

Be More Swiss!

ISWA National Committee member, Chartered Waste Manager and Associate Dean (Enterprise) at the University of Southampton's International Centre for Environmental Science, **Ian Williams** reports on what he learned during a study tour in Switzerland, supported by his receipt of CIWM's JC Dawes Award



The availability of an effective infrastructure and facilities that enable householders, industry and businesses to recover and/or recycle their waste is a crucial part of any modern resource management programme. There is a clear need for new and existing schemes to learn from previous studies and to be carefully matched to the needs of society. There is also widespread acknowledgement that countries such as Switzerland, Germany and Denmark have led the resource revolution, with an emphasis on increased producer responsibility; design of products for recycling, repair, refurbishment and reuse (D4R); sustainable (or green) procurement; waste minimisation; recovery and recycling.

Whilst the UK has made significant progress in these regards in the last 20 years, the lack of an overarching national strategy for waste management infrastructure has now become a significant problem for both local authorities and the business community (producers and consumers). It is therefore vital that the UK learns rapidly from practices and facilities in countries such as Switzerland, so that it does not fall further behind in terms of benefitting from the resource revolution.

I was lucky enough to be supported by CIWM's JC Dawes Award to make visits to state-of-the-art reuse, recovery and recycling facilities and operations in Switzerland – especially in St Gallen and the region of Zurich.

Leading The Way

THE SWISS have led the way globally in terms of recycling and urban mining for many decades. The high standard of Swiss waste management is the product of strict environmental regulations,

persistent enforcement and the willingness of the population to pay for progressive and environmentally-sound waste management facilities and systems. For example, the Swiss approach to raw material management, "ordinance for the return, take-back and disposal of electrical and electronic equipment (ORDEE)", has been very effectively implemented in Switzerland.



Currently being revised, the future ORDEE will require recovery of scarce metals from technological equipment wherever possible. This requirement will apply to waste electrical and electronic equipment (WEEE) and also to electrical and electronic equipment (EEE) from buildings and vehicles, provided that this is possible with proportional effort.

The plan was that my visit would facilitate learning from Switzerland to be effectively absorbed and brought back to the UK for wider dissemination, and allow an opportunity for the development of future Swiss/UK research and academic activities. Alongside daily tweets that provided real-time updates during my visit (via @EnviroTaff) and the ongoing development of educational materials, widespread dissemination will also be achieved via articles in magazines and journals.

Day One

AFTER ARRIVING in St Gallen from Zurich via a very scenic train ride the previous day, I visited my main host, EMPA – the Swiss Federal Institute for Materials Science & Technology. EMPA has a long and distinguished history and focusses on applications-oriented materials research and development. It

also incorporates research laboratories in strategically important areas, such as nanotechnology, natural resources, the built environment and energy.

After a morning of introductions, discussions and putting the finishing touches to a joint EMPA/University of Southampton (my employer) research paper, I headed off in the afternoon with research student Sandra Mueller to Immark Technology AG to see its state-of-the-art facilities for recycling electronic scrap and small electrical household appliances.

The plant was impressive and the company records consistent, decent profits from its circular economy business. The recycling rates for its plants are >95 percent and it has exported its turn-key plants and technology all over the world, including to Spain, Germany, Ireland, France, Italy and China.

Inmark is forward-looking and innovative – for example, it has developed the world's first toner cartridge recycling plant, which safely separates the explosive toner powder from the rest of the product and turns it into a secondary raw material. The company clearly demonstrates that urban mining can be effective, efficient and commercially profitable, and can generate significant employment alongside the other obvious social and environmental benefits of its business.

Day Two

TUESDAY DAWNED bright and sunny. I decided to walk around St Gallen to try and see the waste management systems "on the street". The first thing that struck me was the extraordinarily clean, fresh spring air. I took in several great big lungfuls. It was like breathing pure nectar and simultaneously lifted the spirits and made me feel healthier.

The second thing that struck me was the cleanliness of the city. Apart from the occasional cigarette butt or scrap of paper, you could have eaten breakfast off the pavement, even outside schools, take-away restaurants, cafes and bars. Whilst there are litter bins at regular intervals in the city. Even in areas that are sparsely populated and with little footfall, they appeared to be almost redundant. Initially, the sight of road-sweeping machines cleansing non-existent dust from street gutters seemed odd but, of course, maintenance is usually better than repair, and prevention better than cure.

The contrast with most UK cities was stark. The Swiss take civic pride very seriously and there is perhaps a clear lesson about establishing pro-

environmental values and behaviour – if you don't make much of a mess, there is no need to spend time and money cleaning it up. In contrast, Keep Britain Tidy recently reported that the annual cost of cleaning litter from the UK's streets is set to pass the £1bn mark for the first time in 2017, with >250,000 pieces of litter being dropped every day (not including cigarette butts). Even whilst sitting in the sun in St Gallen, I hung my head in shame and embarrassment.

I found a civic-run recycling station situated in a busy, tourism-influenced area in the centre of the city close to several busy cafes. Shiny, silver, swing-bin-sized containers, clearly signposted with guidance in multiple languages, allowed the separate collection of brown, green and clear glass, aluminium cans and paper/card packaging into underground bunkers. There was no mess around the station with no broken glass or piles of plastic bags. The station could be used by local residents and by passing pedestrians alike.

In the UK, such similar recycling stations are often an eyesore and located on scrap land in dark and dismal out-of-the-way locations. The message in St Gallen seemed to be that recycling is a regular, everyday occurrence that forms part of a high quality lifestyle.

On the advice of a Swiss PhD student of mine, I visited Migros, Switzerland's most well-known supermarket. At the main entrances to the store, clearly signposted recycling stations for the collection of small consumer items such as batteries, CDs/DVDs, water filters, different types of plastic bottles and WEEE lamps were integrated conveniently and attractively into

the store. As I briefly stood (rather awkwardly) taking photographs, several people used the stations as they passed into the store to carry out their post-work shopping. There is no doubt that recycling behavior is fully integrated into the Swiss way of life.

Day Three

WEDNESDAY WAS a particularly important day in terms of learning about how the Swiss approach urban mining and the circular economy. EMPA had kindly agreed to a joint workshop on this subject with presentations by many world-leading Swiss experts. I will share the details of the workshop with CIWM readers in a more specific article on the subject in a future Journal.

Day Four

AFTER VISITING EMPA to bid farewell to my generous hosts, and put the final touches to our research paper, I said a sad farewell to St Gallen and headed to Zurich armed with a pile of research papers and reports to read. The Canton Zurich is the most populated (>1.4m inhabitants) and the most economically important state of the 26 in Switzerland. Its approach to waste and resource management is firmly based upon the principles of sustainable development and is guided by the federal government's resource policy and the "Swiss Guidelines for Waste Management". The Canton Zurich aims to morph traditional waste management into progressive resource management to the highest standards based upon four goals:

- protect and use resources



Left: Ian Williams and Sandra Mueller at Inmark Technology's facility. Above: the spotlessly clean recycling station in St Gallen. Right: a recycling station at the entrance to the Migros supermarket



- ecological and energy efficiency
- optimised disposal safety
- protection of the environment and population.

Zurich utilises an evidence-based approach, using data generated by its own scientists and engineers who work closely with federal and national governments to develop strategy, policy, infrastructure and services. The Swiss themselves are quite modest and even a bit dismissive of the quality of their own approach to resource management, but in reality it is light years ahead of the politically-dominated, rather evidence-free model that currently exists in England.

The result is that for over a decade, the Canton Zurich has evolved towards becoming an urban mine where valuable metals, construction materials and nutrients, such as phosphorus, are secured from municipal wastes alongside the recovery of energy from waste.



Day Five

I WAS very much looking forward to visiting Zurich's new mono-incinerator plant located in the centre of the city next to a major waste water treatment works and operated by ERZ, the Canton's disposal and recycling department. In Canton Zurich, 72 public sewage treatment plants clean 230m cubic metres of sewage and collectively produce 550,000 cubic metres of digested sludge, with six percent dry substance content. This new incineration plant was opened in July 2015 and currently produces ~15,000 tonnes per year of ash

containing phosphorous from the 100,000 tonnes per year of dehydrated sewage sludge generated by the Canton Zurich. Using fluidised-bed technology, the plant complies with the strictest environmental standards set by the EU.

The story of how this plant was realised is instructive. Public acceptance of the direct use of sewage sludge in agriculture fell continually in Switzerland until a direct ban was imposed in 2006. From this time, sewage sludge was designated as municipal waste and was disposed via municipal solid waste incinerators (65 percent), cement plants (10 percent and mono-incinerators (25 percent).

However, it was recognised that this approach would result in capacity bottlenecks in 2015. Consequently, in line with the Canton's progressive approach to resource management, a plan was developed to define a new sludge recycling strategy in order to optimise the recycling of phosphorous. This is because phosphorous is a vital nutrient for living organisms, cannot be substituted and is becoming increasingly expensive as a raw material.

There are no natural phosphorous deposits in Europe and hence securing it from anthropogenic sources, such as sewage sludge, is a desirable outcome. Swiss research suggested that the amount of phosphorous bound in sewage sludge (the end product of which is pictured opposite) annually is about the same as the quantity imported into the country via mineral fertiliser (~6,000 tonnes per year).

It took about eight years for Swiss authorities and researchers, working in tandem with politicians and with extraordinarily high levels of public support, to turn the concept into reality. This included an investigation into how a phosphorous product that could be directly integrated into the fertiliser production chain could be produced. In fact, careful scientific analysis suggested that the phosphorous could be used to produce phosphoric acid, rather than fertiliser.

This is because phosphoric acid is a very marketable product, has a very high added value and would not be subject to any uncertainty regarding revision of fertiliser regulation. The incinerator ash containing phosphorous is currently stored in a carefully-designed mono-landfill, which is

intended to become a phosphorous mine in due course.

The plant operates in the middle of the city, right next to desirable residential properties and alongside a major river. The local population were kept fully informed and involved in the planning and implementation process. There is no public opposition; in fact, quite the opposite. During my visit, I observed the plant to be quiet, clean and immaculately run, with no fuss, but great pride. I was absolutely knocked-out by how this imaginative piece of circular economy thinking was conceived, planned, developed and delivered by a country with a population and an economy a fraction of the size of the UK. And, by the way, all this was communicated to me in English, even though I was the visitor. I wasn't just impressed, I was blown away.

Conclusions

I SPENT the last day of my visit reading documents, walking around a rather wet and soggy Zurich and reflecting on what I had seen and learned. In terms of ambition, vision, strategy, political governance and statistical performance, Wales is the closest of all the UK nations to the Swiss model for resource management.

At the other end of the scale, England and Northern Ireland are a significant distance away from best practice in all areas, but especially in terms of political leadership and ambition. The difference between Switzerland's progressive, ambitious, joined-up, evidence-and consensus-based and partnership-driven approach to resource management and the vision-free, rather siloed processes that occur in England, is like the difference between the flaky chalk of Dover's cliffs and mature, distinctive, hard Swiss cheese. The evidence is as clear as an Alpine mountain stream – when it comes to resource management, we need to be more Swiss. ■

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