needs to be worked on. We need

to try to talk to the EPA and try to get some action. We have pretty good contacts in the Federal Highway Administration, and I think that we will get some action there. The aircraft, Ian Waitz was on our committee. He runs the PARTNER which is an academic institutional group that looks at aircraft noise issues. I'm not sure how far we'll get with the FAA. I think we'll try to get EPA to expand their program. What I didn't mention was the public information area. There's another chapter in the report on public information, and the EPA is interested in doing more; but funding is needed.

**Comment:** I have a suggestion. The NAE reports are generally read more by academics, so we need to make sure that they are widely disseminated in some way, say to the state EPAs, the state DoTs, because many of them could

take local action. They may not go to the NAE website. So I think we need to do something to disseminate this information.

**Comment:** I plan to do quite a bit myself in that area. We had a symposium in Baltimore at the Acoustical Society meeting in April, and there were quite a few people there who were interested in community noise. I know Larry Finegold had gone ahead with the EPA to try to get an information program going. There was also a representative there from the website Noise-free America, and he was quite interested in the work and is going to help with publicity.

**Comment:** I suggest that we contact INCE/USA members in each state and ask them to contact their local EPA, DoT, and other agencies within the state. I can do that for Ohio. That can be really beneficial

if it comes from someone within the state.

**Comment:** We have a long list of stakeholders in the noise business. It's in a database and is ready to go. I'm building up a database for the Transportation Research Board to try to get the report in the hands of all of the state DoTs. I'll try to get as much publicity as we can. CAETS is the International Council on Engineering and Technological Sciences. [www.caets.org](http://www.caets.org)

NWIP=New Work in Progress,  
CD=Committee Draft, DIS=Draft International Standard, FDIS-Final Draft International Standard  
WECPNL=Weighted Equivalent Continuous Perceived Noise Level  
CIFRE=Conventions Industrielles de Formation par la REcherche  
HUD=Department of Housing and Urban Development 



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# International experience with noise emission reduction requirements and technical possibilities

Tor Kihlman, Sweden, Chair of the CAETS Noise Control Technology Committee

*Editor's Note: This presentation by past I-INCE president Tor Kihlman was made at a workshop held in Brussels, Belgium on October 29, 2010. The workshop, organized by the Belgian Presidency of the Council of the European Union and by the European Commission, brought together various stakeholders, representatives from national governments and noise experts in order to launch a dialogue on complementary measures in order to develop a market for low-noise machinery and to enhance environmental awareness and commitment. More information on the symposium can be found at*

<http://www.health.belgium.be/eportal/Aboutus/eutriol/19065028?backNode=3726>.

*PDF versions of all of the slides presented at the symposium may also be downloaded from this site.*

## Introduction

CAETS, the International Council of Academies of Engineering and Technological Sciences, represents academicians from 26 academies worldwide (12 in the EU). CAETS is without affiliation or bias and independent of the stakeholders in the noise issue.

With broad engineering expertise, CAETS brings an independent voice and source of information to the discussion by policymakers of what is technically feasible.

In the EU there is too much noise! The European environment today does not meet reasonable criteria for a good acoustic environment. Progress is slow or even negative!

The EU may be importing excessively noisy products without adequate measures to limit such imports. A balance is needed between freedom to use products that cause other people adverse effects and the right to demand a reasonable acoustic environment. Emission and immission legislation must be coupled--but it is not!

## International perspectives

In China strict regulations and new technology are intended to build a quiet environment in the vicinity of industrial machinery and equipment. The legislation

and technological support system for the noise emission control of machinery and equipment is complete. One objective of China's standards program is to regulate a product's noise emission: measurement, labeling, and control, e.g. GB 20062-2006 Mobile crawler crane, which sets limits for sound power levels and measurement methods for operating noise. China aspires to become the factory of the world and may adopt regulations to further its own economic interests. The legislation and technological support system for noise emission control may be complete in China, but its enforcement is currently ineffective. Whatever the EU or other countries to which China exports prescribe, a statement of compliance may be expected.

In the U.S.A. today the control of noise source emissions is no further advanced than in the EU. The U.S. system for developing noise legislation and regulations is much less transparent than the EU system. No overall accounting of governmental expenditures to reduce noise levels in the U.S. has been made for more than three decades, and at the national government level more than a dozen agencies are involved with little cooperation or agreement among them. The National Academy of Engineering has recently published "Technology for a

Quieter America," a comprehensive report with many findings and recommendations. Some proposals are:

- Strengthen current federal limits for environmental noise of aircraft by 10 dB.
- Develop product noise emission standards and regulations.
- Develop a uniform system of labeling product noise. Inform the public. Mislabeling must be counteracted by effective penalties.
- Government agencies should be required to show leadership in promoting "buy quiet" activities by developing and implementing programs for the purchase of low-noise products.
- Industry should adopt "buy-quiet" programs that require noise emission specifications on all new equipment and declared values in purchase specifications.
- For international competitiveness, establish a database on product emission standards and requirements
- The harmonization of noise emission requirements worldwide is an urgent issue.

In Australia most environmental noise issues are handled at State and Territory level. Of the machinery types covered

in the Directive 2000/14/EC, only some grass cutting equipment is produced in Australia. The following information refers to portable gardening equipment. Noise labeling and limits were introduced during the 1980s but now only remain in New South Wales and Western Australia. There is limited enforcement; and the limits, when set, are set as sound pressure levels at 7.5 m. Labeling has been criticized as confusing and has trade problems. NSW, in charge of a national working group, is likely to propose the adoption of the EU Directive sound power levels for portable gardening equipment. This would be supported by the National Outdoor Power Equipment Association.

Japan is different from other countries because of its culture of consensus. Emission regulations and immission guidelines are linked in the noise field. Japan effectively uses immission guidelines to control noise emissions of sources (e.g. Shinkansen). The mono-culture of Japan permits arrival at consensus to meet immission guidelines.

Therefore, noise is a growing issue in many countries outside Europe; and it is difficult to get a good picture of other countries. Countries protect the exports of their own industries. With Japan as the possible exception, progress in improving the noise climate for citizens in countries around the world has been limited. China, USA, and Australia observe and possibly adopt EU policy on outdoor machinery, but for different reasons.

### **Environmental Noise Sources**

Environmental noise sources are varied and most are too loud, but the dominant noise is from traffic. It is continuous and is being abated by planning and measures at the source, but much too slowly. Outdoor equipment is mobile and temporary in use and its noise cannot be abated through planning but only at the source and through restrictions in use. There is a gap between allowed emissions

and acceptable immissions. For traffic the gap is 10 dB or more between what traffic is allowed to emit and what could be accomplished with the best urban planning to reach reasonable immissions. But outdoor equipment is much too noisy, and a demand for better performance will often require more power and higher rpm. Low-noise outdoor equipment is needed to decrease the environmental noise levels.

### **Low-noise Machines and Products**

Low-noise machines and products do not threaten to impair the hearing of the user without ear protection and do not emit noise levels that seriously affect the quality of life of the neighbors or the public.

Few products mentioned in the Outdoor Equipment Directive fulfill this requirement. A typical need for noise reduction is 20 dB, and this should be the long-term goal. Are noise reductions achievable for outdoor machinery? Yes, but there are technological, economic, and political obstacles to noise reduction. The technological possibilities differ greatly between different types of products. Emission limits in the Directive were set 15 years ago on the basis of data from industry for products existing at that time without independent technical evaluation. It is not likely that especially quiet products would have been included in that data base. It is time for comprehensive technical evaluations of the options for quiet products and new ambitious goals to be set. The NOMEVAL Report is an excellent base for further studies. It describes the problems and the noise reduction principles. The environmental index as suggested in the NOMEVAL report could be used to prioritize between different machines.

### **Future Action**

With known technology we could have much quieter outdoor machinery. In the short-term, machines and products with major environmental impact need to be quieted first. It cannot be sufficiently stressed that the earlier noise is considered in the design of a new product, the

lower will be the costs and the quieter the product. There is a need for further research and development. Many noise reduction problems are product specific, others are common for many product classes. Very important are quieter power sources, especially lightweight combustion engines for tools carried by the user. Also important are quieter processes such as impacting, cutting, suction, and blowing.

Two sources of information on quiet design that have been overlooked are ISO standards (11688-1 and -2) and the possible adoption of technology from the automotive industry which has spent billions on NVH (noise, vibration, and harshness) to reduce noise levels inside the vehicles!

### **Market Forces**

Market forces are, at present, insufficient and need to be strengthened with respect to low-noise outdoor equipment and machinery. These forces must be made more effective, consumer awareness must be raised, and a "buy-quiet" attitude encouraged. The public must be informed that with noisy products you risk your hearing and you are annoying your neighbor. Products just fulfilling the current limits are too noisy! With present weak market forces, we must have legislated emission limits. These limits must successively be lowered to counteract rising noise levels in the environment. This will encourage use of the technology to develop quieter products during the design phase.

Stronger market forces are needed to produce lower-noise outdoor equipment and machinery. We must foster a culture to promote quiet. Consumer awareness must be raised with respect to low-noise outdoor equipment. Quieter machines in the building industry should provide a competitive advantage both in the marketplace and when they are used. Means need to be developed to demand quiet machines as a condition for building activities, refuse collection, gardening, etc. during evenings, nights, and

weekends. Examples of products where market forces have been the driver are:

Consumer product: Dishwashers have become approximately 20 dB quieter the last decade (by applying existing noise reduction technology)

Commercial product: Jet aircraft engines have become more than 20 dB quieter since the late 50s for the same power delivered (by major redesign using new technology).

### **Labeling**

Labeling for professional equipment and for consumer products must fulfill different needs. Consumers need a simple label without decibels so they know what to expect from the product when buying or using it. The labeling must be clear to enable a qualified comparison and choice between different products. A CAETS symposium in Paris next July will discuss labeling schemes for the professional and the consumer.

### **CAETS Offers to EU Policymakers**

The following offers were made to EU Policymakers

- A free online service with perspectives and information on key policy issues involving noise control technology worldwide.
- A free online service with access to a global panel of experts for answers to questions on key policy issues involving noise control technology.
- Workshops, forums, symposiums, and seminars on key policy issues involving noise control technology. 

## **The INCE/USA Online Digital Library**

INCE/USA, in partnership with the American Institute of Physics, is placing papers from *Noise Control Engineering Journal* and conference proceedings online. The platform is AIP's Scitation system, a powerful search engine that is a major worldwide resource for full text retrieval of scientific and engineering papers in all branches of science and engineering.

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# INCE Update

## INCE/USA

### The Leo Beranek Student Medal for Excellence in the Study of Noise Control

At its meeting on 2010 October 24, the INCE/USA Board of Directors established a new award: The Leo Beranek Student Medal for Excellence in the Study of Noise Control. The cost of the design for the Medal as well as the cost of striking and engraving the Medals will be paid by the INCE Foundation. The medal award was proposed and developed by William J. Cavanaugh with assistance from Alan H. Marsh, Eric W. Wood, and members of the INCE Foundation Board of Directors. This special Medal is established to recognize excellence in the study of noise control engineering by undergraduate and graduate students at academic institutions in North America which have courses in, or related to, noise-control engineering including practical applications.

Candidates are selected by their institution and nominated by a member of the faculty. Nominations are submitted electronically as e-mail attachments to the INCE/USA Business Office using special Forms supplied by the INCE/USA Business Office. An institution may submit up to two nominations per calendar year, one for a student who graduated (or will be graduating) with a baccalaureate degree and one for a student who graduated (or will be graduating) with a graduate degree. Nominations will be accompanied by a copy of the student's supporting documentation such as relevant project, thesis, or journal publication (unless copying is restricted by copyright or by limitations imposed

by military or commercial funding). The INCE/USA Vice President for Student Activities and Education together with a Student Activities Committee established by the VP will review nominations and select awardees based on excellence in the study of noise control. The INCE/USA business office will provide administrative assistance.

Establishing this new Student Award should not conflict with the following existing INCE/USA Student Awards: (1) the Martin Hirschorn IAC Prize for a Graduate Student Project Award, (2) the INCE/USA Undergraduate Student Project Award, (3) the INCE/USA Student Papers Award, and (4) the Undergraduate Student Grant Award. It is expected that the first Beranek Student Medal Awards will be made at the NOISE-CON 2011 Conference to be held in Portland, Oregon in July. More information on this new award may be found on the Internet at <http://www.inceusa.org/about/awards/beranek>

### About Leo Beranek

#### Adventures in noise control

#### engineering—in Leo's own words:

"Noise control has been an important part of my life as evidenced by my various books on noise reduction and noise and vibration control. I designed what was then the world's largest muffler that reduced incredibly loud noise and vibration from the test setup for supersonic jet engines at the NASA Lewis Flight Propulsion Laboratory in Cleveland, Ohio. This was followed by my participation in the setting of limits to the level of noise produced by

jet-propelled aircraft in neighborhoods around JFK Airport in New York. A major effort of mine was devising charts and procedures for determining acceptable noise levels in indoor spaces—offices, living quarters, schools, hospitals, and so forth. Another area that I undertook early on was the reduction of noise in heating, ventilating and air-conditioning systems. I tell the stories of these efforts in my autobiography, *Riding The Waves* (MIT Press, 2008)."

*Editors note: For more on the Leo Beranek autobiography, go to*

<http://mitpress.mit.edu/catalog/item/default.asp?tttype=2&tid=12126>

*For more on Leo's history, go to one of these sites:*

[www.aip.org/history/ohilist/5191.html](http://www.aip.org/history/ohilist/5191.html)  
[http://www.ieeeeghn.org/wiki/index.php/Oral-History:Leo\\_Beranek\\_%281996%29](http://www.ieeeeghn.org/wiki/index.php/Oral-History:Leo_Beranek_%281996%29)

### Some Awards Earned by Leo Beranek

Gold Medal Acoustical Society of America  
Gold Medal Audio Engineering Society  
U.S. President's National Medal of Science  
Per Bruel Gold Medal of ASME  
Eta Kappa Nu Vladimir Karapetoff Award  
Institute of Acoustics Barnett Memorial Award

### Some Books by Leo Beranek

*Riding the Waves, A Life in Sound, Science, and Industry*  
*Concert Halls and Opera Houses, Music, Acoustics, and Architecture*  
*Noise and Vibration Control Engineering*  
*Noise and Vibration Control Acoustics*  
*Acoustic Measurements* 

## Europe

### Teaming up to Cut Noise Across Europe

The impacts of unwanted noise can range from mild disturbance to serious disease. At a recent ceremony in London, the European Environment Agency (EEA) and the Noise Abatement Society (NAS) announced a new European noise award, which will recognize innovative solutions to noise problems. The EEA has also published a set of guidelines on the health impacts of noise.

Noise pollution affects many Europeans. Approximately 56 million people are exposed to excessive noise from road traffic alone in Europe's largest cities. Exposure to unwanted noise can cause stress and interfere with basic activities such as sleep, rest and study. But prolonged exposure can also trigger illnesses as serious as hypertension and cardiovascular disease.

The Noise Abatement Society has, for the last 10 years, awarded 'Noise Oscars' to UK initiatives that help reduce excessive noise. They are now teaming up with the EEA to raise awareness and reward initiatives all over Europe. A new European noise award will be presented for the first time in November 2011. Any product, campaign, innovation or scheme offering a creative solution to a noise problem can be nominated for the award.

### Guidance on Health Impacts

The EEA Expert Panel on Noise has prepared a [Good Practice Guide on noise exposure and potential health effects](#), which can help national, regional and local authorities to prepare action plans by concisely explaining how to quantify health impacts. The EEA has recently updated and improved its [Noise Observation and Information Service for Europe](#) (NOISE) database. It now contains noise data for EEA member countries up to 30 June 2010.

The data can be viewed in a user-friendly interactive map tool or can be downloaded in a variety of formats. For the first time, the map viewer also displays local noise contour maps for selected areas. The Agency established the Expert Panel on Noise (EPoN) in January 2009 to facilitate the implementation and development of Europe's noise policy. The panel consists of national noise experts who advise the EEA and the European Commission on assessing and managing environmental noise.

## France

### Buy-Quiet Symposium to be held in Paris

**An International INCE Symposium titled "Inducing 'Buy-Quiet' Purchasing Attitudes Through Simplified Product Noise Ratings" will be held in Paris on July 5-6, 2011. The Symposium is being organized by INCE/Europe in cooperation with the Federal Institute for Occupational Safety and Health (BAuA) in Germany and the Centre d'Information et de Documentation sur le Bruit (CIDB) in France, and in partnership with the International Council of Academies of Engineering and Technological Sciences (CAETS).**

Over the last three decades much progress has been made by acousticians and noise control engineers to determine the noise emissions of products in a standardized manner. These include household appliances, machines and equipment, power tools, IT products etc. However, the noise labels or ratings currently used are neither understood by the public nor widely available to them. There is a global lack of understanding by manufacturers, suppliers, and potential users alike. The EU has developed an energy label for products that is simple, well understood, and widely available. It has proven to be an effective incentive to

encourage the consumer this information has induced major reductions in product energy consumption over the last 15 years. In a similar way, providing simple, understandable noise information to the general public should ultimately increase the availability of low noise products.

- The complexity of existing noise ratings along with their relative scarcity has not induced the user to develop a "buy quiet" attitude nor has it stimulated competition needed to produce quieter products and thus encourage low noise design. The reasons for this are varied:
- Complexity of the dB scale and frequency dependence,
- Confusion between sound power, sound pressure, and other metrics being used to characterize the noise,
- Statistical quantities and procedures to determine values to declare,
- Complexity of test codes including dependence of noise on operating and installation conditions,
- Information generally presented as informative rather than comparative, product families, and
- Limited information on product noise released by manufacturers and suppliers.

The objectives of the symposium are to stimulate noise ratings and to provide manufacturers with the information needed to design low noise products.

- Confirm the need for meaningful product noise ratings,
- Reiterate and list the benefits of providing information to consumers and other stakeholders,
- Discuss the lack of a "buy quiet" attitude for products and machines used in all activities (at home,

during leisure, at work, in industry,) and among all buyers (individual consumers, professional buyers, stakeholders, and advertising media),

- Discuss the pros and cons of existing noise ratings,
- Propose and discuss designs for comprehensive and uniform product noise ratings that will serve the needs of manufacturers and suppliers, and
- Propose and discuss design for simplified product noise rating schemes that will assist consumers in making purchasing decisions. For further information, go to <http://www.bruit.fr/buyquiet>.

## Italy

### Wind Turbine Noise 2011

This Fourth International Conference on Wind Turbine Noise is organized by INCE/Europe with the assistance of local organizers, CNR-Institute of Acoustics and Sensors-IDASC. Co-operating organizations are the Acoustical Society of Italy and the Italian Solar Energy Society. The conference venue is the CNR Auditorium (National Research Council of Italy). The conference will take place 2011, April 12 - 14.

Visit <http://www.windturbinenoise2011.org> for more information.

## United Kingdom

### 10th International Congress on Noise as a Public Health Problem

The 10th International Congress on Noise as a Public Health Problem will be held from July 24th to July 28th at Imperial College, London. The Congress is being organized by the UK's Institute of Acoustics on behalf of the International Commission on the Biological Effects of Noise (ICBEN). This Congress aims to present the current state of research on the biological effects of noise on health and is suitable for research scientists, policy makers and industrialists concerned with the effects of noise. For more information, go to [www.icben2011.org](http://www.icben2011.org). See also the invitation in the Editor's View Department in this issue.

### Noise and Environmental Health in the UK

A report, Noise and Environmental Health in the UK is now available. This report has been produced in response to increasing public concern about possible adverse effects of noise on health. It was prepared by an ad hoc group of experts at the request of the Department of Health and funded by the Department of Health and Department of Environment, Food and Rural Affairs. This is the most recent officially sponsored report dealing with the effects of environmental noise on health in the UK.

For more information, go to <http://www.hpa.org.uk/noise>

### London Conference: Managing Noise for Healthy Communities

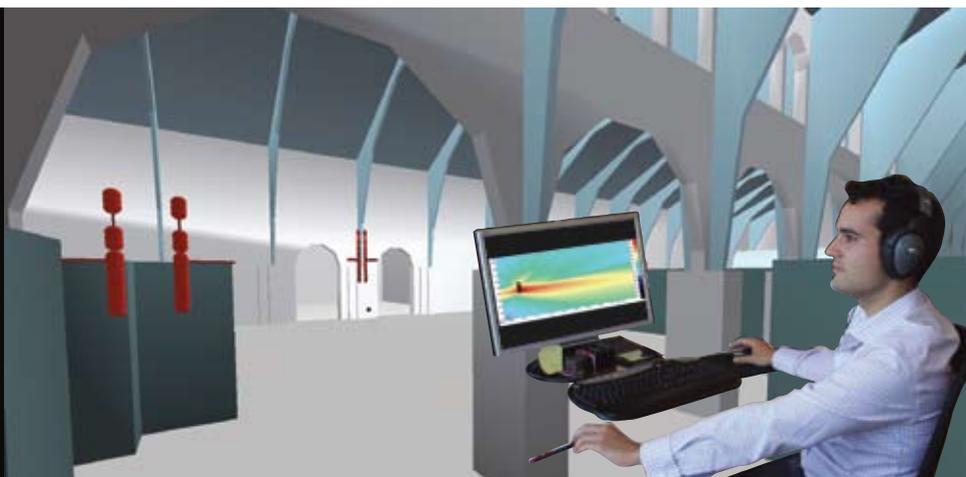
A one day conference examining opportunities in policy and practice for managing noise under the new localism and health agendas will be held in London on March 1. The legislative framework within which noise is managed is undergoing rapid and radical change. Environmental Protection UK's annual spring noise conference aims to look at noise management in the context of developing new policy. In particular, a new strategy for public health in England is out for consultation, which is set to give local government responsibility for health and well being; and the devolution of the planning system will allow citizens to decide how their neighborhoods look and sound—for example by proposing change of use of buildings for schools. A healthy noise environment is at the heart of healthy communities, and we want to give professionals in managing the local noise environment – and those impacted by noise – an opportunity to examine and discuss ways forward for ensuring modern noise management achieves healthy noise levels in communities. For more information, contact [events@environmental-protection.org.uk](mailto:events@environmental-protection.org.uk).



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## Australia

### ICA 2010: Summary of Activities

The International Congress on Acoustics, ICA 2010, held in Sydney on 23-27 August, was a major undertaking by the NSW Division on behalf of the AAS with over 1,000 local and international participants. The executive committee comprised of Marion Burgess as chair, David Anderson as secretary, Chris Schulten as treasurer and Norm Broner as the technical exhibition manager. Members of the local and international advisory committee provided advice and assistance with the technical program.

ICA 2010 was held at the Sydney Convention Centre. The technical program comprised of 10 parallel sessions over the 5 days commencing mid morning on Monday and closing mid afternoon on Friday. Over 750 papers were verbal presentations and 150 were poster presentations. There were 5 excellent plenary speakers; Graham Clark spoke on the Bionic Ear, Joe Wolfe on music, Nico F. Declercq, recipient of the 2007 ICA Early Career Award, Torsten Dau, recipient of 2010 ICA Early Career Award, and Nicholas Makris on Ocean Acoustic Remote Sensing. 8 distinguished speakers spoke on topics including sonochemistry,

language acquisition, airport noise, concert hall acoustics, noise and health, bubbles, energy analysis, and noise and marine animals. Two technical tours were organized: one to the Opera House and the other to the National Acoustics Laboratory.

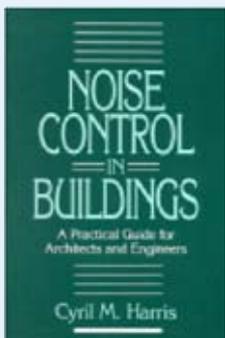
Three associated meetings were held corresponding to the International Symposium Musical Acoustics (ISMA) in Sydney and Katoomba, the International Symposium on Room Acoustics (ISRA) in Melbourne and the International Symposium on Sustainability in Acoustics (ISSA 2010) in New Zealand.



#### **Noise and Vibration Control**

Leo L. Beranek  
Price: \$55.00 US  
S/H: \$8.00 (US)  
\$13.00 (Foreign)  
ISBN: 0-9622072-0-9

This classic text on noise and vibration control is very widely used throughout the world. The book is divided into three parts: the basics of noise control (including measurement methods, acoustical materials, and sound propagation), application of these principles to reducing noise from sources, and criteria for noise control.



#### **Noise Control in Buildings**

Cyril M. Harris  
Price: \$45.00  
S/H: \$8.00 (US)  
\$15.00 (Foreign)  
ISBN: 0-9622072-1-7  
414 pp, softcover

*Noise Control in Buildings* features contributions by leading authorities on noise control, and contains a very complete set of data on the properties of acoustical materials and on the sound insulation of walls and floor/ceiling constructions. This wealth of technical information provides an invaluable resource for the professional as well as the non-professional.

## Canada

### Alberta Conference Covers Issues related to Energy Industry Noise Management

On May 24, 2011 the Alberta Acoustics and Noise Association will host workshops on the practical understanding and application of noise regulations in the Province of Alberta. These workshops begin a 4 day program including workshops, technical sessions and plenary speakers providing a forum for facility representatives to practiced acoustical consultants, to engage in the discussion on noise control and regulation.

The Spring Noise Conference is unique in its approach to present noise as a practical and applied topic for industry, acoustic specialists and practitioners alike and is the only conference in Canada to do so. Since its inception in 1993 the Spring Noise Conference has grown from a local event initiated by the ERCB to a global conference that attracts attendees and speakers from around the world. Conference participants share experiences and innovations in environmental and occupational noise, sound measurement, regulation and control.

This year's plenary speaker specialties include wind turbine noise, low frequency noise, drilling noise, environmental noise regulation, noise control technologies, acoustic ecology and industrial hygiene. Papers have been invited on the following topics:

- Industrial & Occupational: Facility Design, Workplace Considerations, Noise Exposure
- Heavy Industry: Oil & Gas (Conventional/Unconventional), Mining, Resource Development
- Power Generation (Conventional & Alternative)

- Transportation/Infrastructure/ Manufacturing
- Architectural/Community/Public Health/Education
- Ecology, Environment & Wildlife
- Noise Modeling & Measurement Techniques
- Noise Regulations, Standards & Policies
- Vibration & Low Frequency Noise

The 2011 Spring Noise Conference runs May 24th – 27th, 2011 at The Fairmont Banff Springs Hotel. Please visit [www.springnoiseconference.com](http://www.springnoiseconference.com).

## USA

### OSHA Seeks Comments on its Official Interpretation of Workplace Noise Exposure Controls

*(This announcement is being published for the record only. The proposal was withdrawn in mid-January, 2011. OSHA has, however, committed to further study on the industrial noise issue. More details will appear in the March issue of this magazine.—Ed.)*

The Occupational Safety and Health Administration (OSHA) proposed to issue an interpretation of the term “feasible administrative or engineering controls” as used in the general industry and construction occupational noise exposure standards and to amend its current enforcement policy to reflect the interpretation. For the purpose of enforcing compliance with these standards, the proposal states that “feasible” has its ordinary meaning of capable of being done.

OSHA's noise standards specify that feasible administrative or engineering controls must be used to reduce noise to acceptable levels and that personal

protective equipment, such as ear plugs and ear muffs, must be used only as supplements when administrative or engineering controls are not completely effective. The preference for engineering and administrative controls over personal protective equipment is consistent with the approach taken in all of OSHA's health standards and reflects the fact that such controls are generally more effective. Under the agency's current enforcement policy, however, the agency issues citations for failure to use engineering and administrative controls only when they cost less than a hearing conservation program or such equipment is ineffective. The notice appeared in the Federal Register for October 19, 2010, pages 64216-64221. The notice contains useful information related to noise and OSHA activities.

### Cavanaugh Tocci Consultants Present Acoustics Guidelines for Health Care Design

Cavanaugh Tocci Associates presented the new acoustic design guidelines for health care in a series of seminars organized by the American Society of Hospital Engineers (ASHE) in six U.S. cities last year (Jacksonville, New York, Chicago, Boston, Seattle, and Phoenix). Acoustics was a part of each two-day presentation that included multiple topics in health care design. Greg Tocci, Tim Foulkes, and Bill Cavanaugh made the acoustics presentations. Greg was an active participant in the FGI (Facility Guidelines Institute) working group on acoustic design standards for health care, and has a detailed understanding of the acoustic criteria as well as the reasoning behind them. All three CTA presenters have significant consulting experience in health care projects to inform the discussion and practical application of the new guidelines.

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## Distributed Multichannel Sound and Vibration Measurement System Provides Calibrated Accuracy and Flexibility

Scantek, Inc., is pleased to announce the availability of the newest product from Norsonic, the Nor850 Distributed Multichannel System

By connecting a number of individual measuring units through various communication channels, the user may create the optimal multichannel system for any task. Dedicated user-friendly application packages for various uses are available, and the system control is done with a PC running the latest state-of-the-art Windows7 platform.

The concept of individual units for each measuring channel offers a very high degree of operating flexibility. Use individual meters separately or combined with a multi-channel measuring system. Use a multichannel system one day – and many individual measuring units another day! No need to store away an expensive multichannel system for months until the next big project turns up!

Simply connect the measuring units for all the channels – and the software handles the rest. Within a couple of seconds the measuring channels appear automatically on the PC screen ready to be used!

One of the best features is that each individual unit meets ALL requirements for ANSI or IEC sound level meter specifications and can be homologated by an accredited verification laboratory which means that even the entire multichannel system may be homologated! The software holds control of next verification dates for all connected measuring channels and gives warning in time for the possible upcoming verification.

For a data sheet, go to:

<http://kunde.123onweb.no/norsonicnett/uploads/kundefiler/Downloads/PD%20850%20Ed1Rev0%20Eng%200910%20-%20tentative.pdf>

## Meggitt Sensing Systems Announces Release of the

2010 Measurement Product Resource

Meggitt Sensing Systems, a Meggitt group division, has announced the global release of its new "2010 Measurement Product Resource," a 63-page full-color short form catalog, highlighting select models of high-reliability sensing technologies for aerospace, automotive, industrial, R&D and test & measurement markets. Meggitt's Endeveco®, Sensorex, Vibro-Meter and Wilcoxon Research product lines are now offered under one umbrella.

The catalog is arranged into four key sections:

- **Sensors and transducers**, which highlights available piezoelectric, piezoresistive, variable capacitance, acoustic, dynamic and static pressure, displacement and position sensing technologies
- **Condition monitoring**, which includes portable vibration monitors and related instrumentation
- **Measurement systems**, which highlights electromagnetic and piezoelectric shakers, conditioners, rotating machinery vibration amplifiers and calibration systems
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Each section includes an introductory paragraph on the benefits and most common applications of individually featured sensing types, along with detailed technical product specifications presented in a series of well-organized comparative charts.

The 2010 Measurement Product Resource is available for [download](#) here, or may be ordered in printed copy by contacting Jessica Koble, Sales & Marketing Coordinator, at +1 949 493 8181, or email: [jessica.koble@meggitt.com](mailto:jessica.koble@meggitt.com).

For detailed technical specifications, drawings or additional information on Endevco® products or other brands available from Meggitt Sensing Systems, visit [meggittsensing.com](http://meggittsensing.com)

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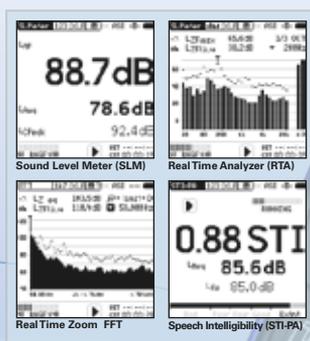
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*Below is a list of congresses and conferences sponsored by International INCE and INCE/USA. A list of all known conferences related to noise can be found by going to the International INCE page on the Internet, [www.i-ince.org](http://www.i-ince.org).*

### 2011 July 25-27

#### NOISE-CON 11

Portland, Oregon

Contact:

Institute of Noise Control Engineering-USA

Amy Herron, Conference Coordinator

INCE/USA Business Office

9100 Purdue Road, Suite 200

Indianapolis, IN 46268-3165

Telephone: +1 317 735 4063

E-mail: [ibo@inceusa.org](mailto:ibo@inceusa.org)

<http://www.inceusa.org/nc11>

### 2011 September 4-7

#### INTER-NOISE 11

Osaka, Japan

Contact: INCE/Japan

c/o Kobayasi Institute of Physical Research

3-20-41 Higashimotomachi, Kokubunji

Tokyo 185-0022

Facsimile: +81 42 327 3847

e-mail: [office@ince-j.or.jp](mailto:office@ince-j.or.jp)

home page: <http://www.internoise2011.com>

### 2012 August 19-22

#### INTER-NOISE 12

New York City, USA

Contact:

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## NOISE-CON 2011

Portland, Oregon  
July 25 – 27, 2011

The 27th annual conference of the Institute of Noise Control Engineering, NOISE-CON 2011, will run concurrently with the summer meeting of the Transportation Research Board, Committee on Transportation-Related Noise and Vibration (ADC40) on Monday through Wednesday (25-27 July, 2011). This conference is joining the overlapping transportation noise and vibration interest of the two organizations in Portland, Oregon to take advantage of the strong public interest and readily accessible public transportation project sites currently found in the Pacific Northwest. The technical program for the joint conference will provide an opportunity for public and private organizations to share technical information on noise and vibration topics associated with high speed rail, light rail systems, highway surface and tire noise and aircraft noise to name a few.

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## The INCE/USA Page at the Atlas Bookstore

[www.atlasbooks.com/marktplc/00726.htm](http://www.atlasbooks.com/marktplc/00726.htm)

### INTER-NOISE 06 Proceedings

This searchable CD-ROM contains the 662 papers presented at INTER-NOISE 06, the 2006 Congress and Exposition on Noise Control Engineering. This, the 35th in a series of international congresses on noise control engineering was held in Honolulu, Hawaii, USA on December 3-6, 2006. The theme of the congress was "Engineering a Quieter World."

The technical topics covered at INTER-NOISE 06 included:

- Aircraft and Airport Noise Control
- Community Noise
- Fan noise and aeroacoustics
- Highway, automobile and heavy vehicle noise
- Machinery noise
- Noise policy
- Product noise emissions
- Sound quality.

### The NOISE-CON 05 Proceedings Archive (1996-2005)

This searchable CD-ROM contains 198 papers presented at the joint NOISE-CON 05/ASA 150th meeting as well as 749 papers from the NOISE-CON conferences held in 1996, 1997, 1998, 2000, 2001, 2003, and 2004 as well as the papers from the Sound Quality Symposia held in 1998 and 2002. All papers are PDF files.

Several papers are taken from sessions organized by the Noise, Architectural Acoustics and Structural Acoustics Technical committees for this 150th ASA meeting. The three plenary lectures related to noise and its impact on the environment are included. Also included are papers in one or more organized sessions in the areas of aircraft noise, tire/pavement noise, and hospital noise.

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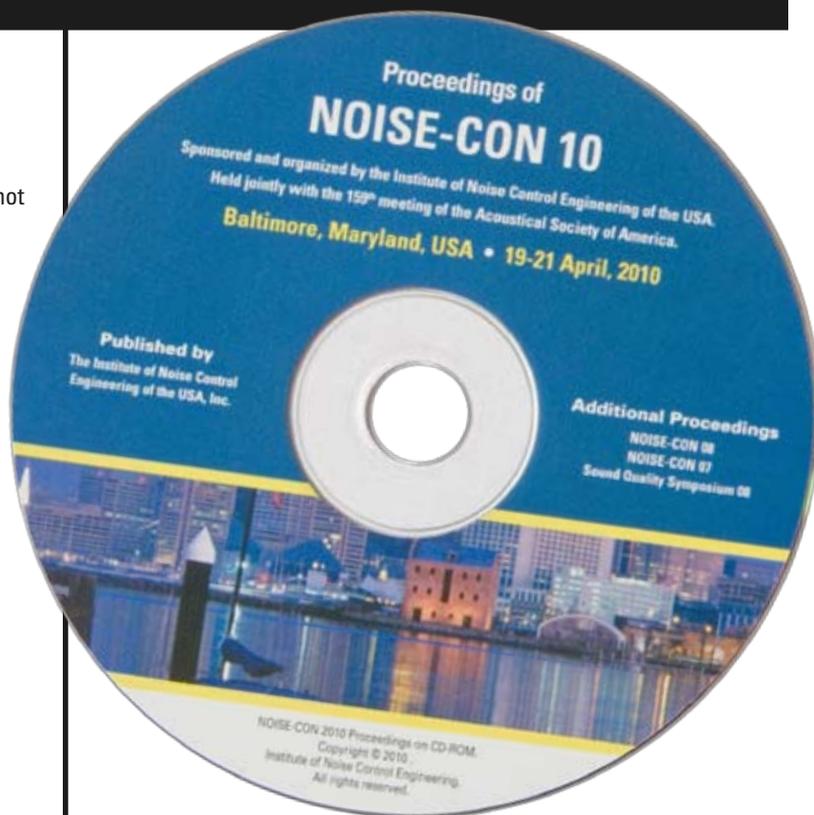
# NOISE-CON 10 CD-ROM

This searchable CD-ROM contains PDF files of the 198 papers presented at NOISE-CON 10, the 2010 National Conference on Noise Control Engineering. NOISE-CON 10 was held jointly with the Acoustical Society of America on 19-21 April 2010 in the Marriot Waterfront Hotel in Baltimore, Maryland. This CD does not contain the papers presented as ASA contributions.

In NOISE-CON 10, there were 24 technical sessions:

- Rocket Noise Environments
- 15 papers Noise Control in Complex and Urban Environments
- 11 papers Ventilation, Fan and Duct Noise Control
- 21 papers Military Noise Environments
- 16 papers Case History, Application and Integration of Architectural Acoustics in Building Modeling
- 14 papers Materials for Noise Control
- Manufacturer Presentations
- 10 papers Building Design and Construction for Effective Acoustic Performance
- 10 papers Experimental Techniques
- 10 papers Construction Noise
- 14 papers Information Technology Noise
- 10 papers Aircraft Interior Noise

This CD also contains Proceedings from NOISE-CON 08, NOISE-CON 07 and papers on sound quality presented as SQS08, the 2008 Sound Quality Symposium. This CD-ROM supplements the NOISE-CON 05 CD-ROM which contains all of the papers published in NOISE-CON Proceedings from 1996 through 2005. These papers are a valuable resource of information on noise control engineering that will be of interest to engineers in industry, acoustical consultants, researchers, government workers, and the academic community.



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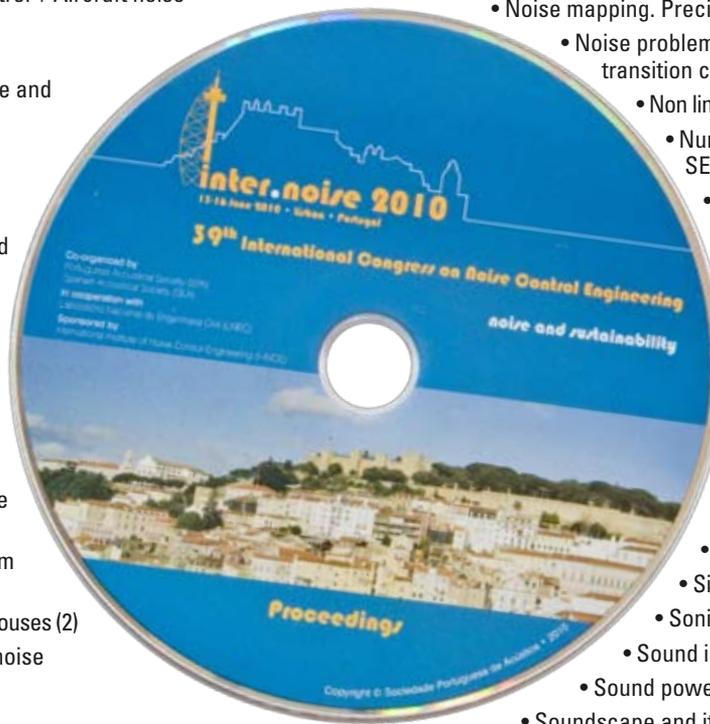
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- Action plans of urban areas: strategies and experiences (2)
- Active noise and vibration control (3)
- Aeroacoustics and fan noise
- Aircraft interior noise and related technology + Aeroacoustics and fan noise
- Aircraft noise modelling and control + Aircraft noise characterization
- Airport noise (2)
- Asphalt rubber pavements - noise and sustainability (2)
- Assessment and strategies for managing noise (2)
- Bioacoustics
- Building acoustics properties and comfort classes
- Characterization of structure-borne sound sources (2)
- Classroom acoustics
- Community noise around airports
- Community noise maps and action plans (2)
- Community response and exposure criteria in environmental situations
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