

## LIGHT POLLUTION - A PROBLEM OF INSPIRATION

Summer is here and many things make it special. Those who like outdoor activities, especially camping, they know exactly the feeling of appreciation for a silent night and enjoyment of the stars. Also, they get the desire of having that view every night after realizing how small we are. Unfortunately, with our current development and urbanization that experience is getting more difficult.

At the same time that the worldwide population grows, the size of cities increases also. We are fascinated by these cities that never sleep, but we forget that at nighttime, when there is no sun and we have no natural light, every light demand has to be covered by electricity that is usually expensive and has an impact the environment.

We desire to build a productive society, and we aspire for more efficiency with fewer resources, also in terms of time. Then, we extend our daily activities to night when our body is supposed to rest as the normal cycle of the nature. Therefore public lighting today is a basic need for our cities and is required for safety reasons. Additionally, commercial and industrial activities make more profit by extending the work time to 24 hours per day and 7 days a week, if the local legal framework allows that. Furthermore, our consumer behavior also supports this model. Advertisements, parties, concerts and sport events are made at the times that people are able to attend, it means after 6 pm when lighting is provided by electricity. It is completely normal, isn't it? I recognize that some activities or basic services must be active anytime such as hospitals, police, firefighters and also the transportation as train stations or airports, but I consider it as an excess to do shopping at any time, to go to supermarkets even in the middle of the night or to eat a big hamburger at 4 am after parties.

As a consequence to the increase of light demand in big cities, we are deteriorating the quality of our skies. This problem is called Light Pollution.

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## News and announcements



### FORMER WASTE STUDENT IOSIF MARIAKAKIS RECEIVES AWARD OF BOYSEN FOUNDATION

On October 14<sup>th</sup>, 2013 Dr. -Ing. Iosif Mariakakis has been awarded with the 5000€ grant from the Friedrich and Elisabeth Boysen Foundation for his dissertation "A two stage process for hydrogen and methane production by the fermentation of molasses". The Friedrich and Elisabeth Boysen Foundation supports science and research in the field of environmental engineering with a special focus on engineering solutions for the reduction of pollutants, noise and energy consumption. Through their sponsorship, the Foundation honors - together with the

University of Stuttgart - outstanding dissertations of young scientists. Dr. Mariakakis completed his dissertation while working as a research assistant at the Institute for Sanitary Engineering, Water Quality and Solid Waste Management at the University of Stuttgart (ISWA). With his outstanding work on two-stage concepts for biohydrogen and methane production, he managed to discuss a complex and - especially in the current debate on energy policy - highly topical issue comprehensively and purposefully. He drew the bow from highly detailed, fundamental studies, ranging from the identification of suitable reactor operating parameters to the energetic evaluation of concepts. The results of Dr. Mariakakis' dissertation are a valuable contribution to both the fundamental understanding of the metabolic processes in the biogenic hydrogen and methane production, and knowledge of the microorganisms involved, as well as the influence of operating parameters of bioreactors. The work, thus, lays the foundation for a future large-scale implementation of two-stage reactors for bio-hydrogen and methane production.

• Carsten MEYER  
lecturer of ISWA



## >>> LIGHT POLLUTION - A PROBLEM OF INSPIRATION

Experts say that Light Pollution is the alteration of natural light levels in the outdoor environment, by the reflection or diffusion of excessive light in the atmosphere. For this reason, various associations and universities develop campaigns and research for creating awareness about this non-conventional type of pollution.

Beside the destruction of romantic nights, the lack of the natural darkness has a real impact on activities that are strongly dependent on the quality of the sky. The most important one is astronomical observations. Light, that escapes towards the sky, is dispersed by molecules or dust in the path of the telescope's beam and, consequently, the telescopes are getting weaker. A rough estimation states that the capacity of astronomical equipment decreases by 5% when the luminosity of the sky increases by 20%. In other words, the astronomical observatories are able to see less stars and which has a detrimental impact on its studies.

In addition, it was also found that an excessive light in the environment influences the behavior of some ecological communities such as mating, migration and predation. Actually everyone has an experience in dealing with insects at night inside a lighted room if the window was left open. This excessive lighting exposes them to predators, reduces their time to find food or shelter, and also they have less time to reproduce.

Even for those who are sceptical to these facts or those with a more anthropocentric point of view, I could add that excessive lighting is also a waste of energy. Energy has a tangible value and price, so a change in our night behavior, in addition, can have economic benefits if we use more natural light from the sun, that I hope always will be free of charge. As you can see now, there are different motivations to work against the light pollution.

In order to fix this problem better we need to reconsider which part of the light is useful for us, and what measures we could take to manage this resource better. Think about the light as a composition of continuous spectrum of several color bands depending on its wavelength. As humans we are limited to see the entire spectrum, so we are able to identify just a restricted range located between 380 and 780 nanometers. Our sensitivity is lower at the extremes but higher in the center. In other words, outside this range every spectrum is completely wasted from our point of view. Nevertheless, other species have different spectrum perceptions, for example insects are able to view the spectrum from 300 to

600 nanometers. Then, light emissions in a lower range are not just waste, they are also harmful for another species.



Considering that one the most important sources of light pollution in a city is its luminaries, I will focus on these devices because there is a huge space of improvement there. The simplest already known measure is proper planning and installation of luminaries, and it is the most cost-effective one because it involves more thinking about the high investment costs. The idea is to check out the lighting demand more deeply and also to include better design of luminaries. Does the light go effectively to the ground or is it lost or emitted directly towards the sky? This loss can be improved easily by installing a suitable screening. Light that has better direction can significantly reduce the number of installed devices, and the overall energy consumption. A second measure is now to completely replace the technology that is used. Nowadays, there are different kinds of lamps in the market with different wavelength spectrum. Considering just this dimension, experts recommend sodium lamps that emit adequate wavelengths for the visible human range instead of mercury lamps. These lamps also save more energy. Another measure, in a long term scale, is to set up standards that indicate maximum levels of lighting, depending on their use. But, it will change also the kind of activities

allowed in the city. Concerts and sport activities could be restricted.

The optimistic part of this article is the fact that we are completely able to do measures against light pollution, as it is done in Chile. The northern part of Chile is one of the best regions in the world for astronomical observations due to the transparency and darkness of its night skies and the dry weather. There, the Atacama Desert is located, famous for being the driest desert on Earth. In this region, there are about 40% of the worldwide state of the art facilities for astronomical observations, and it is estimated that it will reach the 70% after the investment of 3 billion USD over the next 10 years. So we can make a quick "back-of-the-envelope" calculation and realize how important the full use of the telescope's capacity is.

The case of the city of La Serena is very interesting. There the replacements resulted in a reduction of 93% of energy lost emitted to the sky, also a reduction of 19% of energy consumption, a better luminescence and quality of sky for astronomy. Primarily it was possible after recognizing the problem, creating a dialogue among the community, investigators, industry and government, and then establishing a regulation in order to protect the darkness of the sky.

As in every environmental protection problem the decisions are taken in a political frame, so the society needs not only to be informed but also to contribute putting pressure over the media and calling for a transparency process.

Without a correct regulation, the environmental heritage of our skies would be lost when we only consider the economic benefits that we obtain from our planet. It is necessary to make efforts for creating awareness in the society about all the services that our environment has. As environmental engineers, we should learn to enjoy more our environment and then we will have much more sense in our work. As UNESCO said, *"the skies, which have been, and are, an inspiration to all humanity, are becoming obscured and even unknown to the younger generation."* It depends on us now how we, as a society, organize to continue enjoying that inexhaustible source of inspiration. If we have time to be outside and relax in the dark night this summer, enjoy your skies as it is your first time!

• Adolfo Alejandro URIBE POBLETE  
WASTE student generation 2013  
Photographs by Héctor González

Also: State of the Environment Report. MMA Chile 2012



## Studying WASTE

### MY MASTER THESIS IN BAYER CHEMPARK: PHOSPHATE RECYCLING FROM SEWAGE SLUDGE ASH

In our world today, there is a great need for a sustainable approach towards the use of materials in production processes. Two main reasons for this are the scarcity of resources and the environmental impacts associated with disposal. This concerns the reuse of phosphorus in chemical plants. Phosphorus sources around the world are limited. The European Union depends solely on the import of phosphorus for use in fertilizer production, food additives and other industrial processes. In addition to its scarcity, phosphorus is an essential nutrient in the lives of human, plants and animals without any effective substitute. With the majority of this consumption, a large amount of phosphorus eventually ends up in the waste water treatment plant. The phosphorus compounds in the effluent from waste water treatment plants are a major contributor to the eutrophication of rivers and lakes which results in depleted oxygen content in these natural water bodies and thus endangers the aquatic life. A possible solution to this problem would be to use the phosphorus enriched sewage sludge from the treatment plant directly on farm lands, however the sewage sludge contains a wide variety of organic compounds and heavy metals which can contaminate the ground and surface waters. Sewage sludge is therefore mostly



dried and thermally treated in an incineration process to eliminate the organics and produce the ash. This forms the basis of my general motivation for research in this field of environmental and process technology.

**Bayer's Special Interest:** An abundant amount of non-saleable hydrochloric acid and sewage sludge ash is available at the Chempark Leverkusen site. The acid is partially disposed of, and this adds to the high cost of waste water treatment while the sewage sludge ash is disposed at its landfill site. Therefore, Bayer Material Science & Chempark operator Currenta wishes to develop and utilize a concept to recover phosphate and maximize the use of these resources. My thesis included: series of sewage ash dissolution and phosphate precipitation experiments to determine the optimal acid concentration, pH, reaction temperature and time, product quality analyses and comparison with relevant German ordinances, material balances and preliminary cost benefit analysis. Through these tasks, I was able to produce a phosphate product which had good bioavailability and achieved all the heavy metal limits requirements of the German Fertilizer Ordinance. My passion for the envi-

ronment and its integration within process engineering was one of my main reasons for enrolling in this master's program in 2011 after the completion of my chemical engineering degree in Jamaica. The beauty of the WASTE program is that, in addition to studying with others who are passionate about the environment, it offers the opportunity to experience so many other cultures and also to share your own. At the end of my thesis presentation, myself and fellow friends of the WASTE program had authentic and delicious Jamaican food at a local restaurant in Stuttgart. It was a time of fun memories, laughter and for me a "WASTE" moment I will never forget.

• Don-Hugh GOODEN  
WASTE alumnus generation 2011



### ENVIRONMENTAL PROBLEMS IN ETHIOPIA

Many regions in Ethiopia are affected by deforestation and a high degree of desertification. Greenhouse effect, increase of atmospheric temperature, loss of biodiversity, air, water and soil pollution, soil degradation, reduction of surface water and fresh water problem, an increasing number of crop failures, wind and ice damage of crops and soil erosion. Over and above, emissions of pollutants from industries and road transportation, for example, in the metropolitan city - Addis Ababa, and in other cities such as Debrezeit, Nazareth and Dridawa (which are traversed by the main road that connects Ethiopia to the port of Djibouti), untreated industrial and municipal wastewater discharge to receiving waters and untreated MSW landfilling, in general significant climate change etc. are also major environmental problems of Ethiopia like in most African countries. Ethiopia is an ancient country practicing

crop cultivation for centuries. As a consequence of that pollution and fast population growth coupled with changing climate conditions over the past several decades, the unsustainable utilization of the ecological resources have drastically affected the socioeconomic infrastructure of the country. Therefore, it is worthwhile to consider the environmental challenges of Ethiopia in the rural and urban setting. In the rural setting, massive deforestation and revegetation takes place for the need of cultivable land to accommodate the increasing rural population. This has exposed the soil for wind and running water erosions thus depleting the soil nutrients. Timber, lumber and other forest products demands of the urban centers as firewood for cooking and heating in households and for construction purposes are also a major cause for deforestation in Ethiopia. Although the industrial sector is said to be at its infant stage in Ethi-

opia, the few that are in and around the urban centers especially Addis Ababa, the capital city, are releasing untreated effluent into streams and other receiving water bodies. For example, the textile, tannery and iron tools industries are polluting the Akaki River and ground water systems in southeast of Addis Ababa. Lack of sufficient monitoring system and strict regulation for the management of hazardous wastes and radioactive substances in addition to the lack of environmental awareness concerning the linkage between environment and development in general, weak participation of the people and community based organizations in environmental management activities are some of the environmental challenge's Ethiopia is facing nowadays.

• Emiru Moges GIDYELEW  
WASTE student generation 2013

Source: Case Study - Environmental Problems and Solutions in Ethiopia by Yared Beyene, Jimma University, Faculty of Law

## Recent events

### 41<sup>ST</sup> WIM - CHRISTMAS MARKET IN LUDWIGSBURG



This year the WASTE students of generations 2012 and 2013, together with Dr. Vogt, experienced an important part of the German Christmas culture: a Christmas market! On December 14<sup>th</sup> we visited the

Christmas market in Ludwigsburg, one of the most beautiful Christmas markets in Baden-Württemberg. Lights in form of angel wings guided us from the train station to the market place. The market place itself was decorated according to the angel motive with three huge angels made from Christmas light in the center. Our first stop was a Glühwein stand near the centre of the market, next to a nice spring. We clinked glasses with red and white Glühwein or alcohol free Kinderpunsch. Some of us kept the beautiful Christmas mugs as souvenirs. The Glühwein stand was located next to a stage where two musicians performed Christmas songs. They sang not only in German or English, but also in Italian and Portuguese.

Glühwein was not the only traditional Christmas specialty we have tasted. After that we split up in smaller groups and explored the market on our own. We tried the baked, sweet „Snowballs“, Schupfnudeln, Feuerzangenbowle - a drink that is set on fire - and many more. In addition to the culinary offers, a lot of nice presents and souvenirs could be bought at the Christmas market in Ludwigsburg too: Santa hats, Christmas tree decoration, hand-crafted things made of wood and stone, handmade soap, jewelry and a lot more.

All in all, it was a very cozy and nice evening at the Christmas market in Ludwigsburg. It gave us a very good impression of the German Christmas culture.

• Anna Meike LELICKENS  
WASTE student generation 2013

### 42<sup>ND</sup> WIM - END OF WINTER SEMESTER PARTY

*“All work and no play makes Jack a dull boy”*, so goes an adage in English.

The 1<sup>st</sup> of February 2014, marked yet another important day for students of the WASTE programme. The WASTE student community of Stuttgart University organized an end of semester party as a get-together for its students to interact and to have fun. The first semester is usually packed with high academic content but our WASTE course director Dr.-Ing. Ulrich Vogt taught that it is necessary to organize an end of semester party for students to ease stress.



The essence of the party was to bring the various WASTE generations together in order to try to release stress after the semester's activities. It was interesting to see many students from different WASTE generations coming together to grace the occasion. The presence of these generations added so much joy, fun and a sense

of belonging to a wonderful family such as WASTE. Students from other study programmes also graced the occasion, and that made the party more unique and entertaining.

The beautiful decorations at the party were just splendid and astonishing. The atmosphere was full of colours and lights which brightened up the happiness in us. Thumbs up to our special decoration team who spent their time to give us a beautiful party environment.

Music and dance were the “giants” of the day. Music came from different cultural backgrounds to add more taste to the occasion. It was awesome to have our dear course director Dr. Ulrich Vogt around, who gave massive dance-steps to songs coming from Asia, Latin America, Africa and Europe amongst others. His presence made the celebration a memorable one.

It is also worth noting that students who provided food and snacks did a great deal of work and it gave us the opportunity to taste dishes from different cultures. It was so much fun dancing to music and interacting with fellow students. I believe the occasion has really helped us to release stress after a long semester of work.



With this relaxation, I am sure we are ready and prepared to battle well with the final action of the semester, the exams!!!

Kudos to all who made occasion a memorable one! Let us keep the WASTE spirit alive through togetherness.

• Enoch Kwasi ADOTEY  
WASTE student generation 2013





## 44<sup>TH</sup> WIM - COLOMBIAN NIGHT



In order to enjoy a great evening with the WASTE generations and the Alumni who joined us, the WIM team chose to organize the 44th WIM – WASTE Intercultural Meeting with a Colombian night to know more about this country which is one of the 56 countries where the students from all the generations of our program come from.

On this occasion, the WIM meeting was not celebrated at night, as it is usually done, because many of the students were in the middle of the final exams, so it was decided to make it in the evening to have a different activity during the stress of the exams.

The Colombian students of many generations organized a wonderful evening that started with a simple question: What do you know about Colombia? It was easy

to figure out the big influence that the Colombian students have had with their colleagues because they know a lot about this country, from the exportation products to the most important singers and actors. In order to show more about the country and the people living in the different regions, Natalia Restrepo of the 2012 generation presented some videos and pictures of those regions, and the main cities where some of the students come from. The videos projected were part of an advertising campaign of the Colombian government to invite people to know the amazing landscapes, the nice people, the delicious food, the great parties and the variety of activities that someone can do in those regions with, the slogan “Colombia; the only risk is that you want to stay”.

After this wonderful presentation, I showed the typical attire of the Caribbean region and some of the dances and music in both Caribbean and Pacific regions (Cumbia and Mapale respectively), at the end everybody was learning how to dance it. With the help of the amazing Venezuelan dancer Victor Gomez (student from generation 2012), all the students had the opportunity to learn how to dance along some other famous music in Colombia and Latin America: Salsa. It was a great opportunity to learn this famous sensual dance

in simple steps and with a lot of fun

Last but not least, a buffet with a variety of typical food and snacks was offered to all the participants of this great evening. It was a big effort of

all the Colombian students from different generations who cooked delights to give a taste of Colombia to their colleagues.

At the end, it was a touching moment for the Colombian students because it was nice to see all the beautiful things that our country has and the nice point of view that many people have of the Colombians: kind, funny, happy people who will always try to make you at home.

• Natalia SUAREZ ARAQUE  
WASTE student generation 2013



## 45<sup>TH</sup> WIM - GREEK NIGHT

The WIM Night on the 9th of May 2014 was dedicated to Greece. Although in every generation some (or more) Greeks are present, it was the first time that two generations, Generation 2012 and Generation 2013, organized a Greek WIM night!

We, the Greek students of WASTE, tried to organize an evening with a diverse, characteristic and interesting schedule that would cover more or less the “basics” concerning our country. The 1.5 hour schedule included presentations, videos, games, traditional dances and of course the necessary culinary delicacies. We were really surprised by the number of people that finally showed up and by the interest they showed to learn things about Greece.

The event started around 6pm with some short introductory videos that stimulated the interest of the audience and pre-



sented some basic facts and figures of our country. Then, Chris took over with a presentation of some selected islands and beaches along the whole country. Apart from the beauty and calmness of the beaches he also gave some really interesting info about the history and some myths related to these islands. After that, it was Irini’s turn to

present some natural beauties of Greece; a presentation that included mountains and geological formations of breathless beauty, picturesque villages, lakes and mysterious caves that would satisfy all kinds of tourism. Sissy continued with a presentation about the Acropolis, giving the must-know facts and stressing the matter of the Parthenon Marbles and the claim of their return to Greece. For the end of the first part, Panos prepared a presentation concerning the words that are used in the English vocabulary and have a Greek root. He tried to demonstrate some patterns that will help the non-Greek speakers understand the meaning of some words with Greek origin.

The second part included traditional dances that are widely popular in our country. A first dance was performed by Anastasia, Irini and Sissy and then the celebration continued with many students joining and dancing together with us.

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## >>> 45<sup>TH</sup> WIM - GREEK NIGHT

After almost 1.5 hours the anticipation of trying traditional Greek food had literally hit red, and of course we couldn't let our guests wait more. A nice short video presented the philosophy that is hidden behind cooking and eating in Greece and



then it was time for the meal. The buffet consisted of homemade pies, Stifado (chicken stew with special spices), Briam (a mixture of cooked vegetables with lots of oil and feta cheese), the traditional Tzatziki and of course the Greek Salad. A shot of Ouzo was also awaiting everyone to accompany the food. After we were done with the food, a small fest started with traditional Greek music and dancing,



which led us to around 10pm when this unforgettable evening ended.

From the bottom of our hearts, we would like to thank you all for coming and for the interest you showed to learn about our country. You're all welcomed to visit us, especially now that summer is coming!

• Sissy BLIATSIU  
WASTE student generation 2013

• Panos OIKONOMOPOULOS  
WASTE student generation 2012

## >>> 46<sup>TH</sup> WIM - WASTE INTERGENERATIONAL MEETING



On the 23<sup>rd</sup> of May the 46th Waste Intergeneration Meeting took place in IFK. This event gave us hope for our future, support from all the Alumni we met and demonstrated that an international student in Germany can be well-appreciated. Six WASTE Alumni shared their journeys from the time they began to study the WASTE program until the present.

First was Ms. Sepideh Nemati Shahab, WASTE generation 2010 from Iran. She gave us a lot of hints regarding the best way to find a job in Germany. She said that it was hard to find a job if applying only in English. That's why she had to improve her German skills and after that she started applying in German language as well. In short time she got several phone interviews and after that, one-on-one interview invitations from different companies. Regarding our online profiles, we were advised to keep them up-to date. It is good if we show our resumes to different people (friends) and get feedbacks as well. During the interview time she told us to be careful about our body language and to ask for the next step of the selection procedure. She advised us to write an e-mail back to the interviewers and to remind them about us.

A next follow-up is also reasonable.

Ms. Kristy Peña Muñoz, WASTE generation 2006, gave us a lot of information regarding the Ph.D.-thesis, as a next step after completing our master program. The Ph.D. research topic has to be really carefully chosen, because we will be "married" with the thesis for a long time. During the process of working on the thesis we have to keep writing and summarizing all the information we gather. Planning and establishing a regular schedule are a part of the way to do really good job and to finish our Ph.D. fast and well as Ms. Muñoz did.

The third alumnus was Mr. Collins Ndibe, WASTE generation 2009, from Nigeria. He was the first one who mentioned how important is to find a HiWi job. This "small job" gives you a lot of opportunities: you get experience in the field you study, you get to know people, who shared the same interests like you and also you get paid. He also mentioned that we have to study and have good grades and continuously improve our German skills.

The next WASTE alumnus, Mr. Mazen Abou Elfadil (Generation 2010) from Syria, decided to continue his education, making a Ph.D. at Fraunhofer. He presented his view of life-study-balance, to choose two of the following three things: good grades, enough sleep or social life. I think he really described the master student's reality by this definition.

The fifth WASTE alumnus was Mr. Wehner, German student in generation 2010. He showed that good decisions can make your stu-

dies one unforgettable journey. He started as a HiWi during the second semester of his education, and did Student Research Project during the third semester. His words were, that the things and decisions he took, will maybe not be proper for us, therefore we have to choose our own paths.

Last but not least was Ms. Carolina Acuña Caro, WASTE generation 2004, from Chile. Now, Ms. Caro is working in the German company "Eisenmann". She mentioned, that internships are always recommended, because they are a great opportunity to internalize our knowledge.

After more than two hours of presentations, we had a great time, enjoying the grilled meats and the great prepared salads. Like every prospective WIM meeting, this one was again unforgettable and full of joy. The 46th WIM meeting gave all WASTE students a chance to meet together, to get to know each other and to convince us - the "juniors" - that choosing the WASTE program is worth a lot.

• Vesela VALEVA  
WASTE student generation 2013





## 47<sup>TH</sup> WIM - BIKE TOUR



Last week a bunch of us reunited in front of IFK to start the 36 km bike tour as planned. It was a nice, hot Sunday morning when we started our journey. We crossed Vaihingen town, following the bike path next to the road, and soon found the first slope of the trip which followed us until Oberaichen and Musberg. The first part of the trip we had cars right next to us for most of the time, and at some parts we even had to go on the same road. This totally changed as we left behind Musberg, and followed a dirt track

into the woods.

The weather and the different views during the trip were really good, so we made several stops to take photos of the landscape and to enjoy it.

The kilometers passed by really fast and we had already done approximately half of the trip when we crossed the river Aich. At this point, the sun was hitting really hard and most of us had run out of water, so we were looking for fountains everywhere. As we turned left and crossed the town of Waldenbuch, we finally found one but it ended up being non-drinkable... After the disappointment, we continued right away to the next stop, Ritter Sport, where we could finally drink something.

Then, we followed a flat road crossing a big plain with farm fields, without any trees to protect us from the sun.

This part was quite tough, but we took it easy and stopped a few times to rest, eat something and check the map. After getting some energy back, we continued to Stei-

nenbronn.

As we passed the town we entered again a forest path that was supposed to lead us directly to Rohr. But we got lost at some point and had to do some extra miles to find the right path again. After arriving at Rohr we continued till Vaihingen, we were already home!

The idea was to spend a Sunday with friends, enjoy the company, the weather and have fun. And we totally did it in this bike tour!!

• Narcis BORRAT COMPANY  
WASTE student generation 2013



## INTERNATIONAL FOOTBALL TOURNAMENT 2014

On Saturday, 28<sup>th</sup> of June 2014, our WASTE football teams participated in the annual football tournament organized between the different master programs in our Universität Stuttgart. For my team, we had this day marked in our calendars since that first game we played in very cold November weather last year. As I remember, it all started with football chats during class breaks between us, about teams, players, World Cup, and then, one day, the suggestion came, why don't we play?

The extreme cold, rain, snow, fog and short days could frighten anyone, but were no match for our desire to play football. At first, we didn't have the proper equipment, unusual for us, like gloves, or knitted hats, even the right football shoes. We were not used to play using numerous layers of clo-



thing for protection, at least not in those conditions. The public field we used was practically ours, because nobody used it in the winter, so we scheduled weekly games and little by little, weeks passed, more people joined, seasons changed, exams went by, some friends left, some new friends came, and without noticing, we formed our team.

Looking back at these 8 months, now, after we finished 5th in the tournament, I can say I am very proud of our team. We became friends in the process, which is the 1<sup>st</sup> place in life. Anyone in the team can tell you exactly what we laughed about, which is pretty cool if you ask me. Many nationalities, ages, customs and traditions, ways to see the world, but at the end, we were exactly the same, a bunch of friends laughing at each other and having fun, playing this

beautiful sport that brought us together, the football.

And it was all very clear during this day. Everybody played and supported each other. Our cheering team was incredible, not even the all-day-long rain stopped them. The barbecue team struggling through rain. People looking out for each other, if everybody had lunch, if you had playing time, water... Many, many details that if you add them up, your result is no other than friendship and camaraderie, which is the best trophy you can get as a team.

I know that when my teammates read this, some will say that, maybe winning the tournament is better, which makes me laugh already, but let me tell them first, we are going for the prize next year. See you on the field!

• Douglas Alberto RIVERA SAGASTUME  
WASTE student generation 2013



## Life after WASTE

**PH.D. AT ISWA: 5. NICOLÁS ESCALANTE, WASTE ALUMNUS GEN. 2003**

I returned to Stuttgart in January 2008, after having worked a year and half as a lecturer back home in Colombia (see WASTE Newsletter Issue No. 3) on a joint scholarship sponsored by the DAAD and my employer at the time, Universidad de los Andes, in order to carry out my doctorate at ISWA. The original plan was to finalize my doctorate within a time frame of four years, return to the university in order to start in a tenure-track position. But as John Lennon sings, "life is what happens while you are busy making other plans", and adjustments to the plan had to be made as it had confronted with the real life, which have been beneficial to a large extent, but also brought some difficulties.

A major adjustment was made shortly after my return to Stuttgart. Prof. Kranert, my advisor, had chosen me to work as a research associate in the IGNIS project, which would start in June 2008 and run for five years in Addis Ababa, Ethiopia (see WASTE Newsletter Issue No. 8). This was significant, as my research topic was on modeling and simulation of waste management systems and coincided with two work packages of the project. I saw this as a great opportunity to develop my dissertation in a project with a real world case study, instead of being about completely academic and theoretical exercise. The tasks in the project proved to be challenging and enriching. I had the opportunity to advise students and improve my project management skills. Moreover, I learned how to plan and organize data collection campaigns on waste generation rates, productivities of waste collection and resource recovery operations, and socioeconomic characterization of the population. Also I had to learn how to carry out the corresponding data analysis. Additionally, since I was working in an international team with Ethiopian and German partners, and interacting closely with stakeholders in Addis Ababa, ranging from public officials to waste collection and resource recovery workers, I developed further my intercultural competences. I also had the chance to work on my presentation skills and expand my networking as I shared our work at several conferences, such as the ORBIT conference, the international congress of the International Solid Waste Association (ISWA), the International Conference on Solid Waste Management in Developing Countries (WasteSafe) in Bangladesh, and the Gordon Research Conference of the International Society for Industrial Ecology.

The second major adjustment was in methodological terms. I had carried out my master's thesis analyzing the environmental impact of waste management strategies in Baden-Württemberg using Life Cycle Assessment (LCA). However, the LCA method does not allow for a true systemic and holistic evaluation of waste management strategies, as it leaves economic and social aspects out of the analysis. I started by evaluation of the methods that traditionally have been used in waste management, such as cost-benefit analysis, optimization, and multicriteria decision analysis. Although these methods could potentially allow for the integration of several decision criteria together with Material Flow Analysis (MFA) into a decision support system, the implementation of most Operations Research (OR) methods is cumbersome. Additionally, they are basically static methods, not well suited for scenario analysis of how the effects of decisions or strategies evolve over time, which was what we were aiming for in the project.

After reading the book "Limits to Growth" at the end of my first year, I found that the method behind this study, System Dynamics (SD), was actually what I was looking for. SD is a systems modeling and dynamic simulation method that accounts for how accumulations, delays, threshold effects, and feedback are responsible for changes in performance over time. SD has been used in many domains such as management, ecology, and transportation to analyze the causes of instability in supply chains, the cause of collapse of ecosys-



tems, and the impact of land use policies on urban development. Additionally, the method uses a user-friendly diagramming language while at the same time creating a set of equations that represent the accumulation of resources (asset-stocks) driving performance, and the decision processes and policies changing the resource levels based on the observed performance.

Since there has not been substantial work published in waste management using SD, I had very few reference points to help me identify how I could actually apply it to the case of a growing urban center in a developing economy like Addis Ababa. Because there was no experience in using SD at ISWA, I decided to learn the methodology by myself. It was, however, not as easy as I thought. Because of the steep learning curve the method has, it was necessary for me to train myself formally in SD. Unfortunately, there are practically no courses available at the University of Stuttgart, so I had to seek them elsewhere.

>>> continues



## >>> PH.D. AT ISWA: 5. NICOLÁS ESCALANTE, WASTE ALUMNUS GEN. 2003

As a result, I took an introductory course on SD at the University of St. Gallen, Switzerland, online basic and advanced courses at the Universitat Politècnica de Catalunya (UPC), an online graduate certificate in SD at Worcester Polytechnic Institute (WPI), and thanks to a scholarship from the Deutsche Gesellschaft für Abfallwirtschaft, a course on model-based socioeconomic planning at the University of Bergen, Norway.

Using the skills I developed combined with the fieldwork, interviews, and workshops carried out in Addis Ababa, I have been creating a strategic planning simulation model for integrated sustainable waste management. The model helps to assess the performance of the baseline situation of the municipal waste management system resulting from the interaction of the physical subsystem (waste generation, waste collection, disposal, resource recovery) with the governance subsystem (financial sustainability, user and provider inclusivi-

ty, and local, institutional and national legislative coherence). Material flows as well technical, environmental (greenhouse gas emissions), and financial indicators measure the system's performance. Seeing that in the case of Addis Ababa, as well as most urban centers in the developing countries, the intervention with the highest leverage is the recovery of organics, a strategy design and evaluation stage complements the baseline assessment phase.

In the second stage, the modeling method is used to analyze how the development of strategic resources and policies, that enable biowaste composting at decentralized, semicentral, and central level, affect the system's overall performance. Using sensitivity analysis the robustness of these policies are tested and generalized for other urban centers. In order to obtain feedback on my work and improve it, I have presented it at three conferences of the System Dynamics Society.

To sum things up, carrying out this

individual doctorate, in parallel to working as a research associate at ISWA has its positive and negative aspects. Since I have had to split my time between my project responsibilities and my doctorate it has resulted in a longer time to completion. This is compounded by the long time needed to become a proficient SD modeler. The time-consuming project management work and the intense learning process have also limited the possibilities to produce the much-needed peer-reviewed publications to kick-start my academic career. However, I have developed a number of soft skills and methodological competences that will help me in my future work, both within academia and real-world practice, which I could have not acquired had I not chosen the path less travelled.

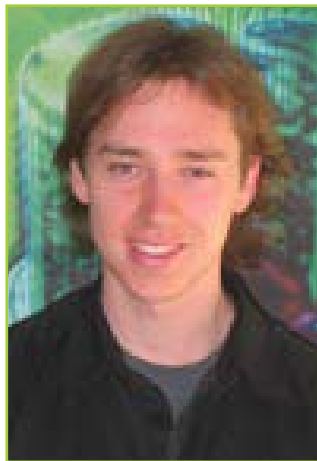
• Nicolás ESCALANTE  
WASTE alumnus generation 2003

## PH.D. AT ISWA: 6. SEBASTIAN PLATZ, WASTE ALUMNUS GEN. 2005

Yes, I know: "Generation 2005 and still busy with my PhD!" But listen to my story!

After studying the first two semesters of the WASTE Programme, as a German, I decided to write my Master's Thesis in a foreign country. I found a very nice position at the University of Edinburgh. Being there I learned what it meant to work at a university institute, and I liked it very much. I needed to have my own time management and not to follow strict office rules. Thus, my decision was to go for a PhD at an institute as a research associate. I got a very nice offer at the University of Edinburgh, but Germany, my home, drew me back. I wrote applications to Berlin, Aachen and Zurich in Switzerland. And, suddenly, I got an offer at ISWA without even looking for it actually. Then, everything went quite fast. In summer 2007, I began my job here at the ISWA in the department "Industrial Water and Wastewater Technology (IWT)".

First, I was involved in preparations to change from the German diploma system to bachelor and master degrees. Also, I wrote some interesting expert reports. One was about a solid waste treatment system placed on a Caribbean island. Another one



was an assessment of the water purification and wastewater treatment facilities in the worldwide biggest steel works in Rio de Janeiro, Brazil. At the same time, I supervised two diploma theses which dealt with a German cement company. During all that time I wrote applications for my own PhD project. Finally, in summer 2008 we started the project "BIO-BUNK". Basically, our goal was to adapt a German MBT-process (mechanical-biological treatment) for municipal

solid waste to the conditions of developing and newly industrialized countries. After the planning phase we started the build-up of a pilot plant in south-central Thailand. Until 2010, I visited that wonderful country many times. Also five of our students had the opportunity to join for a thesis or a practical work. Unfortunately, the project ran out in summer 2010 and due to many problems we couldn't start a new project on that topic. As a consequence I had to start all over again. But the spent time and all the experiences I made are very valuable and important to me. Thankfully, our department got a positive response for a new project and I started working on a completely new topic.

For more than three years, I have been

dealing with the removal of powdered activated carbon (PAC) out of wastewater for the elimination of micropollutants. In that time, I visited many interesting conferences all around the world (Germany, Hong Kong, Korea, USA, Switzerland, Thailand and Japan). I supervised almost 20 students with their thesis. Also, sometimes I give lectures and exercises for the German and WASTE/WAREM students. But now the really good news is that My PhD thesis, I call it "Doktorarbeit" of course, is almost done. For the last three month, I was writing and writing.

In conclusion I have to say that I really like my job here at the ISWA. For practical research, we have the WWTP, the experimentation hall with our own mechanical and electrical workshop and many laboratories. Also, we have many international projects. My colleagues are very nice people. Sometimes we meet for birthday parties, go to "Wasen", or go in the mountains for a weekend for skiing.

Now you know why I already spent almost seven years here at ISWA. Next, I want to stay a little more as post-doc. Currently, we are applying for some new interesting projects. Maybe you are interested in some of the projects and in being a research associate at ISWA?

• Sebastian PLATZ  
WASTE alumnus generation 2005

## PH.D. AT ISWA: 7. DIEGO SALAMANCA, WASTE ALUMNUS GEN. 2007



Since I was working in Colombia for a petroleum company, I knew my path was to be a scientist. After being accepted for M.Sc. WASTE Program at the University of Stuttgart, this path became even clearer. I started working in the research field at ISWA through my independent study and master thesis. During this research, I acquired solid knowledge and

strong interest in the field of environmental microbiology (anaerobic reduction of heavy metals), which further encouraged me to pursue scientific endeavors by making PhD.

I became a member of the doctoral program ENWAT (International Doctoral Program Environment Water), where under the supervision of Prof. Engesser I engaged in research in the field of hydrocarbons degradation. I was granted the IPSWaT scholarship by BMBF (Bundesministerium für Bildung und Forschung), thus, getting a chance to relate my research to the environmental issues in Colombia and work in a cooperation with the Pontificia Bolivariana University (UPB). As a

result of the cooperation, I obtained an award as environmental researcher in Bucaramanga, Colombia.

During my PhD studies, I was invited as a guest researcher at TU Dortmund by Prof. Dr. Andreas Schmid. There, I met interesting people who shared their expertise in the field of biodegradation and biotechnology processes.

The doctoral study was an amazing experience both in professional and personal life. Now, I feel ready to embrace a new challenge and start a postdoctoral research. As final quote I can say: "Keep curious!"

• Diego SALAMANCA  
WASTE alumnus generation 2007

## WORKING AT THE INTERFACE BETWEEN ENGINEERING AND SALES/MARKETING

In September 2011, I finished my Master's thesis at IFK regarding biomass gasification technology, and went back to Japan to work again. Soon I could work again in my company, NIPPON STEEL & SUMIKIN ENGINEERING, because my study in WASTE was funded by my company. Prior to coming to Stuttgart, I was a process engineer and dealt with R&D of waste gasification technology. However, my new job was sales and oversea marketing. Of course, I'm an engineer; therefore, I'm not only sales personnel but also a proposal engineer. In addition, presentation of our proven waste gasification technology was one of my tasks. From this point of view, my experience in WASTE was very helpful, because I could deeply involve in researching works again in WASTE and IFK.

I was also involved in a certain gasification project in Europe in 2012. As proposal manager, I often came to Europe and had discussions with our partners. In July



ny.

I often (almost once a week) travelled to other countries from Düsseldorf, because we have no project of "Energy from Waste" in Germany. My tasks in Düsseldorf are: Proposal of our proven waste gasification technology to clients, information collection of "Energy from Waste", connection, acknowledgement of our company and technology, and writing reports and presentation on conferences. From a bidding point of view, finding a correct European partner is one of the most important tasks

for us to expand our activities in Europe, because it is really difficult for a Japanese company to be a main contractor due to some local difficulties. During our activities in Europe after 2012, we had information about selling Fisia Babcock Environment GmbH (FBE). FBE is one of the largest "Energy from Waste" technology companies and has many references of waste incineration technology all over Europe. For our activities in Europe, they are the best partner for gasification project. In addition, their grate technology can be adapted in our Japanese market. Therefore, we can expect many synergy effects. I was deeply involved in this acquisition project as a technical and sales manager. Involving this acquisition project was a really good experience for me to improve my knowledge on "Energy from Waste". Successfully, the transaction was closed in May 2014.

Now, I am still in Düsseldorf (I'm really not sure until when I'm in Germany). I'm out of office, because of meetings with our new colleagues at FBE, or of business trip to other countries. But I really enjoy this life with my family. Life after WASTE; I believe that my experience in WASTE was fruitful and helpful for my life and the experience in WASTE could lead me to our first project in Europe in the near future.

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• Nobuhiro TANIGAKI  
WASTE alumnus generation 2009

## DATES TO NOTE

- Waste Intercultural Meetings "WIM" in upcoming winter semester every 3 - 4 weeks
- Aug. 18<sup>th</sup> - Sep. 12<sup>th</sup> 2014: Exam period

- Sep. 2014: Arrival of 13<sup>th</sup> generation
- Oct. 13<sup>th</sup> 2014 - Feb. 13<sup>th</sup> 2015: Lecture period
- Nov. 29<sup>th</sup> 2014: Graduation Ceremony

- Dec. 22<sup>nd</sup> 2014 - Jan. 6<sup>th</sup> 2015: Christmas Holidays
- Jan. 15<sup>th</sup> 2015 - Feb. 15<sup>th</sup> 2015: Re-registration for summer semester



## WASTE ALUMNUS WINNING THE GLOBAL GREEN AWARD



Renewable energy for me is a synergetic element, an element we adopted since the start of time. One of the biggest discoveries in history, i.e. fire by human led to thermal energy generation and

utilization. For several decades our energy demands were served by the means of renewable energy only, be it solar, biomass (leafy material or wood), hydro energy or wind power.

Sources say, as early as 4000 - 3500 BC, the first sailing ships and windmills were developed harnessing wind energy. With the use of hydropower through water mills or irrigation systems, things began to move faster. Fuelwood and dung cakes are even currently a major source of energy in many developing countries. Solar energy is used for drying and heating.

Industrial revolution forced the use of fossil fuel energy, which kept on growing with industrial growth. Oil and natural gas fields were exploited and so was the environment. Global warming, ozone layer depletion are some of the examples of resulting grave problems, which we are facing today. In present circumstances, I

believe renewable energy is not an option but a compulsion to drive the human race further.

With this motivation, I came back to my home country India, which is in a phase where its economy has experienced tremendous growth over the past several years. I realized that renewable energy is the only route to continue the energy growth on sustainable basis. At the beginning, I had to address the inherent challenges, which cross all sectors and impact all citizens. I started working on the utilization of bio energy, which I believed could play a vital role in eradicating rural and urban energy poverty. I started concentrating on financial, technical and social feasibilities. Out of these three, social engineering caught our eyes and we realized that in order to get success, we need to strengthen our deployment approach. I believe, this was the time when my entrepreneurial journey started taking off and I along with my team came out with several interesting social engineering models. In order to

bring stakeholders together and propagate biogas in a sustainable way, I even created a platform named "Indian Biogas Association". At that time, I never thought to aim for any award or accreditation. The innocent smile of people, who could get rid of smoky atmosphere due to the use of clean

fuel was more than anything I could desire! Nevertheless, based on the work in last five years, I felt lucky and blessed to receive Global Green Award on the 31<sup>st</sup> of March 2014, in Berlin, Germany. The award analyzes the three basic criteria:

- International Recognition & Prestige
- Promotional & Marketing Campaigns
- Enhance a High Ratio Competitive Performance

Truly speaking, now I feel that the award is perhaps not for the work, which was done by us in the past but it is there to motivate us to keep taking the steps, which we believe in!

• Gaurav KEDIA  
WASTE alumnus generation 2003



## WORKING IN CHINA FOR A CLEANER ENERGY MARKET



About 2 years after graduating from WASTE, an email sent by Ajay, who guided me through all of my Master's thesis, let me know that I have received a prize for my Master's thesis work performed at IFK. I felt happiness and even a little bit excitement. Such kind of feeling also repeated when I recalled my time as a WASTE student. Beside all the friends I got to know from WASTE programme, I also have learned not only the intensive knowledge but also other very important thoughts such as "culture fusion", "act as a team-player" and "to be an optimistic person". I want to thank all my friends there and also people who dedicated their time or efforts for the WASTE programme.

After I graduated from WASTE programme, I went back to my home country China. As a developing country, living

standard is rising here and also the energy demand grows very sharply. Until now, most primary energy consumption in China is coal. Therefore, a clear coal power solution is needed in this land. The company I joined,

is a company which provides clean energy solutions for the Chinese market. As the Chinese clean energy market for power plant changes dramatically, the product line developed in the company was also enriched. And thanks for that, I got a chance to know several kinds of product, such as waste heat recovery system, Low-NO<sub>x</sub> burner and ESP. For the Low-NO<sub>x</sub> burner design, we even had some cooperation with RECOM. It was a great time for me, and I think what I learned from WASTE programme really helps me to have the com-



munications about the process.

From last year on, the concern about dust emission from coal fired power plant has raised. Now the dust emission limitation in China is 30mg/Nm<sup>3</sup>, and for well-developed area it is 20mg/Nm<sup>3</sup>. Even that won't make people satisfied. So in some provinces the limit will be 5mg/Nm<sup>3</sup> for existing power plant, and 3mg/Nm<sup>3</sup> for a new one. For me, it is a great chance to contribute my time and knowledge to the environmental protection business in China. I hope, here, it will go back to the beautiful land again like things happened in Germany at the end of the last century and I will be really happy to be part of this work.

• Xizhi YU  
WASTE alumnus generation 2009

## Where to go in Europe?

### WASTE RUNS MARATHON IN CRACOW

In April 2013, we were facing the big challenge of running the first marathon in our lives. We, four students of the WASTE generation 2012 (Maria Paula, Adrian, Gilbert and me), had signed up for Hamburg Marathon in order to let a dream come true. Once in a lifetime we wanted to finish such a famous run. Anyways, after half a year of practice we managed to finish it and were very happy about it. According to a book about runners, I read that there are two types of persons: one type has done it once and will never do it again, the other type can never stop and does it every year. I guess we belong to the second type which made us register again this year. Since we were a team coming from four different countries, we were looking for another place to run at and decided to go to Poland, which was Adrian's home country. In addition, we convinced Carole and Maurice (both gen. 2012) to join our team and four other members of the WASTE-family booked flights to support us.



In May 2014, we finally went to Cracow in Poland to visit the city and run the "Cracovia Maraton" as it is called officially. Arriving in Poland, the country was not presenting its best side: it was raining the first three days of our stay which made visiting the city quite uncomfortable. Anyways, thanks to our Polish friends Adrian and Barbara we were shown the beauty of the city and very nice restaurants ending up in having an absolutely pleasant 5 days trip.

The day of marathon was the very first day with mainly dry weather conditions and only some rain. It brought everybody of us to our limits but also satisfied us afterwards looking back



to what you were able to do. After the run we decided to repeat it next year. One idea is going to Paris. If anybody is willing to join our marathon team, you are more than welcome! If you would like to host the marathon at you home let us know! We would be very happy to discover new places of this world.

On the last day, we were visiting the concentration camp in Auschwitz, which made the whole unbelievable brutality of Nazi-Germany against mainly Jewish and Polish people visible. Anyways, it feels very good to sit on a table with people from France, Poland, and Germany, having been enemies in World War II, discussing what we had seen and what our great-grandparents had to go through. I would like to thank the WASTE program for this opportunity and because of this, I believe, WASTE makes this world a little bit more peaceful.

• Marc WUTSCHERK  
WASTE student generation 2012



### WASTE NEWS

Newsletter of the international study program WASTE and the WASTE Club Stuttgart e.V.

#### PUBLISHER

Ulrich Vogt

#### CONCEPT

Michael Waldbauer, Keng Been Ang, Christine dos Santos Costa, Student task force 2006 and 2007 of the WASTE program

#### DESIGN AND PRODUCTION

Felix Wellenreuther, Zhuguo Zhang, Tobias Bunk, Julius Ranghieri

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#### PICTURES

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Master of Science Program „Air Quality Control, Solid Waste and Waste Water Process Engineering“ (WASTE), of the Universität Stuttgart and WASTE Club Stuttgart e.V.

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