

Biogas, Birth Rate and the Beach.¹ By Martin J. Gehring²

After decades or even centuries of delayed development China's economy has been increasing rapidly for about 30 years now. From a trough in 1978 until 2006, the Gross Domestic Product (GDP) grew by an annual average of 9.67 %, according to the National Development and Reform Commission.³ 2006 was the fourth year in a row that China had a GDP growth rate of more than 10.0 %, amounting to 11.1 % in the first quarter of 2007.⁵ It is predicted to reach 10.9 % in 2007.⁶ China is booming, and sometimes it seems that it grows faster than one would wish considering economic, social and ecological criteria. For instance, experts from the China Nonferrous Metals Industry Association expect that the demand by the Chinese economy for nonferrous metals will exceed the supply by 2020 at the latest. The rapid economic development not only leads to great achievements but also negative and sometimes even catastrophic “collateral damage” to environment, health and social conditions.⁷ The human race forms part of the earth's biosphere, and our health depends on the quality of “the environment”. An environmentally friendly society is one of the four key characteristics of sustainability and a precondition of our long-term survival.⁸ The Chinese national government understands this and continually takes action to improve the situation and prevent further damage. For instance, more than 50 environmental laws and regulations have been published in China since 1 January 2006.⁹

Considering the dynamic development of Northeast China, its growing demand for energy and other natural resources, the rapid urbanisation and the continuously increasing number and severity of the unsolved or newly discovered environmental and human health problems, the Shenyang

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- 1 Revised version of an article published in the SYIAE university journal. I am grateful to Ms Barbara Fisher for reviewing and editing the manuscript. Designed by means of OpenOffice 2.2.1, <http://www.openoffice.org/>.
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 - 6 People's Daily Online, 19 April 2007, http://english.people.com.cn/200704/21/eng20070421_368515.html, accessed 12.05.2007
 - 7 See e.g. 1) World Watch Institute (2006): State of the World 2006. Special Focus: India and China. A Worldwatch Institute Report on Progress Toward a Sustainable Society. Washington, DC: WWI. ISBN 0-393-06158-2. 2) Information Office of the State Council of the People's Republic of China (2006): White Paper “Environmental Protection in China (1996-2005)”. June 2006, Beijing, URL: <http://www.china.org.cn/english/MATERIAL/170257.htm>, accessed 25.06.2007
 - 8 See e.g. 1) United Nations (1987): Report of the World Commission on Environment and Development. General Assembly Resolution 42/187, 11 December 1987. URL <http://www.un.org/documents/ga/res/42/ares42-187.htm>, last modified 16 December 1999 13:50:10, accessed 25.06.2007. 2) Anonym (2007): Sustainability. URL: http://en.wikipedia.org/wiki/Sustainability#_note-0, last modified 03:15, 24 June 2007, accessed 25.06.2007. 3) United Nations Environmental Programme (1992): Rio Declaration on Environment and Development. URL: <http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=78&ArticleID=1163>, accessed 25.06.2007
 - 9 See <http://www.law-lib.com/>. I am thankful for this information to Meng Fanbin, B.Sc., who gave the presentation on this topic.



Institute of Aeronautical Engineering (SYIAE) founded, in the year 2002, the Institute of Clean Energy and Environmental Engineering (ICEEE). Its work emphatically aims at the protection of human and environmental health and establishing a circular economy as part of a sustainable society. It achieves this through exhaustive energetic and material utilisation of secondary resources, so-called wastes, and the conservation and efficient utilisation of primary resources and energy. ICEEE is chaired by Prof. Dr Li Rundong. The Institute has established long-term cooperation with Liaoning Energy Institute (LEI), Shenyang City Environmental Protection Bureau (SYEPB) and several foreign research institutes. Jointly with LEI, ICEEE forms the “Liaoning Province Key Laboratory of Clean Energy” and the “Liaoning Province Clean Development Mechanism Project Management Office”.

ICEEE offers a B.Sc. degree in Environmental Engineering and studies in Environmental Engineering within a M.Sc. in Safety Engineering. The M.Sc. includes an innovative approach to ensuring students have a strong understanding of critical issues.

With regard to the protection of the environment and human health, it is most important to understand emerging observations and changes in the situation as soon as possible. Also, it must be acknowledged that all environmental media and spheres, i.e. water, soil, air and life, are interrelated. Environmental and human health protection require ecological understanding and an interdisciplinary as well as integrating approach in analysis and problem-solving strategies. In order to strengthen the students’ understanding of these issues, the M.Sc. study includes, from summer 2007, a focus on “Introduction to Environmental Health and Safety (EHS)” led by the German CIM Integrated Expert Dr Martin J. Gehring.

This so-called “integrated lecture” consists of brief discussions of relevant daily news, lectures by Dr Gehring introducing some 20 of the currently critical issues in EHS, more comprehensive presentations by the students and the respective papers of some 15 pages each on these 20 topics. All lectures, presentations, discussions and papers are in English, supported by a Chinese-English interpreter.

This term, the topics covered a broad spectrum from heavy metals (lead, mercury), air pollution with dust and asbestos - to organic substances such as pesticides, solvents and pharmaceuticals. The students were required to present a scientifically rigorous and comprehensive approach to the topic. It was the first time for all students participating in the lecture to give such a presentation.

And what do the students themselves say about this lecture and their achievements? Let three of them, who had the tasks of reporting on surfactants, siloxanes or two of the Platinum Group Elements (PGE), namely platinum itself and palladium, tell us:¹⁰

Ms Tian Xuehui writes in a statement: “In our lesson, we just introduce some chemical substances in general. If we have enough time, we can give some concrete examples. For example, we introduce some heavy metals’ characteristics in our lesson. We know in sludge there are high heavy metals contents, and sludge is also a serious pollution problem. We can introduce heavy metals in sludge, and then we know more about heavy metals and, at the same time, about sludge. In my opinion, that’s more interesting and has a big impact on us.” “In this lesson I gave a presentation about surfactants. Consumption of surfactants is very high, the world consumption of LAB (Linear alkyl benzene, one kind of surfactant) alone is $1.5-2.0 \times 10^6$ Mg annually. We use surfactants for instance in cosmetics, food and washing products. Surfactants are harmful to our skin, digestion system, liver and other organs of our body, can cause skin allergies and other diseases. So we should reduce the quantity of surfactant consumption and try to find substitutes.” “Giving a

¹⁰ Minor editing by MJG and Ms Barbara Fisher



presentation in English is really a big challenge for me and I spent most of my spare time preparing it. But it is a good chance. Through doing that I improved my English language skills in translating, reading and speaking. Also, it is a good practice to speak facing my classmates. That is a good experience before the final presentation of my Master's thesis. With this practice, I will not be so nervous then. We can learn more through preparing our presentation.”

Ms Zhang Hailian adds: “Because of the wide application of siloxanes in the manufacturing of personal hygiene, health care and industrial products we have to discuss its relevance to environmental health and safety. Siloxanes are saturated silicon–oxygen hydrides with unbranched or branched chains of alternating silicon and oxygen atoms (each silicon atom is separated from its nearest silicon neighbours by single oxygen atoms). There are many kinds of siloxanes; especially the siloxanes of smaller molecular weight, including “L2”, “L3”, “L5”, “D3”, “D4”, “D5” and “D6”, can easily evaporate and be found in landfill gas and sewage gas. The output of siloxanes in the world was 1,130,000 Mg in 2004 and more than 1,300,000 Mg in 2005. In China, it was 75,000 Mg in 2005. Results of a study according to the TSCA (USA Toxic Substances Control Act) indicate that there may be a cancer hazard associated with D5. D4 shows an estrogenic activity, which means it mimics female sexual hormones. Some researches also found that several short chain siloxanes (D4, D5 and HMDS) affect human health, with the liver (D4), kidney (HMDS) and lung (D5 and HMDS) being the target organs. But further data have to be obtained. Basically, siloxanes are less toxic but slowly degradable. Siloxanes in landfill gas can be transformed through combustion for energy production to sand which does no harm to the environment but damages the boiler engine if the burned landfill gas were rich in siloxanes. Recently researchers showed that siloxanes in landfill gas can be absorbed by some materials, so that we could use landfill gas safely. About the methods of this lecture, I think it is really a good idea to do so. Firstly, from lectures given by the teacher, we can learn what we do not know; secondly, from presentations by ourselves, we can improve our speaking skills and oral English. After presenting the EHS lectures, I think that both my oral English and learning skills are improved.”

And, finally, Ms Li Guirong states: “Over the past 30 years, vehicle emissions of unburned hydrocarbons, carbon monoxide and nitrogen oxides have been successfully treated by automotive catalytic converters containing platinum group elements (PGE). They comprise, amongst others, palladium (Pd), platinum (Pt) and rhodium (Rh). These metals are also used in jewelry, as catalysts in the chemical industry, in electronics, as dentistry alloys and in anti-tumor drugs in cancer therapy. At the same time, there are more and more emissions i.e. of Pt and Pd into the environment. The present literature survey shows that the concentration of these metals has increased significantly in the last decades in diverse environmental matrices like airborne particulate matter, soil, roadside dust and vegetation, rivers, and the coastal and marine environment. The toxicity is not yet very clear. The PGEs have long been thought not to be toxic but the final chemical forms of them can have detrimental effects on living organisms. PGE concentrations in the environment are low and might not present a direct human health risk. But the occurrence of bioavailable PGE species raises concern about potential ecological risks. So it is very important for us to investigate them, such as assess more reliably their transformation in nature.”

The last 2 hours of the lecture will be used to discuss the main findings of the term, draw conclusions and clearly enunciate opportunities and tasks e.g. in research, the economy, governance and consumer behaviour. In the next year, the topics of the presentations will be different, and additional current issues will be presented and discussed. Students suggested for instance, that noise and catastrophic events should be included in the spectrum. Nature conservation, e.g. the protection of endangered species, arsenic and radiation i.e. from mobile phones are further candidates on the list.



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Zitierweise

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