

The Spirit Of 66

We're not talking about England's World Cup triumph, or Belgium's famous music venue of the same name. But delegates from 66 nations attended the recent International Waste Management and Landfill Symposium in Sardinia, as **Howard Robinson, Keith Knox & Bob Gregory** report



The biennial Sardinia Symposia continue to thrive, and the 2015 meeting was again organised by the International Waste Working Group (IWWG) and attracted 732 delegates from 66 countries to the Forte Village resort in Sardinia this October.

Sardinia is an intensive week! After a Sunday of international training courses, eight parallel sessions then occupy five full days, from 9am until 7.40pm each day, and are necessary to allow more than 537 scientific papers to be incorporated into 128 technical sessions and specialised workshops. It is essential to be selective about what to attend!

Sardinia is unique in that almost all delegates stay within the beautiful surroundings of the Forte Village resort, where frequent coffee breaks, an extended lunch break and evening meals and entertainment provide a great environment for networking.

Opening lectures were given by

retiring German professors Werner Bidlingmaier and Bernd Bilitewski, who spoke with insight on changes in the waste industry and its future.

They jointly received the "A Life for Waste" award, for their fundamental contributions to the science and practices of wastes management. Professor Bidlingmaier reflected wisely that, although we are far better at recycling wastes, the amounts we produce continue to increase. We are failing to avoid waste production. He calculated that in Germany, landfilling since 1975 has wasted €42bn of energy, and €1.2bn worth of copper. Presently, addition of waste compost to land can be extremely valuable in adding phosphorus, nitrogen, potassium and lime, which otherwise must be added inorganically, costing us energy and resources.

He stated that a 75-year-old German will have turned 12m litres of drinking water into an equivalent volume of waste water; lived a lifestyle that has cost €3.5m; and used 3m kWh of energy.

Each Symposium has a "special guest country", which this year was China, with 45 delegates attending. As you might expect, with it being one of the country's most popular and successful sports, they won the Symposium's Ping Pong tournament!

More seriously, presentations by the Chinese participants gave delegates an insight into waste management issues in a country that has undergone huge economic growth and urbanisation in recent decades. We learned of both the huge logistical problems in bringing waste collection and disposal up to a modern standard for a high proportion of the population, and of the high quality of research and development work that is being undertaken in China, especially in some of its major universities.

Professor Pinjing He from Tongji University, Shanghai, gave a fascinating overview of current waste management in China. Of its 1.34bn population, 54 percent





More picturesque than most conference's coffee breaks (above) and venues (left); the Chinese delegation at this year's event

now live in urban areas. Municipal solid waste (MSW) generation is about 1kg per person per day, similar to many other industrialised countries, and amounting to 489m tonnes per year. This is despite a large degree of informal recovery of paper and plastic bottles prior to collection.

Only 240m tonnes per year of the generated MSW is currently collected (172m tonnes per year urban, 68m tonnes per year rural) with collection as low as four percent in some rural areas. Chinese MSW has a very high food content by Western standards (50-75 percent) and consequently a moisture content from 50-60 percent. Currently 68 percent is landfilled and 30 percent incinerated. There is a move to increase the use of incineration to 50 percent by 2020 – a recently built 3,000 tonne per day incinerator for Shanghai is soon to be doubled in size, for example.

Professor Tony Zhang (Zhejiang University, Hangzhou), describing the development of regulations and standards, noted that prior to

1988 there were only dumps. First generation sanitary landfills began only in the 1990s and second generation in the 2000s. The country is now part way through a five-year plan to close sub-standard landfills and dumps. The high moisture content of MSW creates special problems for both landfilling and incineration: in landfills, there is a high base flow from waste compression and the potential for high leachate levels and slope failures, as well as impedance of gas collection, such that current standards now require 3D drainage systems to ensure efficient collection of leachate.

In incineration, it is necessary to first compress the waste to remove some moisture before combustion, leading to a need for wastewater (leachate) treatment facilities at new incinerators.

Other papers by Chinese delegates presented research on such matters as leachate treatment, sewage sludge management, fluorine transformations during incineration of sewage sludge, the use of biochar to reduce ammonia

inhibition during the anaerobic digestion of food waste, dewatering of food waste by extrusion prior to incineration and the identification of bacterial species in landfills using 16sRNA fingerprinting.

The focus on China and the presence of their delegates greatly enhanced this year's symposium, both in the enlightening technical sessions and in the social events, including "Sardinia's Got Talent"! Many new friendships and contacts were made, and it is to be hoped that Chinese delegates will continue to participate in similar numbers at future Sardinia symposia.

Still Leading On Landfill

36 OUT of 112 English language sessions were on landfill, the largest single topic. Next was characterisation, recycling and waste minimisation, with 26 sessions; landfill gas recovery continues to hold a high interest internationally. For actively gassing landfills there were suggested improvements in gas well design



Professor Bidlingmaier gives one of the opening lectures; the Landfill Harmonic Orchestra entertain guests with "salvaged" instruments



Big crowds attended each of the hundreds of sessions

and gas recovery, treatment of landfill gas to increase methane content and the removal of hydrogen sulphide and carbon monoxide, again to improve usability of the gas.

For both operational and closed/late life landfills, methane surface emissions management techniques were examined in detail. Several UK reports showcased the recent work of Defra and the Environment Agency (EA) to understand landfill gas emissions better and, indeed, a paper by NPL and the EA on regulating landfills using measured methane emissions won the John Pacey prize for best landfill gas paper. Tracer techniques also described at the conference are also practicable, and possibly more affordable as a routine technique.

The EA's ACUMEN project showcased technologies for recovering low quality landfill gas for small scale power and heat generation, and also for low calorific value gas management. Some practitioners urged developers to consider the reuse of existing grid connections for longer-term power generation capability, such as solar PV, while using a low calorific value flare for declining gas management.

Others favoured accelerated landfill stabilisation using firstly, leachate recycling and secondly, in-situ aeration, followed by landfill mining, although the economics and practicalities remain challenging and could only be seen as part of wider environmental rehabilitation. It is notable that local legislation and renewable energy enabling mechanisms remain the two most significant drivers for landfill gas utilisation and management, in both developed and developing countries.

In addition to landfill gas

management papers, UK delegates presented several state-of-the-art case studies into leachate treatment and management. In contrast, of more than 50 presentations on incineration or ash management, only one had a UK author. Similarly, only one paper out of 37 on anaerobic digestion was written by a UK delegate.

The highlight of the social programme (apart from the famous floodlit international football tournament, with 80 players in eight teams), was a performance by the amazing "Landfill Harmonic Orchestra". The orchestra is a group of 35 young musicians who live in Paraguay, next to one of South America's largest landfills. They play music using instruments they have made entirely from items scavenged from the landfill site; string and wind instruments are made with oil drums, tin cans, forks, bottle caps, and whatever is available. But the recycled instruments serve another, more practical purpose: "For many children, it was impossible to give



The man himself: Howard Robinson

them a violin to take home because they had nowhere to keep it and their parents were afraid they would be robbed or the instrument would be sold to buy drugs", said Favio Chávez, an environmental engineer at the landfill, who began the orchestra, which in 2014 played as support band to Metallica on a world tour, and will shortly be the subject of a not-to-miss movie (see www.landfillharmonicmovie.com).

The conference closed with a roundtable discussion on waste management in Mediterranean countries, specifically looking at cities such as Naples, in refugee camps and on the islands. Professor Gidarakos, from Crete, focussed on current waste management problems in Greece, a country with 6,000 such islands and islets.

And as Professor Bidlingmaier reflected in his opening address, it remains clear that waste minimisation is not making significant progress, and probably will not, until a more circular economy develops. This, of course, requires a fundamental change in the approach to design, manufacture and supply of goods. Consequently it is unlikely to have a direct effect on waste management in the near future.

The success of the Sardinia Symposia is intimately tied in with the massive programme of scientific presentations, combined with the unique venue. At a time when technical information is available at the touch of a keyboard, when conferences remain expensive and time is ever more scarce, it is easy to question the value of a week at a specialised technical waste conference.

However, the fact that delegate numbers in Sardinia have remained stable for several years demonstrates the huge additional value of personal interaction between scientists and engineers who are the forefront of international waste management.

Where else can you have detailed discussions about sorting of organic fractions of MSW, while eating pizza by a beautiful Mediterranean beach? Or about waste pyrolysis in Beijing, while drinking Prosecco at 1am in a pine forest, beneath a star-filled sky? ■

All of the technical papers are listed at www.sardiniasymposium.it and are available in full on a searchable CD, which can be ordered at a price of €190 from IWWG by e-mailing papers@sardiniasymposium.it