Sino Italian Cooperation Program
Environmental Training Community

中-意合作计划
环境培训园地

newsletter
工作通讯

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for the Environment and Territory

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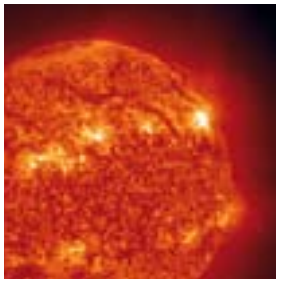



This Newsletter is specially dedicated to all those who have been engaged in the Advanced Training Program so far and to those who will join the Program in the future. After two years of successful experience and with more than 1000 trainees involved, our hope is to create a virtual *Environmental Training Community*, in order to consolidate the network of the different actors – participants, professors, lecturers, government officials, experts and entrepreneurs – that make up this challenging project.
This Newsletter is edited in such a way as to keep the Chinese trainees informed with the proceedings of the Training Program as well as of the wider Sino-Italian Cooperation Program supported by the Italian Ministry for the Environment and Territory; to keep them updated on the technical and management issues already discussed in the different training sections; and to disseminate the news in these fields.
A **News & Events** section has been created precisely to announce the latest environmental directives, policies, technologies and most significant events, going on in Europe and Italy.
The **VIU Training Program** section offers quarterly reports on the most recently Trainings arranged in Italy and in China, providing an overview of the main topics covered as well as the case studies discussed and the site visits arranged during the different training sessions.
As the issues covered in the Trainings are so numerous and diverse, each Newsletter is devoted to a special **Focus**, in which some outstanding experts are invited to give their view on the selected issue. In this way, we hope the Focus will represent an opportunity for trainees to continue his/her education path, and a platform for nourishing further discussions and exchange.
This Newsletter's Focus is dedicated to Waste, one of the most urgent concerns in nowadays society.
The dissemination of the projects and programs that are being implemented in China – in the frame of IMET Sino-Italian Cooperation Program for Environmental Protection – is entrusted to the **Around Us** section.
To know the content of the next Newsletter, please check the **What's Next** section.
We warmly welcome any contribution, suggestions and ideas to feed our Community and make it become a dynamic and lively meeting place for all those involved in the environmental challenge.
Welcome on Board!

Sino – Italian Environmental Cooperation Program

Corrado Clini
Director General, Department for Environmental Research and Development,
Italian Ministry for the Environment and Territory

In year 2000, the Italian Ministry for Environment and Territory launched a cooperation program with the China State Environment Protection Administration (SEPA), the Chinese Academy of Social Sciences (CASS), the Ministry of Science and Technology (MOST), Beijing and Shanghai Municipalities.
The program aims at the realization of pilot projects and feasibility studies for natural resources protection and conservation, energy efficiency, renewable sources promotion, low emission transportation systems and technologies, sustainable agriculture and environmental training courses.
The cooperation program was included among the "Partnership initiatives" for sustainable development by the United Nations. In September 2002, the Italian Prime Minister Silvio Berlusconi, together with the Chinese and Italian Ministers, Mr. Xie Zhenhua and Mr. Altero Matteoli presented it during the Johannesburg World Summit.
The program takes its place among the United Nations International Conventions and protocols on climate changing, ozone layer protection, biodiversity protection, persistent organic chemicals elimination and the fight against desertification.
Between 2001 and 2005 the program started off and partly concluded 45 projects. All the projects are realized in cooperation with both Italian and Chinese scientific Institutes with the participation of Italian enterprises and technologies.
In order to fund the projects the Italian Ministry for the Environment and Territory established funding mechanisms and allocated financial resources on the base of agreements signed with International Financial Institution, with Chinese Authorities, Italian Universities and Institutes and with Italian enterprises.
The Italian Ministry for the Environment and territory co funded projects with 96 Million euro through direct contributions and Trust Funds instituted by World Bank and Multilateral Funds.
Chinese Institutions co fund the projects with 24 million Đ, the Italian enterprises supporting the cooperation program with 23 million Đ, the United Nations Foundation, the United Nations Agencies (UNEP, UNDP, UNIDO), Global Environment Facility, World Bank and the Multilateral Fund of the Montreal Protocol for the Ozone layer Protection with 19 million Đ.
The program, so far, include projects for 162 million Đ.
Starting from 2003, in the frame of the Sino-Italian Cooperation Program for Environmental Protection, the Italian Ministry for the Environment and Territory (IMET) has launched an Advanced Training Program on Environmental Management and Sustainable Development addressed to Chinese senior governmental officials, professors, researchers, managers and engineers.
The training program is part of a long run perspective where the Chinese decision makers' and experts' role is strategic, since it has to become an active and responsible part of the environmental protection development at both national and global dimension. The core aim of the Program is to foster and further stimulate concrete actions on sustainable development in the People's Republic of China.

EU Commission proposes clean air strategy to protect human health and the environment

The European Commission proposed an ambitious policy to reach further significant progresses in air quality across Europe. The Strategy on air pollution aims by 2020 at cutting the annual number of

premature deaths from air pollution-related diseases by almost 40%. It also aims to significantly decrease the area of forests and other ecosystems suffering damage from airborne pollutants; furthermore, the Strategy gives special attention to fine dust and ground-level ozone pollution since they pose the greatest danger to human health. Moreover, the Commission is proposing to start regulating fine airborne particulates, known as PM2. 5, which penetrate deep into human lungs and to streamline air quality legislation by merging existing legal instruments into a single Ambient Air Quality Directive.

Climate change: EU Commission proposes strategy to limit greenhouse gas emissions from air travel

The European Commission introduced a plan for reducing air travel's growing contribution to climate change. Airplanes are an important and increasing source of greenhouse gas emissions that are causing global warming. For example, a return flight for two from Central Europe to East Asia produces considerably more greenhouse gas carbon dioxide (CO_2) than the average new car in a whole year. The Commission declares that the most promising way to tackle aviation emissions is to bring aircraft operators into the EU's Greenhouse Gas Emissions Trading Scheme (ETS). The ETS sets an overall limit on greenhouse gas emissions, extending emissions trading to the aviation sector; this policy would create a permanent incentive for airlines to minimise their emissions.

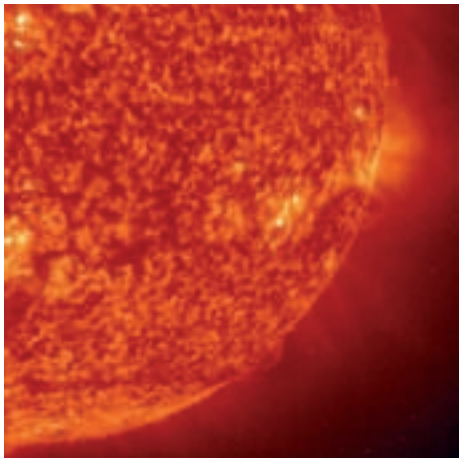
Integrated measures in Agriculture to reduce Ammonia emission

In order to better understand the impact of potential measures to reduce ammonia emissions from Agriculture, the European Commission has launched a service contract. The objective of the contract is to delineate the most suitable integrated and consistent actions to reduce various environmental impacts (notably water, air, climate change) from agriculture. Specifically, the objective is to develop and apply a methodology allowing the calculation and quantification of costs and effects of various policies and measures aiming at reducing the impact of agriculture on water, air pollution and climate change. The impacts and feasibility of the most promising measures need to be analysed in depth.

In Italy all new buildings will have a "green label"

The legislative decree n. 192/2005 adopting EU directive (2002/91/CE) on energetic production in town planning, which sets the criteria and methods with the intention of improving energetic provision and developing renewable resources, has been approved.
The decree sets the criterions of the scrupulous energy control that, starting

from October 2006, will be applied to all "new" constructions and the already built ones (which have a surface superior to 1000 m2), with the aim of providing them with the new green energy efficiency certificate (green label) in order to strengthen and develop the application of all renewable sources of energy in building construction.



Italy invests in "renewable solar energy"

Italy is going to invest in sun power for energy production; in fact, the Italian Council of Ministers is going to adopt a decree that will change the political approach to renewable energy; for the first time its aim will not "only" be boosting the installation of photovoltaic systems, but, since Italy has a solar energy consumption of only 20 MW, it also has the objective of reaching 300 MW by 2015.
Moreover, this new political project is particularly important because it has the intent of increasing the use of solar energy not only in the public sector but also in the private one, in particular by expanding the installation of photovoltaic systems in private block of flats.

Europe's premier wind energy event - Megaron, Athens, Greece - February 27th – March 2nd 2006

From February 27th to March 2nd 2005, Europe's premier wind energy event will take place in Megaron, Athens, Greece. The event aims at presenting the important role that renewable energy, and in particular wind energy research plays in Europe; moreover, it will focus on the manifold aspects of wind energy and it will also describe its multifaceted applications. Drawing on experience all over the world (senior politicians and representatives from international institutions and national governments will be invited to speak at this leading event), the conference program includes over 200 speakers in 40 separate business, techical, scientific and workshop sessions, where all the partecipants will have the opportunity to promote mutual understanding of their respective roles, to share best practices and to define strategies to improve outreach and dissemination of research results.

International Conference on Sustainable Development and Environmental Protection – Beijing, 24 - 25 October 2005

On October 24-25 2005, Venice International University and Tsinghua University held an International Conference on Sustainable Development and Environmental Protection in Beijing, in the frame of the exchange project between Tsinghua University and Venice

International University (Tsinghua is a VIU member since 2005). In addition to the fruitful discussions and exchanging of views among the professors, all parties confirmed the importance for future cooperation in the fields of sustainable development, environmental economics, environmental biology and biochemistry, global climate change and air pollution control, water management, waste water treatment and solid waste management.

Harvest season in Beijing, China

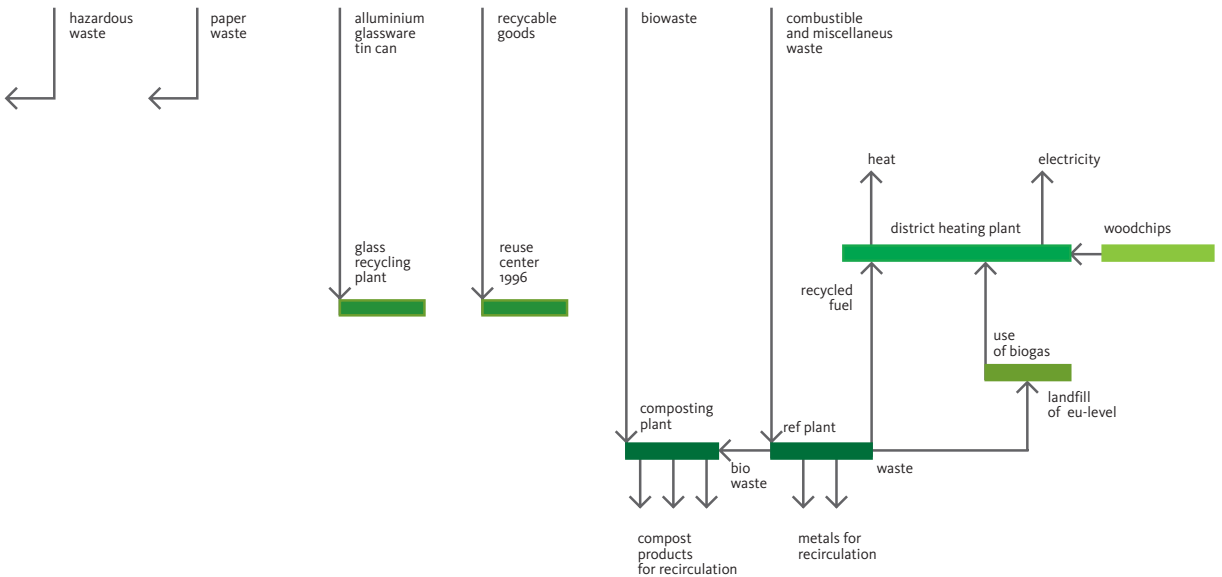
More than 15 Italian professors and experts headed by Prof. Ignazio Musu, Dean of Venice International University (VIU) visited China from October 24 to 31 2005. VIU delegation participated in two training courses focusing on Eco-Management Strategies and Policies and Clean Development Mechanisms, organized in cooperation with the Chinese partners, respectively, CASS and MOST. More than 200 Chinese officers, scholars and managers had the opportunity to benefit of the experience of some of the main Italian experts in the field of Climate Change and Wetlands Management.
VIU delegation concluded its China stay in Shanghai, with an official visit to the Universities of Tongji and Jiatong.

Integrated Waste Management Technology and Environmental Control Instruments for Sustainability in the waste emergency

Luciano Morselli
University of Bologna – Rimini Branch

Trends in Waste Generation and Waste Management in Europe and in Italy

Total waste quantities are continuously increasing in most European countries. The raise of municipal waste is considerable and continuous, while quantities of hazardous waste have decreased in many countries but increased in others.
It is estimated that more than 3000 million tons of total waste are generated in Europe every year.
In the period 1998 – 2001, about 210 million tons/year of household waste were generated in Western Europe (550 kg/capita). In the same period, candidate countries generated 60 million tons/year of household waste on average (358 kg/capita).
In Italy, municipal waste generation increased from 25. 800 Mt in 1995 to 30. 039 Mt in 2003.
The municipal waste management involves: Landfilling (51. 2%), Incineration (8. 8%), Composting (7. 6 %), RDF + Biostabilisation production (21. 0%), Other (11. 4%).
As for Industrial and Hazardous waste, in 2002 49. 3 Mt of Industrial Waste, 4. 99 Mt of Hazardous Waste and 37. 3 Mt of C&D were generated.
The most important documents showing European environmental policy guidelines for the next 10-15 years are: the Sixth environmental action programme of the European Community; the Green Paper on integrated product policy and the White Paper on strategy for a future chemistry.
The aims of the European environmental policy are to decouple the generation of waste from economic growth and achieve a significant overall reduction in the volumes of waste generated through improved waste prevention initiatives, better resource efficiency, and a shift to more sustainable consumption patterns.



Furthermore, for wastes that are still generated, to achieve a situation where:
_ the wastes are non-hazardous or at least present only very low risks to the environment and our health;
_ the majority of the wastes are either reintroduced into the economic cycle, especially by recycling, or are returned to the environment in a useful (e. g. composting) or harmless form;
_ the quantities of waste that still need to go to final disposal are reduced to an absolute minimum and are safely destroyed or disposed of;
_ waste is treated as closely as possible to where it is generated.

Environmental System/Economic System interaction and Sustainable development

The Brundtland report "Our common future" on sustainable development (1987), introduces the concept of "More with Less". In other words, the need to produce more value from goods and services with less raw material and energy consumption and less waste and emission products.
One way to achieve an equitable development for all human beings, including future generations, while preserving the integrity of the global environment, is to aim at a new growth paradigm and a higher quality of life through wealth creation and competitiveness on the basis of greener products.

Integrated Waste Management System (IWMS)

Waste managers need to create sustainable systems that are economically affordable, socially acceptable and environmentally effective. Integrated Waste Management (IWM) develops an overall approach to this, involves the use of a range of different treatment options and deals with the entire solid waste stream. IWMS combines waste streams, waste collection, treatment and disposal methods, various recycling technologies, energy recovery, correct disposal and control in the different environmental compartments with the objective of achieving environmental benefits, economic optimisation and societal acceptability. This will lead to a practical waste management system for any specific region.
IWMS must involve the commodity characteristics and chemical-physical properties of waste collected at the source. Furthermore, it is essential to determine the total waste flux and the flux of each commodity class in order to adopt the most appropriate technologies to valorize materials and energy. This approach allows the recovery of material (by recycling), of electric and thermal energy (by incineration), when the different possibilities of recovery have been adopted, finally waste safely disposed.
The EU defines the priorities in waste treatment by a specific hierarchy. It gives preference firstly to Waste Prevention (Minimization, Re-use), then to Recycling (Material Recycling and Biological Treatment - with energy recovery), then Thermal Treatment with energy recovery and finally to Landfill disposal.
The general features of IWMS are: global approach; use of differentiated treatment system; utilization of all material; environmental sustainability; economical sustainability; social acceptability.
The tools are: law and regulations; waste characterization procedure; LCA/LCI; environmental monitoring integrated system.

Case study: Waste Management in Rimini Province

An example of Integrated Waste Management System can be found in Rimini Province, in Emilia Romagna Region (Northern Italy). In recent years it underwent an important arrangement and some other modifications are also planned.
Till the end of 2002, MSW collection and disposal services, in Rimini Province, were managed by AMIA S.p.a. and GEAT S.p.a.
Then, a modification in the structure of these companies occurred, when a new holding, HERA S.p.a., was born. It aggregated 11 companies operating in Emilia-Romagna Region and became a multiservice society working in energy, water distribution and environmental fields. 137 Municipalities in Bologna, Ravenna, Rimini and Forlì-Cesena Provinces became stockholders.
Waste management is organized in this way:
_ for undifferentiated waste collection traditional bins are used (only in particular situations a door to door system);
_ differentiated collection uses both the containers along the streets (in particular for paper and glass), and ecological stations to which consumers could bring various types of waste (e. g., bulky wastes, batteries, exhausted oils...);
_ as for road sweeping, mechanical devices associated to manual systems, depending on the features of interested areas are used.
The humid organic fraction collection is performed by a "door to door" system, only for great users (fruit

and vegetable markets, catering, restaurants, etc.); in a similar way, the dry multi-material fraction is collected.
Different plants for MSW management, treatment and disposal are present. First of all, an incinerator is working, with three different lines of incineration, burning approximately 140,000 t/y. Now, the plant treats about 128,000 t of waste, yearly.
Municipal, special and hazardous wastes can be brought to the plant. The latter are sanitary waste of infective hazardousness and they are allowed till a tenth of the total amount of treated waste.
Another important plant for organic fraction management is the composting plant. It can treat a maximum of 35,000 t/y of waste (corresponding to about 115 t/d).
There are also a multi-material selection plant and plants of preliminary storage (transhipment stations).
Nowadays in the territory of the Province of Rimini, no operating landfill is present and wastes to be landfilled are transported to a plant in the Province of Forlì-Cesena. On average, 70,000 to 100,000 t/y of municipal waste coming from Rimini Province are conveyed to that plant.
The general aims fixed by the Waste Management Plan of Rimini Province are:
_ to promote the reduction of waste production and hazardousness;
_ to increase differentiated collection to reach at least the target of 35-40%;
_ to increase the amount of waste to be incinerated, with the construction of the fourth line of incineration in Coriano plant;
_ to increase the amount of waste to be composted, associated to the enhancement of organic fraction collection;
_ to reduce the amount of undifferentiated waste to be landfilled;
_ to realise a provincial self-sufficiency in municipal wastes, with the project of a new landfill.

Case study: Tools for evaluation of impact associated to MSW incineration: LCA and Integrated Environmental Monitoring System
L. Morselli, M. Bartoli, M. Bertacchini, A. Brighetti, J. Luzi, F. Passarini
Waste Management 25 (2005) 191-196

As seen before, Life Cycle Assessment is an important tool within IWMS. In this research a Life Cycle Assessment and an Integrated Environmental Monitoring System were applied together to a case study of a municipal solid waste (MSW) incinerator. The former is a proven methodology, but its application to waste management systems constitutes a relatively new field of application with a great development potential. The contribution of the incineration process to the different environmental impact categories was investigated, finding many avoided impacts, due to energy recovery.
The latter is an innovative approach that allows a remarkable understanding of impacts due to a contamination source; interesting correlations were found between heavy metals both in gas emissions and in natural matrices in the surroundings (in particular, depositions). The use of ordinary chemical monitoring instruments, together with biomonitoring methodologies gave interesting results in order to understand the interaction of the various pollutants with the biological matrices and the potentiality of their use in environmental studies.

Experiences and Perspectives for Waste Management in China

China is experiencing a great development in economy and this, as in the other countries in the world, results in a greater waste production and environmental impact. The need of performing a development model according to the bases of sustainability is becoming perceived (cleaner production, recycling-based economy, 'green economy' development, as reported by Y. Wang, of the Chinese Academy of Sciences at R'05, 7th World Congress, Beijing, September 25th -29th 2005) and the promotion of an Integrated Waste Management and the implementation of updated technologies, according to the international experiences in this field, could have a wide expansion. In particular, some researches exposed at the recent R'05 Congress point out an increasing attention in Municipal Solid Waste Management (M. Li & H. Xu, and X. Shu, China University of Mining and Technology), Life Cycle Design to balance environmental and economic impacts of processes (Y. Qian & Z. Yan, S. Zhang et al., C. Wang et al., H. Xu, J. Cai et al.), wastewater treatment (Y. Liu & M. Zhou, M. Li & L. Xiong) recycling processes (E. Huang & H. Zha, L. Hu, L. Zou, F. Zhu), abatement techniques (H. Lu & W. Wang), sustainable solutions for energy supply (G. Chen et al., K. Li, Y. Chen, J. Wu et al.) and many other green chemistry processes.

From Disposal to Recycling

Antonio Massarutto
Professor of Financial Science and Tributary Law, Economic Science Department, University of Udine

European waste management regime is nowadays based on the "ladder principle" that considers reuse and recycling as preferred options instead of indirect (energy) recovery, and holds final disposal into landfills just as a final option for those waste flows that cannot be used in any way.
This is quite a recent achievement. No more than 30 years ago, experts hardly believed that separate collection could have a significant role in waste management. Waste disposal was starting to become a problem in urbanized areas, due to the emerging lack of landfill capacity; yet recycling was considered as a residual option. The recommended solution for giving up with landfills was incineration or mechanic end-of-pipe recycling facilities for recovering compost and combustible materials. Separate collection potential was limited by the apparently limited capacity of secondary market to purchase waste materials.
In the 70s, waste management in Europe entered its second phase. Previously, the main issue was taking waste away from urban areas. Disposal was easy, since a lot of void space was available nearby. Waste management costs were 90% collection and handling costs. During the 70s, the equilibrium is broken: waste flows grew more rapidly than the available void space; increasing awareness of environmental and health consequences were made apparent. Policy response was mainly that of improving environmental quality standards of facilities and ensuring an adequate infrastructure through regional planning.
However, even this response demonstrated quickly to be inadequate. Social opposition to treatment facilities was making location choices more and more difficult, while waste quantity continued to grow faster and faster. Costs of disposal were rapidly multiplied by factor 10 to 30 due to the shortage of capacity.
The starting of a third phase in the history of waste management came straightforward once it became clear that end-of-pipe disposal could not be a solution in the long term. But it would never become a success, if the obstacles of inefficient downstream markets for recycled materials could be overcome. The chosen strategy - indeed a very successful one - has been that of forcing producers to take responsibility over the whole life-cycle of products, including their destiny after consumption. Waste management costs are now increasingly incorporated into product prices and industry finances separate collection and downstream recovery. As a result, recovery rates have been significantly improved and quantities of waste destined to final disposal stabilized or even decreased.
This story has probably some more general lessons to learn even for developing economies.
Waste management crisis could occur quite rapidly, once living standards and consumption patterns develop quickly. Many European countries were simply unprepared to face this crisis and for many years, they had to cope with the incapability of providing solutions. Sooner than expected, the same will occur to developing economies as well, unless they learn to anticipate this evolution through more far-reaching policies.
End-of-pipe disposal – managed by local authorities and paid by citizens – is unable to follow the rate of growth of waste quantity and polluting potential. Recycling has become instead a cornerstone of sustainable growth. Producers' responsibility has demonstrated to be a very powerful tool for promoting recycling. And most important, this evolution requires a fundamental change in people's behaviour, as education to separate collection should become a fundamental component of citizenship.

Landfill Gas (LFG) Purification and its Utilization Prospect

Cheng Jiajun,
Zhang Xiangfeng (National Key Joint Lab of Environmental Simulation and Pollution Control/College of Environmental Science, Beijing Normal University)

Foreword

In recent years, the secondary pollution and the resource utilization of landfill gas (LFG), produced from urban refuse sanitary landfill, is drawing an extensive attention. LFG mainly consists of CH_4 and CO_2 as well as some micro constituents. Its hazard is mainly the aggravation of greenhouse effect, explosion and fire, thus threatening the safety of landfill and the surrounding people's lives and properties. LFG has a complicated composition and it changes with the factors of refuse stabilization progress, compactness, refuse composition and characteristics, hydrogeology in landfill region and landfill method etc.

LFG also is a precious renewable resource and, in addition to power generation, domestic fuel and boiler fuel gas, it can be used for vehicles. In the 1970s, the United States started to investigate the use of LFG in vehicles. In the 1980s, Pueuthill Landfill in the United States successfully produced LFG into compressed natural gas and used it for vehicles. The most representative example among developing countries is Brazil. In 1985, Rio de Janeiro built a LFG Gas Station and put it into operation to supply gas for 253 vehicles in the city, with a monthly consumption of 972,500m3 LFG.

LFG contains 40-60% methane and the use of it as energy source has many advantages: to reduce global greenhouse gas effect; to alleviate air pollution; to decrease dependence on fossil fuel; a high octane number, high ignition point and relatively high compression ratio; a high heat value. With LFG containing 54%CH_4 and 45%CO_2 as calculation basis [3], it can be seen that the heat value of LFG is close to that of town gas, and the energy of a liter of LFG corresponds to 0. 24l of diesel oil and 0. 31l of gasoline. Higher heat value is the main reason for LFG to be used as vehicle fuel.

Present Situation of Research and Application of LFG Purification

The use of LFG is different; therefore purification treatment processes are slightly different as well. When used as high heat value fuel such as piping gas, it is necessary to remove H_2O, CO_2 and macromolecule hydrocarbon and deeply process minor constituents. When used as medium heat value fuel in boilers and

furnaces, LFG needs to be condensed and dewatered below 38u dew point after its particles are filtered. LFG is most widely used as electric power for engines and turbines, and, due to the simplicity and low price of its auxiliary equipment, it is often regarded as the priority in energy reutilization.
The existing LFG purification technology is developed from natural gas purification process and traditional chemical treatment process. Classified by reaction type and clarificant type, it includes solid physical absorption, liquid physical absorption, chemical absorption and other methods (condensation, membrane separation, bacteria oxidation and molecular sieve). The selection of purification methods and treatment processes needs to be determined according to the characteristics of landfill gas and its utilization method (i. e. landfill gas purification requirement).

Pre-treatment of Landfill Gas

Production temperature of landfill gas is 27~66 C, water vapor is almost saturated and pressure is slightly higher than the atmospheric pressure. When gas is drawn into the collection station, water vapor may be condensed in pipes and cause problems such as gas flow blockage, pipe corrosion and gas pressure fluctuation.
The removal of impurity particles and water is the first step of landfill gas utilization and the most frequently used absorbent solutions are polyethylene glycol, calcium chloride solution and alcohol compound; solid absorbents are activated alumina, silica gel and molecular sieve, etc; used physical units are sifting screen, prefilter, gas and liquid coalescer, condenser, gravity settler, cyclone separator and filter separator. Recently, membrane separation and low temperature phase change separation have made new progress in the research of particle and water removal.

Absorption

Absorption is the most commonly used purification technology and there are examples of application at the present. Tilburg Landfill in Holland uses water washing method to remove CO_2 and control operation condition to be below normal temperature and 1MPA. Wijster and Nuener Landfills use molecular sieve to remove CO_2 and H_2O. However, traditional technology also has many defects and problems of high cost, low efficiency and retreatment of waste acid and alkali liquor and other wastes often trouble the landfill gas plants. In recent years, people are continuously improving the singular process and developing combined process and new technology. For example, combining chemical oxidation absorption with absorption technology and utilizing absorbent to protect catalyst to increase treatment efficiency greatly, which is apparently advantageous to the removal of low concentration of H_2S. The typical combined process also has chemical oxidation scrubbing and catalyzed sorption etc.
Normal pressure polyamine method can effectively remove CO_2 and purified gas in complete conformity to the requirement of the National Standard GB1804722000 “Compressed natural gas for vehicles”. The solution used in polyamine method is basically composed of MDEA, and in order to accelerate absorption reaction speed, different organic amine activators are added to greatly accelerate CO_2 absorption reaction speed and enhance CO_2 absorption ability.

Sub-zero treatment

The denitrification technology being developed both at home and abroad consists of cryogenic cooling denitrification, membrane permeation, solution absorption and pressure swing adsorption etc, among which cryogenic cooling denitrification technology has many advantages such as large amount of treatment, high removal efficiency and mature and reliable technology and it should become the preferred landfill gas denitrification technology in our country. Cryogenic cooling denitrification technology consists of cool

throttling of the landfill gas at a certain pressure to make it partially or completely liquefied. It then uses the rectification method to remove nitrogen according to different relative volatility between nitrogen and methane.

Biofiltration

The most rapidly developing new technology is biofiltration. Experimental results from Australia and the United States [6] show that biofiltration technology has many advantages such as simple operation, wide application range, economy and non-production of secondary pollution and it is especially applicable to the treatment of low water solubility organic waste gases. It is regarded as the most promising purification technology.

Biofiltration method can remove two impurities of H_2S and CO_2. Its operating principle is to utilize the biogenic degradation of microorganisms in filtering materials. The core of the whole technology is the biological filter and the key is to control the characteristics of filtering materials and the activity of microorganisms. Peat, heath, sawdust and broken bark are usually chosen as filtering materials. To improve the purification effect, inert materials such as expanded clay, active carbon and polystyrene are added. Filtering material temperature, moisture content, resistance and gas residence time are the major factors that affect the growth of microorganisms. Compared with other technologies, filter cell volume is great if processing load is also great. For this reason, cascade filtration, also called tower filtration, is developed to significantly reduce filter cell volume.

Membrane separation

Membrane separation technology is characterized by high separation efficiency, low energy consumption, simple equipment and strong process versatility. In recent years, performance-excellent new membrane material types continuously emerge, leading to the extensive application of gas membrane separation technology to landfill gas purification. Membrane separation technology separates CH_4 from other impurity gases by utilizing the difference of various gas components in landfill gas in the penetration speed for osmotic membrane.

Absorption separation

Absorption separation is realized by the selective absorption of absorbent from gas components. The absorbents that can purify landfill gas are active carbon, silica gel and molecular sieve etc, of which active carbon is the most widely applied thanks to its larger surface area, good micropore structure, various absorption effects, higher absorption capacity and high surface reactivity. In recent years, pressure swing adsorption has been developed into a new type of high efficiency gas separation technology and its feature is to regenerate absorbent by changing the partial pressure of absorbed components while the rapid change of partial pressure is realized by changing the total system pressure or using purge gas.

Development prospect of LFG utilization in China

Fundamental research has started

LFG utilization in China started in the 1980s and, after 20 years of development, it has made full grown progress. At present, more than ten big and medium cities and dozens of colleges and universities and scientific research institutions are conducting research for LFG collection and utilization. At the end of the 1980s, Hangzhou Municipal Government cooperated with Canadian Environmental Technology Co. on a research on power generation by using gases from Hangzhou Tianziling Refuse Landfill and obtained success in 1996. In 1993, Suzhou Institute of Urban Construction & Environment Protection started to investigate the use of gases from Qizishan Landfill as domestic fuels. In 1997, sponsored by Global Environmental Facility, Anshan, Maanshan and Nanjing cities initiated the LFG utilization project and Nanjing Shuige Landfill Gas Power Generation Project was formally synchronized and generated power in 2003. In 2004, Guangzhou Xingfeng Refuse Landfill Gas Power Generation Project started trial operation. The existing researches and tests have accumulated precious experience to push LFG utilization to develop in depth. With the formal effectiveness of Kyoto Protocol and under the excitement of clean development mechanism, LFG energy utilization, as an important greenhouse gas emission reduction means, is in vigorous progress in China.

Support of state macropolicy

In 1984, the Ministry of Construction put forward the refuse treatment principle “In the near term, priority will be given to sanitary landfill and compost and incineration

technology can be developed if possible" according to our country's situation. In 1986, State Environmental Protection Commission proposed that "For urban refuses in China, reducing, beneficial and harmless treatment shall be the ultimate treatment and control objective". By the 1990s, China formulated the "Trans-century Green Project Planning" whose first phase was carried out from 1996 to 2000 and 69 urban domestic refuse disposal projects were planned to be built. In 1996, the "Outline to implement the Ninth Five Year Plan and 2000 perspective objective" defined that the future air pollution treatment and control objective are to ensure that air pollutants in 2000 will be kept at the level of 1995. In the same year, the Ministry of Agriculture issued the "Notice on strengthening energy-environmental engineering development in the Ninth Five Year Plan period". The Environmental Protection and Energy Department of Ministry of Agriculture is organizing and pushing this work [12]. Energy and environmental protection policies provide favorable support for the research and development of LFG energy utilization.

Broad market prospect

Hence, urban energy structure will change from coal to coal gas and natural gas and inorganic constituents of urban refuses will decrease while organic constituents will increase. China's economic pattern and refuse features decide that in a quite long period of time, urban refuses will be mainly based on centralized landfill. Calculated at 80%, if annual refuse production is 100,000,000t, then the actual methane production will be 340,000,000m3. If 30% is recovered, i. e. 100,000,000m3, it corresponds to 120,000,000m3 gasoline, thus market prospect is broad.

Existing major obstructions and recommended measures

1) Obstruction in management system. Government and enterprises are not separated and industrialization foundation has not formed yet.

The cost for urban domestic refuse disposal and treatment is relatively high. It mainly relies on government subsidy at present and lacks marketization operation mechanism. Industrialization operation is not standardized enough.

2) Fund obstruction

The recovery and utilization of landfill gases involves landfill gas collection, disposal and utilization methods. In order to ensure the landfill gas production quantity and quality, higher requirements are proposed for the landfill site construction and landfill operation. Therefore, its initial investment is high. Due to low economic development level, imbalance of economic development in various places and deficient funds, the landfill site with good gas production conditions can only implement the landfill gas utilization project by introducing funds (usually foreign funds).

3) Technology obstruction

Technically, since China started landfill gas utilization relatively late and lacks landfill gas utilization technology, the core equipment for landfill gas utilization such as generator needs to be imported from abroad. This will undoubtedly increase the cost for landfill gas utilization and is adverse to the promotion and popularization of landfill gas utilization. At the same time, China also needs technical personnel in landfill gas utilization and corresponding development ability.

For the obstructions existing in refuse landfill gas utilization, the follow countermeasures are recommended:

_ Formulate codes, standards and technical specifications for landfill gas utilization;

_ Accelerate domestic refuse management system reform and push industrialization;

_ Formulate economic encouragement policy to push refuse landfill gas utilization;

_ Improve public consciousness;

_ Strength technical training in landfill gas utilization.

kyoto 4/4

PCB from Electrical Generation and Dioxins from Medical Wastes: Challenges and Opportunities for China.

Carlo Lupi,
Senior Expert Italian Ministry for the Environment and Territory

PCB

Dangerous properties of PCBs.

Polychlorinated biphenyls (PCBs) belong to a class of organochlorine aromatic compounds long used for industrial purposes in many countries. The PCBs unique properties, like fire resistance, low electrical conductivity, high resistance to thermal breakdown, high chemical stability, have lead to their widespread use. Unfortunately, PCBs are also extremely toxic and persistent in the environment: PCBs belong to group 2A of probable carcinogens for man [IARC, 1987], can affect the human reproductive system and impose toxic impacts on an embryo. Moreover, dioxin-like PCBs exhibit toxicity similar to that of dioxins. Due to these dangerous features, starting from the 80s, the production and use of these compounds has been banned in most of the world. PCBs are now one of the 12 compound listed in the Stockholm Convention on Persistent Organic Pollutant.
Before being banned, PCB have been used in closed systems as dielectric fluids in capacitors, transformers, electric motors, in partially-closed systems as hydraulic fluids and heat transfer fluids, and in open systems as inks, flame retardants, adhesive, surface coatings, etc. PCB used in open and semi-closed equipment were mostly released in the environment; whereas PCB used in closed systems, like transformers, may represent a delayed risk in case of fire or leaking.

PCBs inventories in western countries.

Data from the western countries which already performed PCBs inventories show that the biggest amount of PCBs is still contained in on-line transformers; capacitors normally representing the second PCBs source. In USA (700000 tons of PCB produced), the 1988 inventory (1) listed an overall amount of 2. 590. 000 mineral oil transformers contaminated with more than 50 ppm of PCB; 74300 pure PCB transformers (those with dielectric oil entirely constituted by PCB) and near 1460000 large PCB capacitor. In France (2), the PCB containing transformers represent the greatest fraction of PCB contaminated devices (508076 transformers over a number of 519000 devices considered). Only 3537 capacitors were listed in the inventory. In Italy (26000 tons of PCB produced), the 2001 inventory (3) listed near 10000 pieces of equipment contaminated by PCB with a concentration greater than 50 mg/kg, of which only a minor fraction were capacitors.

PCBs inventory in China.

From the available data which need further investigation and verification, (4) it is known that China produced 1,000 tons of PCBs in oil paints and exterior dopes

between about 1965 and 1974, and about 9,000 tons of PCBs over the same period, mainly used in manufacturing capacitors for electricity supply; 400,000 PCB-containing capacitors were imported. In the 1980s, following the emergence of PCB health and environmental concerns, China removed from service about 1. 15 million PCB-containing capacitors and placed them in temporary storage facilities (underground concrete coffins or caves) that were designed to hold them for no more than 3 or 20 years (depending on the design), pending permanent disposal. Tracks of most of these disposal facilities have been lost; from several of these storage sites there were serious leakage of PCB affecting both the environment and the population health.
On the others side, in China no data are available yet concerning the amount and level of contamination of online PCB transformers. The first data will be available only after the first round of sampling and analysis for the Zhejiang and Liaoning provinces which is expected to be completed before September 2005 under the Sino-Italian PCB inventory project (5). Should the severity of the transformer contamination be the same as that of western countries, a very well designed plan at the national level for the decontamination or disposal of PCB transformers would be needed, in order to avoid the environmental risk due to the PCB without affecting at the same time the electricity production. In Europe, as PCB contaminated devices must be disposed or decontaminated before 2010, the European regulation required countries to prepare a national plan (schedule, technology selection and financial plan) for the disposal of the PCB contaminated equipment. Cost of that plan has been for instance estimated by France as high as 1. 2 billion euros (including the cost of missed electricity production), and by Italy in the order of 112 millions of euros (not including the cost for missed electricity production).

Challenges and opportunities for China.

Therefore, in the near future China has to face three very important task concerning the PCB issue: 1) inventory and localization of both disposal sites or PCB contaminated equipment 2) technology selection and implementation for the PCB disposal, and 3) the development of a national plan on PCB disposal, including the institutional strengthening and awareness raising.
Concerning the 1st point, a mix of conventional (probing, direct underground surveys) and advanced

(georadar, geoelectrical tomography, aerial mapping) technologies would be required for the localisation of buried PCB wastes, while the task to measure PCB in online transformers will require a strong collaboration between environmental authorities and electricity producers.
The selection of the technology for the disposal of PCB wastes would be a more complex task, involving the need to individuate technologies which may address the requirement of the Stockholm Convention, be cost effective, and at the same time can fit the technical capability of China. At least three class of disposal / decontamination technology must be carefully evaluate for this purpose: technologies for the decontamination of large amount of low PCB contaminated wastes (e. g. soil); technologies for the disposal of high PCB contaminated wastes or pure PCB oil, and technologies for the non destructive decontamination of low contaminated valuable electrical devices.
The 3rd point is probably the most important and difficult of the three, as it requires the capacity to individuate strategies for convincing PCB holders to declare PCB contaminated equipment, the development of a communication policy targeted to the specific interest of the different stakeholders, the review of existing regulations and their modification in order to fulfil the requirement of the Stockholm Convention, the

establishment of a system of control and procedures, the development of a sustainable national plan for the treatment of the different PCB contaminated equipment and wastes.
The individuation and demonstration of the best solution for all these three tasks is the objective of the "China PCBs management and disposal management project", a 31,8 million USD project with the duration of 4 year. The project is co-funded by the Global Environmental Facility and bilateral donors (China local and provincial government, Italy, Japan, USA,) and to be executed in Zhejiang as the demonstration province (6). This project, whose beginning is eagerly expected, will be the first PCB demonstration project in the world, and will serve also as an important example for the developing countries.

Medical waste management and dioxin generation.

The problem of medical wastes management in China.

Following a recent technical report and surveys (7), while medical wastes produced in large hospitals are managed well, the wastes produced in many small or medium-size hospitals, and in remote countryside clinics and private clinics are not disposed in the proper way; very often these wastes are mixed with the municipal wastes, or burnt in very rough or inadequate incinerators; sometimes medical wastes are directly burnt in the open air, not far from the hospital itself. According to a recent survey (8) the management of medical wastes at the hospital level is quite insufficient. Sometimes, the management of the wastes generated by the hospital is so poor that people can use wastes as an easy source for generating profits: some people scavenge for used medical equipment such as plastic syringes and blood transfusion bags and send them to the plastic waste market.

The answer from the central government: national plan.

The need to solve these problems became extremely urgent after the SARS (Severe Acute Respiratory Syndrome) epidemic in China.
The plan drawn up by the State Environmental Protection Administration (SEPA) (9), the national administration responsible for hazardous waste management, proposes the construction of 332 disposal facilities, of which 277 are small scale medical waste treatment plants, and 55 are multipurpose waste treatment facilities containing both medical and hazardous wastes treatment plants. Total planned medical waste treatment capacity is in the order of 2080 tons/day. Four large scale treatment plants with capacity greater than 30 tons/day are planned for the municipalities of Beijing (60 tons/day), Shanghai (50 tons/day), Chongqing (50 tons/day), and Tianjin (30 tons/day).
The planned average investment unit cost for the multipurpose plants ranges from less than 2000 to nearly 16000 RMB tons/year (with the unit cost inversely related to the plant building size), while the cost for the small medical waste plants ranges from 5700 to 6000 RMB/tons/year.
Total investment required by this national plan is in the order of 14. 2 billion yuan, of which nearly 11. 1 billion is dedicated to the 55 multipurpose facilities and 3. 12 billion to the 277 small sized medical plants.

The requirement of the Stockholm convention and its implication on the National plan.

Recently, a new event influenced greatly the discussion concerning medical and hazardous waste management in China: the ratification by China of the Stockholm Convention on Persistent Organic Pollutants on August 13th 2004.
The Article 5 of the Stockholm Convention establishes that "*each party is obliged to make efforts to promote and use best available techniques and best environmental practices for existing incinerators and phase in the use of best available techniques in any new incinerators no later than four years after the entry into force of the Convention for that Party.* "
As a Party, China will then be bound by the obligations of Article 5. It follows, therefore, that facilities constructed or modified in late 2005 and beyond will be required to use best available techniques and best environmental practices no later than August 12th 2008, and should be planned to employ such techniques and practices.
The National Plan has then a further and challenging goal to reach: the overall reduction of the PCDD/F emitted by the waste disposal sector. This aspect will require some improvement of the National Plan, for the following reasons:
1) The plan is based on the building of more than 332 disposal plants; however, of the 332 planned plants, 292

have a capacity equal to or less than 8 tons/day, and 245 have a capacity equal to or less than 5 tons/day. This could be not very efficient as it is known that the atmospheric emission of PCDD/F is better controlled in large scale plants, due to better design parameters, and better economics of the flue gas treatment and monitoring.
2) The existing regulation in China, (which several plants in the country are not yet able to fulfil (10) requires an emission limit for the PCDD/F less than 0. 5 TEQng/m3. Despite the BAT Guideline for the Stockholm Convention are still in a draft stage, it is however expected that Parties of the Stockholm convention will be required to reach emission level for PCDD/F not higher than the limit of the 01 TEQng/m3 limit widely adopted in western countries. Thus, an important debate is now occurring among the national environmental managers concerning how and when this limit has to be reached. However, no matter when the new limit will be reached, this will affect greatly the technical design of the plants required by the national plan, and the overall budget of the National Plan itself, as a lower limit for dioxin requires higher investment and operational costs.
3) The need for reducing dioxin emission makes clearer a fact that sometimes has not been sufficiently considered: the disposal of medical wastes cannot rely only on the incineration technology. There are at least other three technologies that can be used for disposal or pre-treatment of medical wastes without generating dioxin: autoclave with high pressure steam injection, microwave sterilisation, chemical sterilisation. These technologies are low cost, small scaled and can be very useful for solving the management of medical wastes in all these cases where the waste flow is small and discontinuous and where transportation of medical wastes is difficult or dangerous.
4) It is also absolutely clear that in order to reduce the PCDD/F emission, it is not enough to select proper and up to date disposal technologies, but it is also crucial to reduce waste production, to segregate wastes into different categories, to optimize the waste flows toward the centralized disposal facilities in order to allow their continuous working.
Thus actually, the goal of the reduction of PCDD/F emission can have a very beneficial effect as it requires the medical waste management to be strengthened and better designed, with a beneficial influence on environment and human health which could be much greater than the one achievable with the only PCDD/F reduction. The Stockholm Convention requires developing and transition-economy countries to be assisted from both the technological and economical point of view in reaching the scheduled environmental goals: thus, the reduction of PCDD/F emission could be the opportunity which could help China in the improvement and better implementation of its National Plan for the management of medical and hazardous wastes.

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Environmental Management and Sustainable Development Advanced Training Program

M. Lodovica Gullino,
AGROINNOVA, University of Torino

The Advanced Training Program on Environmental Management and Sustainable Development is part of the *Sino-Italian Cooperation Program for Environmental Protection*, a long-term cooperation project between the Italian Ministry for the Environment and Territory and some major Chinese administrations. The Training Program addresses senior government officials, professors and experts of the People's Republic of China, with the aim of updating and improving the environmental knowledge of the Chinese decision makers who have a strategic role in terms of designing the measures and regulations for the promotion of sustainable development in China. The program started in 2003 and was originally designed for 280 participants from the Chinese Ministry of Science and Technology and the Chinese Academy of Social Sciences. Given the success of the first year of activity, in 2004 the State Environmental Protection Administration of China and the Municipal Environmental Protection Bureaus' of Beijing and Shanghai joined the Program, thus raising to twenty the number of training sessions organised and to 450 the overall number of participants in the second year of activity. After an opening week in China, each training session in Italy foresees three main components: a one-day opening at the Italian Ministry for the Environment in Rome, a eight-days stay at Venice International University in Venice, and a closing day in Turin, at the Centre of competence for the Innovation in the agro-environmental sector-Agroinnova. Such structure allows the participants to confront themselves with the national strategy for sustainable development and with different local environmental management systems. As a matter of fact, when in Rome, participants are introduced to Italian and EU environmental policy systems through presentations given by experts of the Italian Ministry for the Environment; local environmental management is explored at Venice International University, where professors of Italian and international universities as well as experts and managers from local municipal agencies, environmental research centers and enterprises are invited to lecture. Being Agroinnova a specialised research center in the agro-environmental field, it is in Turin that, most often, the main issues linked with agriculture are presented. The teaching activity of the training program is organized in such a way as to present concrete case studies in addition to the theoretical issues that form the environmental framework of reference. Case studies are further complemented by a series of site visits all over Italy to plants and companies of foremost importance in terms of advanced technologies and approach to sustainable development. They offer the best occasion to Chinese participants to see and taste examples of Italian environmental management. Following the suggestions and requests of the Chinese partner institutions, a broad number of different environmental issues has been explored during these two years of Program and will be further developed in the third year of activity. I do hope that this newsletter will be a way of continuing the cooperation with the many high-level participants that took part in the Training Program, by fostering the dialogue that has started in Italy.

Building Capacity for Sustainable Development: the VIU contribution

Ignazio Musu,
Dean Venice International university

Venice International University considers Sustainable Development as one of the main fields of its programs both in advanced education and in research. It is evident to everybody that in our time the challenge of sustainable development cannot be fruitfully addressed unless one takes a world-wide approach. In particular co-operation between mature and developing countries is essential. China is a big and fast developing country; it has taken the issue of sustainable development very seriously. If China will be able to shape its economic growth model as a sustainable one, it will greatly contribute to the solution of global environmental problems and will ultimately benefit also Europe. On the other hand, what has been and is being done in Europe might be of some help to China in order to better achieve a sustainable development path. This is the profound meaning of these programs, and this is the reason why Venice International University is honoured by the choice of the Italian Ministry for the Environment and different distinguished Chinese institutions strongly committed to the target of sustainable development, in the organisation of the training programs about which this newsletter will periodically report. The programs are thriving, and we hope to use the former experience to tailor them better according to the requirements of the specific Chinese institution involved. Let me mention a very important fruit of the training program's first year: the decision of Tsinghua University to become a member of VIU; a number of PhD Tsinghua students and faculty are going to visit VIU in the near future, to take courses and continue their research in the Doctorate Program in Analysis and Governance of Sustainable Development and in Environmental Sciences. Last October a first joint workshop between Tsinghua University and VIU was organised on these issues in Beijing. In preparing the training programs at VIU, we have tried to respond to the requirements of the institutions sending participants, but we also tried to keep the complexity of the issue of sustainable development, which involves not only technical aspects, but also economic, legal and institutional ones. From this point of view the fact that an important part of the programs organised in Italy takes part in Venice has a particular meaning and relevance. Venice is a peculiar example of the complexity of the issue of sustainable development. This is why during the period in which participants are in Venice, they alternate classroom lectures held on the island of San Servolo with visits to some local realities which are expected to give them some flavour of this complex relation. My wish is that this unique opportunity to learn something about the most appropriate methods to promote sustainable development in the Venice lagoon environment, together with the opportunity of utilising the network of international Universities associated to VIU, will make the training programs even more productive and successful, thus providing an outstanding example of fruitful co-operation to promote a society in which increasing wealth is always coupled with better quality of life not only for the present, but for the future generations.

Advanced Training Program: an overview

The Advanced Training Program is organized and managed by Venice International University with the support of the Italian Ministry for the Environment and Territory and carried out in cooperation with the Center of competence for innovation in the agro-environmental sector (Agroinnova) of the University of Turin.
The Program offers advanced training courses on Environmental Management and Sustainable Development for senior government officials, professors, managers and experts from the State Environmental Protection Administration of China (SEPA), China's Ministry of Science and Technology (MOST), the Chinese Academy of Social Sciences (CASS), Beijing and Shanghai Municipal Governments (BMEPB and SEPB).
The Training Program is structured as a set of one-week or two-week sessions. With each training session concentrating on a specific field of study, the Training Program covers a broad and comprehensive spectrum of topics: Clean Development Mechanism, Water and Air Pollution, Waste and Water Management, Energy Efficiency and Renewable Energy, Urban Sustainable Development and Eco-Building, Rural Development and Resources. Lectures are held in English with consecutive translation into Chinese.
The Training Program started in the 2003-2004 academic year. The Chinese Ministry of Science and Technology (MOST) and the Chinese Academy of Social Sciences (CASS) have been the first Chinese institutions to participate in the Program with 120 and 160 trainees respectively. The Italian sessions of the Program took place entirely at Venice International University (VIU). The training activity officially opened in Beijing in October 2003 with an opening ceremony held by IMET's Director General Dr. Corrado Clini, MOST's General Secretary Mr. Shi Dinghua, CASS' Deputy Director General Prof. Li Ping, VIU's Dean Prof. Ignazio Musu, and the Director of the Training Program Prof. Maria Lodovica Gullino of the University of Turin.

Delegation	Training Session	General Schedule	Trainees
CASS - Beijing	Eco-management Strategies and Policies: Overview on European and Chinese Programs	Oct. 20th-24th 2003	160
MOST - Beijing	Global Environment and Strategies for Sustainable Development	Oct. 20th-24th 2003	30
CASS	Eco-Management Strategies and Policies	Nov. 17th -27th 2003	41
CASS	Eco-Management Strategies and Policies	Dec. 1st -11th 2003	43
MOST	National and Local Dimension of Sustainable Development	Jan. 8th -17th 2004	35

VIU training program

CASS	Eco-management Strategies and Policies	Feb. 9th -19th 2004	40
CASS	Eco-management Strategies and Policies	Feb. 23rd-Mar. 4th 2004	37
MOST - Beijing	Renewable Energy	Mar. 1st -5th 2004	42
MOST	Renewable Energy	Mar. 6th -19th 2004	42
MOST	Water	Mar. 22nd -Apr. 2nd 2004	39

2003-2004
Total training sessions in Italy: 7

In 2004-2005 academic year, the State Environmental Protection Administration of China (SEPA), Beijing and Shanghai Municipal Environment Protection Bureaus (BMEPB and SMEPB) joined the program. A total number of 18 training sessions have been organized between China and Italy; the Italian sessions of the Program developed so as to include scientific activities not only at Venice International University, but also at the Ministry for the Environment and Territory in Rome and at the University of Turin. A total number of 399 trainees attended the different training sessions. Among them, a delegation of 15 SEPA General Directors selected from SEPA departments and Environmental Protection Bureaus of various Chinese provinces attended a special training devoted to Sustainable Development and Environmental Management and entirely organized at VIU.

Delegation	**Training Session**	**General Schedule**	**Trainees**
SEPB - Study tour	Italian experience of environmental management	Oct. 2nd -10th 2004	5
MOST - Beijing	Capacity building on Clean Development Mechanism	Oct. 18th -22nd 2004	30
CASS - Beijing	Eco-Management Strategies and Policies	Oct. 18th -24th 2004	160
BMEPB	Air Quality and Traffic	Oct. 23rd -Nov. 6th 2004	21
SEPA	Environmental Management and Sustainable Development	Nov. 6th -19th 2004	17
CASS	Water pollution	Nov. 20th -Dec. 4th 2004	41
MOST	Capacity building on Clean Development Mechanism	Dec. 4th -18th 2004	27
BMEPB - Study tour	Water Pollution Control	Dec. 11th -19th 2004	8
CASS	Urban sustainable development and eco-building	Jan. 8th -22nd 2005	42
CASS	Energy Efficiency	Jan. 22nd -Feb. 5th 2005	42

VIU training program

MOST - Beijing	Capacity Building on Sustainable Development	Mar. 1st -4th 2005	30
MOST	Capacity Building on Sustainable Development	Mar. 5th -19th 2005	23
MOST	Development and application of Clean Renewable Energies	Apr. 2nd -16th 2005	28
CASS	Waste Management	May 7th -21st 2005	38
BMEPB	Solid Waste Management	May 28th -Jun. 11th 2005	21
MOST	Ecological Industrial Development	Jun. 11th -25th 2005	24
SEPB	Environmental Management and Sustainable Development: focus on Water	Jun. 25th -Jul. 6th 2005	22
SEPA	Environmental Management and Sustainable Development	Jul. 9th -23rd 2005	20
SEPB	Environmental Management and Sustainable Development: focus on Air	Sep. 10th -24th 2005	20

2004-2005
Total training sessions in Italy: 16
Total training sessions in China: 3
Trainees: 619
Trainees in Italy: 399

The same Chinese institutions will take part in the Training Program 2005-2006, which will maintain the same structure. CASS Trainings will explore the main issues concerned with Urban Sustainability, by focusing on Energy Efficiency, Eco-Building, Waste and Water. MOST Training will mainly concentrate on CDM, Renewable Energy, Capacity Building for Sustainable Development and Marine Environmental Protection. The Municipality of Beijing (BMEPB) will participate in 3 training sessions dealing with environmental management systems, environmental Education and Eco-System Conservation. The Municipality of Shanghai will participate in 2 training activities between June and September 2006. A total amount of 482 trainees are expected to join the 2005-2006 Training Program.

CASS Training on Eco-Management Strategies and Policies

Beijing, October 24th -29th 2005
160 trainees

The opening session of the 2005-2006 CASS Training Program gathered the 160 trainees who will take part in the 4 training sessions held in Italy between November 2005 and May 2006. The training was devoted to Eco-Management Strategies and Policies, with the aim of providing the trainees with a general overview on the basis principles of Sustainable Development. Such knowledge represents the common background concerning Environmental Management, necessary to develop the specific issues that the trainees will focus on during the Italian thematic sessions (Energy, Eco-Building, Waste and Water Management). Italian and Chinese speakers from various academies and research institutions conferred on topics such as economic sustainability, climate change and

VIU training program

international environmental agreements, site reclamation and water management. The discussion concerned also specific case studies: Beijing's Urban Waste and Waste Water Treatment Facilities were visited to contribute to an exchange of views on nowadays' main environmental issue; Venice's Lagoon was presented as a representative example of a complex environmental system.

MOST Capacity Building on Clean Development Mechanisms

Beijing, October 24th -28th 2005; Italy, October 29th -November 12th 2005
40 trainees

The Chinese Ministry of Science and Technology (MOST) confirmed that Climate Change is of foremost importance for today's China. For this reason, MOST and VIU agreed on devoting a whole training session to Clean Development Mechanism (CDM) and opening it to 40 trainees, who attended an introductory one-week session in Beijing and a two-weeks session in Italy. The analysis of social and economic impact of Climate Change along with the principles and prescriptions of the Kyoto Protocol have been debated in the Beijing session, which confronted Italian and Chinese lecturers on CDM opportunities. Thanks to the cooperation of the FEEM-Eni Foundation -a primary Italian institution for Energy and Climate Change- the Italian session provided experiences, projects and case studies on emission reductions and renewable sources of energy, focusing on their role in the implementation of Sustainable Development. The promotion of renewables has also been explored through site visits of technologically advanced companies, offering trainees the possibility of getting acquainted with the use of new energies and highlighting specific CDM opportunities, in order to strengthen the cooperation and exchange between China and Italy in this field. In particular, the Enel Power Station in Venice was visited to discuss the project of using Hydrogen, a by-product of industrial process developed in the petrochemical area, as a zero emission fuel for the power plant. Finally, a visit to the Venice Science and Technology Park-VEGA was organised to explore one of the Hydrogen Park's partners, a structure created in Porto Marghera on the initiative of the Industrial Union of Venice to develop and test the use of Hydrogen as a fuel in different sectors.

Beijing Municipality Training on Environmental Management Mechanism

Italy, November 12th -26th 2005
21 trainees

The first training organised in the academic year 2005-06 with the Municipality of Beijing concerned the main aspects of environmental management, confronting the European, the Italian and the Chinese experiences. The lecturers, from the academic world as well as from the public and private sectors, presented the environmental EU legislation and policies, focusing on the enforcement at national and local level. Economic approaches to environmental issues as well as funding sources were other important topics that trainees and lecturers exchanged on; meetings with the Regional and Municipal governments were organised to present practical examples on this topic. Case studies on environmental planning were discussed, presenting the Strategic Environmental Assessment as an important tool in this field.
Site visits were organised to allow the trainees to directly experience how specific environmental issues such as land reclamation and waste treatment are faced in Italy. The case of Porto Marghera was presented as an example of land reclamation that brought both environmental and financial benefits. Waste water treatment and electronic waste management plants were visited to provide some practical experiences on how waste is managed in Italy.

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Sino – Italian Environmental Cooperation Projects

The Italian Ministry for Environment and Territory launched international cooperation programs with several Chinese Ministries, Municipalities, Academies and Universities, including the State Environment Protection Administration (SEPA), the Chinese Academy of Social Sciences (CASS), the Ministry of Science and Technology (MOST), the Chinese Ministry of Water Resources, the State Forestry Administration, the National Development Reform Commission (NDRC), and both Beijing and Shanghai Municipalities.

Since year 2000, a great number of cooperation projects on different fields such as natural resources protection, environmental conservation, energy efficiency, renewable energy promotion, low emission transportation systems and technologies and sustainable agriculture, have been implemented or already completed. Many more are about to start in the near future.
Here follows a brief description of the most relevant projects, classified according to the main areas of intervention:

Intelligent Transport System & Air Pollution

Following the agreements signed with Beijing Municipality aiming at the realization of a sustainable transport system for the 2008 Olympic Games, in

year 2004, 300 buses equipped with Italian high efficiency and low emissions natural gas engines started running in Beijing.
In year 2005 an advanced laboratory for vehicle emissions control and an Intelligent Transport System for urban traffic regulation is going to be realized in Beijing using Italian technologies.

Within the agreement with the State Environmental Protection Administration, a consortium gathering CNR and three Italian enterprises has completed the testing of an innovative pilot system for monitoring and managing air quality in Suzhou.

On the basis of the agreements signed with the Municipality of Shanghai, a Project line, through the realization of an Intelligent Transport System, has been launched aiming at developing strategies for planning and management of urban traffic; at the same time the Parties decided to develop a project for the control of air pollutants from stationary and mobile sources in the city of Shanghai.

On November, 2003 the Italian Ministry for the Environment and Territory (IMET) and the China State Environmental Protection Administration (SEPA) stated their shared goal of developing a pilot project to establish an Air Quality Monitoring System (AQMS), put forward an optimum overall air pollution control scheme and conduct survey on the issue of greenhouse gas emission in the city of Lanzhou.

Water

The Italian Ministry for the Environment and Territory and the China Academy of Social Sciences agreed to assess the environmental impact of the Chinese South – North water diversion project. The assessment concerns one of the biggest hydraulic projects ever designed. The “SWIMER” project (Sustainable Water Integrated Management East Route of South North Diversion Project), was launched with the aim to stress environmental, climatic, economic and social impact of the East Route of the South-North Diversion Project.

Following the agreements signed with Beijing Municipality, in order to preserve the Beihai Lake, located in the central urban area of Beijing and which is of great

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cultural and landscape importance, the Italian Ministry for the Environment and Territory launched a project aimed at developing a pollution control program and a demonstrative system for the treatment of urban water. At the same the Italian Ministry for the Environment and Territory is working on a project which aims at developing a comprehensive plan for water pollution control and prevention in Miyun Reservoir and at suggesting general guidelines for the sustainable development of the watershed area.

Agriculture

The Italian Ministry for the Environment and Territory is working on two main projects in Inner Mongolia: the first one, on the basis of an agreement with the State Environmental Protection Administration, aims at intervening on the agricultural sector in Xinjiang and Inner Mongolia provinces, two among the lowest rural areas in China with serious desertification issues; the second one, together with the Beijing Environmental Protection Bureau, wants to realize an overall strategy for the control of dust and sandstorms that affect Beijing, which causes that are mostly originated in Inner Mongolia, reducing, in intensity and extension terms, sand/dust sources which causes desert storms reaching Beijing.

In the framework of the agreement signed with the Shanghai Municipality, the project "Organic farming systems and techniques for the promotion of "green agriculture in Dongtan Chongming Island", for the technological and know how transfer finalized at the realization of green agricultural production in Shanghai's inland, has been started through the reduction of the use of chemical compound and through the development of crops compatible with the soil characteristics.

Natural Resources

The first phase of a Joint Survey and Evaluation on Ecological Environment in selected areas of China has been completed. The Sino-Italian Eco-Survey project is a constructive and cost effective approach to study China's broad and complex territory, focusing mainly on Central China. Primarily depending on satellite imagery, the Eco-Survey project was designed to study land use, land cover and the ecological status in six large areas in China, totaling more than 200,000 km2 of surface area.

Chemicals

In the framework of the agreement between the Ministry for the Environment and Territory and the State Environmental Protection Administration, the Sino-Italian Program aims at phasing out Methyl Bromide compound, largely used in China for soil fumigation in the horticultural sector. The project has successfully demonstrated the efficacy and feasible introduction in the Chinese market of alternative technologies, such as grafting on resistant rootstocks, the combination of Metham Sodium and Virtually Impermeable plastic Films (VIF), and other technologies.

An Italian enterprise, in collaboration with the biggest Chinese company in the sector, will replace the use of CFC (ozone depleting substance banned by the Montreal Protocol) with cyclopentane (PU foaming agent) in the manufacturing process of domestic refrigerators. The project, co-funded by the Multilateral Fund for the protection of the Ozone layer and the Ministry for the Environment and Territory, strengthens the Italian role in these products' biggest and most dynamic global market.

In the framework of China "National Implementation Plan (NIP)" project under Stockholm Convention, the Italian Ministry for the Environment and Territory is financing three projects aiming at the formulation of the national program for the elimination of Persistent Organic Pollutants (POPs), including pesticides substitution in agriculture; PCBs substitution in industry and waste disposal; Dioxin and Furan non-intentional production.

Energy

The Italian Ministry for the Environment and Territory and the Chinese Ministry of Science and Technology signed several agreements in order to: implement the realization of a "Solar Village" pilot project for the electrification of rural areas in Inner Mongolia and Western Chinese provinces; develop a pilot project on the use of

biogas produced by a Chinese Municipality landfill; develop a Feasibility study on 5 different hydrogen research & development sectors, with the partecipation of the Lombardy Region and the Shanghai Municipality's Committee for Science and Technology; promote and increase the use of renewable energy in Tibet; carry out a study on photovoltaic hybrid energetic systems and fuel cells.

In framework of the China CDM study project financed by World Bank, GTZ and Switzerland, the Italian Ministry for the Environment and Territory, in cooperation with the Chinese Ministry for Science and Technology, started a project with the purpose of promoting CDM projects in China, and developing methodologies based on real CDM cases, with particular respect to CDM methodology in steel and eco-housing sectors.

A pilot project on "Urban Energy Plans (uenp) for sustainable development" to assist municipalities and Chinese enterprises in defining local energy plans for emissions and consumption reduction has been completed. This project is part of an agreement with the State Environmental Protection Administration. The outline plan for the dissemination of technologies and best practices for energy and heat re-utilization, as well as for the improvement of energy efficiency in the most significant energy consumption sectors, was assessed in pilot municipalities as Jinan, Suzhou and Taiyuan.
An application of the methodology developed was implemented in Shanghai where four factories have been intensively audited, reporting good potentials for the implementation of energy efficiency solutions and CDM projects.

In the renewable energy sector, the Italian Ministry for the Environment and Territory and the Chinese Ministry for Science and Technology, established a joint working team for the development of two feasibility studies which foresees the planning of two cogeneration plants trough biomass gasification and biomass complete combustion.

Environmental Building

On March 2005, the construction of the "Italian Pavilion" at Tsinghua University has been started. The Pavilion will be an "eco-intelligent" building to refer to as a model for the use and diffusion of high energy and environmental efficiency materials and technologies in the Chinese building industry.

The Italian Ministry for the Environment and Territory and the State Environment Protection Administration will cooperate for the construction of the China Convention Compliance Center. This building will both host the management headquarters of all the activities related to the Sino-Italian International Cooperation Program and the head office of the Program Management Office (PMO). The China Convention Compliance Center will be designed by a Sino-Italian team and it will be equipped with the best Italian technologies in the sector of environmental efficiency materials and technologies.

Integrated Approach for Sustainable Development

The Italian Ministry for the Environment and Territory, the Environmental Bureau of the Shanghai Municipality and the Chongming County Government will cooperate for the sustainable development of Chongming, the third biggest island of China. The project is devoted to the design of sustainable development of the East District of Chongming Island, integrating urban planning with eco-tourism, conservation of natural resources with sustainable agriculture, costal zone and water bodies management with sustainable fisheries, increasing energy demand with renewable energy use, increasing mobility demand with sustainable transport strategies and ITS technologies.





Training Sessions

From November 2005 to February 2006 four training sessions will be held in Italy within the VIU Advanced Training Program, and will involve 130 Chinese trainees totally.
42 trainees selected by the Chinese Academy of Social Sciences (CASS) will attend the *Energy Efficiency* training session, from November 26 to December 12, 2005.
Another delegation of 42 trainees from CASS will follow (December 9-23, 2005) to attend the *Sustainable Urban Development and Eco-building* advanced training.
A delegation of 21 trainees selected by the Environmental Protection Bureau of the Beijing Municipality will attend the first VIU training on *Environmental Education*, from January 7 to 21, 2006.
A training session devoted to general issues of *Sustainable Development and Environmental Management* will be offered to 25 Deputy Director Generals from the State Environmental Protection Administration of China and will be held from February 11 to 25, 2006.

Newsletter Focus

The next issue of the Environmental Training Community Newsletter will focus on Energy, including articles from Italian and Chinese experts on Energy Efficiency and Renewable Energy.