

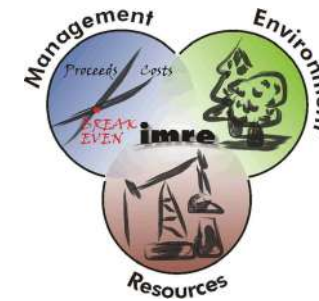


TECHNISCHE UNIVERSITÄT
BERGAKADEMIE FREIBERG

The University of Resources. Since 1765.

MANAGEMENT OF ENVIRONMENT AND RESOURCES

Annual Report 2018



Compiled and edited by:

Prof. Jan C. Bongaerts (JCB) and
Dr. Jiangxue Liu (JL)

Designed by:

Dr. Jiangxue Liu

Table of Contents

International Activities	1
Teaching & Research Activities	13
IMRE Alumni Activities	21
Outlook into the future	29

After retirement of Prof Bongaerts on April 1, 2017, lecturing within the IM-RE Programme has come to an end and more time is available for international projects and for research. The format of this annual report has therefore also changed.

URM TEAM

Head of the Chair of Environment and Resources Management (URM)

Prof. Jan C. Bongaerts



Research Associate

Dr. Jiangxue Liu



Research Associate

M. Sc. Katharina Rosin



Contact:

Prof. Jan C. Bongaerts: j-b.bongaerts@ioez.tu-freiberg.de

Dr. Jiangxue Liu: jiangxue.liu@bwl.tu-freiberg.de

M.Sc. Katharina Rosin: katharina.rosin@bwl.tu-freiberg.de

Institut of Mining at TU Bergakademie Freiberg

Gustav-Zeuner Str. 1a

09596 Freiberg, Germany

CEMEREM Project

In April 2016 a new project entitled “Development of a Centre of Excellence for Mining, Environmental Engineering and Resource Management (CEMEREM) started. It is a joint project of Taita Taveta University (TTU), Voi, Kenya, the University of Applied Sciences Dresden (HTWD) and TU Bergakademie Freiberg. The purpose is to develop CEMEREM at TTU in the next five years. CEMEREM has four main objectives:

- Education and training of students and staff of TTU and of members of stakeholder organisations of CEMEREM
- Promotion of research
- Development and operation of

specific laboratories for issues of the natural resources sector

- Community outreach

The project also aims to foster scientific and cultural exchange between the project partners, industrial and governmental institutions in Kenya and Germany. Until the end of 2017, the financing of the project is secured by the Ministry of foreign affairs of the Federal Republic of Germany through DAAD. The government of Kenya spends a considerable sum of money on the construction of a new CEMEREM building on TTU’s campus.



DAAD’s Film Team Underway for CEMEREM

CEMEREM Summer School 2018

9 – 16 July Twenty CEMEREM teachers and students participated in the 2nd Summer School organized by the CEMEREM Project Team of HTW Dresden and TU Bergakademie Freiberg. As in 2017, the program started with a lecture session given by Prof. Bongaerts, Prof. Feistel, Dr. Liu and Oscar Choque, one of Saxony’s promoters for resources policy and migration. In addition, participants were also taken on excursions. The group was split into three groups based on the participants’ background.

In Dresden, visits were made to DREWAG power station at Nossner Brücke, to the experimental fields and laboratories of the Faculty of Agriculture/Environment/Chemistry of HTW Dresden and Bosch Rexroth GmbH. They had a tour to Welzow-Süd o-

pencast lignite mine and its post-mining rehabilitation site. In Freiberg, participants visited the underground mine at “Reiche Zeche”, the laboratory in Mining institute for the demonstration of a simulator for excavation, and to Agrargenossenschaft in Clausnitz. A workshop and brainstorming on the utilization of renewable energies in mining was the offered by Kateryna Zharan to address a topic which plays a prominent role in the development of the mining sector in Kenya.

One more time, the CEMEREM summer school provided an excellent opportunity for participants to learn and train themselves on subjects related to mining, natural resources management and environmental technologies and gain first hand practical experience.



Visits to Welzow Open Pit Mine, Agrargenossenschaft Clausnitz, Institut of Mining of TU Bergakademie Freiberg

Teaching at TTU

In the fall of 2017, TTU opened two new study programmes at Master's level, one for mining engineers and the other programme as an executive MBA on Natural Resources Management. This programme is taking its inspiration from the School of Business, Economics and Social Sciences and from the MBA IMRE Study Programme of TU Bergakademie Freiberg. As one essential part of CEMEREM, several teaching activities took place at TTU by HTWD and TU Bergakademie Freiberg members.

11 September – 10 November, Prof. Bongaerts was DAAD Johann Gottfried Herder Professor at Taita Taveta University in Voi, Kenya, the CEMEREM Partner. Prof Bongaerts taught two modules for the engineers and two more modules for the MBA students. The MSc engineers were trained in project management and they learned about investment and financing for mining operations. The MBA students took a course on international mining law and another course on environmental management.



TTU Campus



Prof Bongaerts in his lecture

8 – 10 October and 18 – 20 December: Prof. Carsten Drebenstedt gave an intensive lecture "Mine planning" to the new students of the MSc in Mining Engineering. His lecture dealt with an overview of the objectives and functions of mining for the needs and benefits of society and the economy. He also highlighted appropriate mining technologies in accordance to the types of deposits and their geological structures.

9 – 17 December, Bruno Grafe, associate researcher at the Mining Insitut of TU Bergakademie Freiberg completed the lecture with assignments on software for mine planning.

22 – 26 November: Prof Konietzky lectured on Geomechanics for the MSc Mining Engineering programme. He given a brief introduction in geomechanical methods and their applications in mining related areas. He also visited the soil and chemical laboratory and had a discussion with the chief laboratory technician Koti Musomba about commercialization opportunities for the soil mechanics equipment at TTU.



Prof. Drebenstedt and Students



Bruno Grafe and the Students



Prof Konietzky in his lecture

CEMEREM Smart Biogas Project

27 October – 7 November, Niazi Azim Khan, IMRE Alumnus, and Erik Ferchau, researcher for biogas at TU Bergakademie Freiberg carried out a 8 days visit at TTU. They successfully completed comprehensive preparations and tasks for the installation and start-up of four so-called Smart Biogas Plants at TTU.

The Smart Biogas Plants are based upon an innovative and completely novel application of the well-known anaerobic digestion principle. In contrast to traditional underground dome structures, they stand above ground, they are lightweight, portable in an empty condition and without any need for preparatory civil engineering works. They operate on a multitude of biomass feedstocks. Moreover, biogas production is highly effective in comparison with underground domes and outgoing digested sludge constitute an important bio-fertilizer.

Four plants have been installed at the TTU main campus and at the campus of the School of Agricultural, Earth and Environmental Sciences (SAEES) in nearby Ngerenyi. In a first stage, they will produce biogas for TTU's Catering Department with kit-

chen waste and other biomass as preferred feedstocks and be used for the research about biogas production. More importantly, be used as a demonstration plant for local farmers and would-be entrepreneurs who intend to disseminate the technology around the SAEES campus and beyond.

Vice Chancellor Professor Fred Simiyu Barasa has a clear opinion about the future: "TTU CEMEREM is now equipped for three important tasks: education of our students, research on biogas and digested substrates for agriculture and land amelioration, and dissemination through future manufacturing of more plants within the region."



Installation of the Smart Biogas Plants at TTU

CEMEREM Macadamia Project

Almost two years ago, during a visit of the SAEES Campus of Taita Taveta University, the "problem of nuts cracking" was identified. SAEES, in their plantation, cultivate macadamia trees. Macadamia nuts range at the top end of all nuts in terms of quality, except that they are extremely difficult to open. Current technologies often result in shells being cracked and nuts being pulverized. This makes them almost worthless for sale. Moreover, the lack of an efficient nutcracker technology significantly reduces their price for farmers. In essence, the value added is much higher for whole kernels. As a result, an attempt was made to draft a profile of requirements to be fulfilled by a better, benign, technology cracking the shells and leaving at least 80 percent of the nuts intact. Another, important, objective consisted in a minimum capacity of production expressed as the number of nuts opened per unit of time. Needless to say that this machine should also be robust, and eventually manufactured in Kenya.

TU Bergakademie Freiberg's Professor Mathias Kröger, himself a diligent and enthusiastic researcher on many

different types of nut crackers, picked up the idea and decided to develop a machine as a prototype which meets the set requirements. As a result of that initiative, his student Johannes Gebel investigated various physical principles serving the purpose and, eventually, identifying one of them as key. Experimental work in the lab justified the approach and further work on the design of the prototype machine resulted in his Master's Thesis project. Days before the Christmas season, the prototype – meanwhile patented – was demonstrated in Professor Kröger's traditional Christmas lecture with substantial media coverage.



Johannes Gebel demonstrate the macadamia prototype at TTU

Sustainable Partnership with East Africa

12 March 2018 A Networking conference on the CEMEREM Project was organized at Alte Mensa in cooperation with the Saxon State Ministry of the Environment, the Saxon State Economic Development Agency, the Chamber of Commerce of Chemnitz, especially represented by EZ Scout Konstantin Kotsas, and the Delegation of German Industry in Kenya, represented by Head of Energy Andreas Kaiser. A delegation of Local Government Representatives of six Southern Kenya Counties participated as honorary guests. More than 100 participants attended the event.

Prof. Dr. Ulrike Feistel of HTWD (Hochschule für Technik und Wirtschaft Dresden) and head of the CEMEREM project gave an overview of CEMEREM's activities, the Kenya

Delegation informed about recent development for economic cooperation and Andreas Kaiser explained



Prof. Dr. Ulrike Feistel (HTWD)

ned the opportunities for business development in Kenya, especially in the sectors of water, energy and environmental technologies. Participants welcomed the informative talks and they appreciated the networking facilities offered by the symposium.



Left: Panel Discussion „Sustainable Relationship with East Africa, Experiences from Sachsen“

Right: Deputy Governor Delegation from Kenya

Afrika-Verein Conference on Mining in Kenya and Tanzania

3 May at the invitation of the Afrika-Verein, Prof. Bongaerts took part in a conference on mining in Kenya and Tanzania. The event took place at the premises of DMT, a leading mining technology and project management consultancy in Essen. Prof Bongaerts gave a presentation on the CEMEREM project in order to show the participants, mostly of the

mining business community, how a university project can assist companies in entering the market in Kenya. In general, several other speakers evaluated the conditions for mining in Kenya as positive, whereas Tanzania was considered one of the worst countries for mining projects in all of Africa.

12th Saxon Raw Material Day

Sächsischer Rohstofftag 2018 

21 June Sächsischer Rohstofftag is an annual conference organized by Geo-KompetenzzentrumFreiberg e.V. (GKZ) addressing issues related to mining and minerals processing in Sachsen and beyond. This year, in the afternoon session, the organizers made an attempt to highlight international networking as an important activity of the GKZ office and some of the GKZ members. In that context, they included the role of education for mining, minerals processing and natural resources management. In two presentations, a German graduate of TU Bergakademie Freiberg gave an insight in his remarkable career in a German mining equipment company which brought him to many

countries and another Russian graduate showed how he settled in Germany. Prof Bongaerts gave a short overview of the CEMEREM project with a specific focus on the contribution of international educational projects to international business networking.



Prof Bongaerts gave a presentation

Annual Meeting of the Africa Group of German Geoscientists

22 – 23 June Prof. Bongaerts took part in the Annual Meeting of the Africa Group of German Geoscientists, organized by the University of Applied Sciences in Neubrandenburg. The Group has a long tradition of research in various countries in Africa, except that it became dormant when the first generation of

promoters went into retirement. Since a few years, a new approach takes place and the annual meetings enjoy a small but highly motivated participation. Prof Bongaerts gave a short presentation about recent developments in the financing of mining operations with a specific focus on selected African countries.

The first GMIT Symposium on Engineering and Environmental Science

28 – 30 August the first Symposium on Engineering and Environmental Science took place at GMIT in Nalaikh, Ulaan Baatar District. The meeting was attended by scientists from Germany, China, Russia and the USA and, naturally, also of Mongolia.

CEMEREM was represented by Prof. Feistel of HTW Dresden, Prof. Bongaerts, Prof. Drebenstedt of TU Bergakademie Freiberg and Arthur Ndegwa of Taita Taveta University. During the opening ceremony on the first day, Prof. Drebenstedt gave a keynote address about the overall

significance of mining and its contribution to the economies of mining countries. Several scientists presented papers on a large project of investigation of water resources in Mongolia and the Lake Baikal region which was recently concluded.

On the last day, participants took part in an excursion to the environs of Nalaikh viewing abandoned mine areas with first attempts of reclamation, on-site meetings with small-scale miners and a visit of an underground coal mine, which, surprisingly, was exclusively for male visitors.

Networking Conference in Berlin

9 – 16 October The tenth annual meeting of the DAAD African centres of excellence took place in Berlin. CEMEREM was represented by all three participating universities: Taita Taveta University, Hochschule für Technik und Wirtschaft Dresden and TU Bergakademie Freiberg.

It was a memorable event with a ceremonial character as the culmination of ten years of continued financial support by DAAD throughout the continent. For several centres, funding by DAAD comes to an end and discussions showed that not all centres are well prepared to sustain their current level of operations. From the point of view of CEMEREM, this implies that appropriate steps



CEMEREM Stand

are taken already at this stage to secure that CEMEREM activities will be perpetuated beyond the DAAD funding horizon. One important strategy to be developed in the coming years consist in networking with government, industry and community partners in the region.



Networking Conference in Berlin

DAAD Centres of African Excellence meeting

6 – 9 November The 2nd DAAD African Centres of Excellence Alumni Conference took place in Ghana. The topic was “Sustainable Development in Africa: The Role of Science and Education”. The conference was organized by the Ghanaian Alumni Network (IGAN) with the support of the Institute for Statistical, Social and Economic Research (ISSER), University of Ghana, the Ghanaian-German Centre for Development Studies (GGCDs), and the Center for Development Research (ZEF), University of Bonn. Since Centre Co-ordinators were also invited, Prof Bongaerts travelled from Kenya to Accra.

The meeting itself took place in Akosombo at the location of the Volta Dam in the hotel of the same name. During the first meeting almost a year ago in South Africa, a decision was made to establish a network of Alumni and platform for scientific discussion. In Ghana, a small Organization Committee reported on achievements so far. The Alumni association is now established and first activities are planned for the near future. Many Alumni gave papers on their current research projects.

The next meeting is planned to 2019 in Kinshasa, Democratic Republic of the Congo.



DAAD Alumni Meeting in Accra, Ghana

The 4th Oriental Design Forum International Symposium on Regial Revitalization and Holistic Design 2018 in Shanghai

22 – 25 December By invitation of the Department of Communication and Design of Shanghai Jiao Tong University (SJTU), Prof Bongaerts took part in the “The 4th Oriental Design Forum - 2018 International Symposium on Regional Revitalization and Holistic Design”. The conference is dedicated to design issues with a very broad perspective in mind, reaching from products, com-

munication to gardening and landscapes. During the opening ceremony, Prof Bongaerts gave a presentation about experiences with mine rehabilitation in Germany entitled “Mineland – Wasteland – Newland”.

On 25 December, he gave a seminar for Graduate Students entitled “Multicriteria methods for designers – qualitative and quantitative methods based on matrix calculations”.



Group Photo of the 4th Oriental Design Forum

Teaching at GMIT

From 1 February until the end of April, Prof Bongaerts was DAAD Johann Gottfried Herder Professor at German Mongolian Institute for Resources and Technology (GMIT) in Nalaikh, District of Ulaan Baatar.

This programme is open for universities in developing countries who require teaching assistance by retired professors. GMIT is a new university, now in its fifth year, supported by TU Bergakademie Freiberg and four other German Universities. The main focus is on the education of engineers for mining and environmental technologies. In the fall of 2017,



Lecture at GMIT

GMIT opened an executive MBA on Resources and Environment which is modelled after the MBA IMRE Study Programme of TU Bergakademie Freiberg. Prof Bongaerts taught four modules for the first generation of five students of this new study programme.

Teaching at TU Bergakademie Freiberg

In the spring term and the fall term of 2018, Prof Bongaerts is a scheduled teacher of modules on project management, finance for the mining and resource sectors and licensing and stakeholder manage-

ment for the English language Master Study Programmes of the Institute of Mining. The number of students, coming from many countries, enrolling in these Study Programmes is steadily increasing.

Teaching at HTW Dresden

On 18 December, Dr. Jiangxue Liu gave a lecture about critical minerals in the module „Resources Management Mining“ to the Environmental Engineering Master Students. Her

lecture dealt with the methodology of criticality assessment of minerals and strategies of EU for the supply chain security of critical minerals.

InnoCrush - Assessment of a highly selective mining process chain



The aim of the research project “InnoCrush” focuses on the development of an innovative highly selective process chain (HSPC) combines a high automatic selective cutting and a selective comminution for increasing the efficiency and sustainability in the mineral production process. This project is financially supported by the European Social Fund. The research work focuses on the extraction of minerals from vein deposits, which is commonly in small mineral occurrences and with difficult assess. The conventional mining and processing methods are often not feasible due to their technical, economic, environmental and social restrictions. The main objective of the research

work of Dr. Jiangxue Liu and Katharina Rosin within the InnoCrush project is to evaluate of the new process chain respect to its economic feasibility, its environmental impact and its impacts on stakeholders. In order to achieve this task, an integrated economic-environmental-socio evaluation model must be developed. As the first evaluations step, the quality function deployment (QFD) method is used to analyse the priorities of mine operators and the technological profile of the HSPC. The result of the analysis will be presented in the 9th International Conference on Sustainable Development in the Minerals Industry in Sydney in May 2019.

Economic and technical utilization of Associated Petroleum Gas – Case study Yemen

The PhD project of Arfan Obaid aims to find a solution of the existing flaring practice of the associated petroleum gas, taking Yemen as a case study. The research joins the forces for more sustainable business in the field of utilizing the Associated Petroleum Gas (APG). The main objective is to decrease the CO2 emission by finding alternatives to flaring, except for safety reasons. APG is the gas,

that along with water, accompanied the crude oil production which is found either dissolved in the oil or as a free “gas cap” above the oil in the reservoir. Despite the existence of vast number of possible applications of the associated gas, the most widely applied approach is Gas Flaring; such approach is broadly used due to its simplicity and feasibility.

Resource Efficient Product Provision - Closing the resources loop for waste mobile phones and smartphones

The main objective of the PhD project of Nicoleta Gurita focuses on developing incentive-based approaches for the sustainable and resource-efficient provision of small electronic products and the exploitation of strategic and critical metals from electronic waste. So far, the dissertation project has developed a mathematical model to measure the inventory and monetary value of strategic and critical metal inventories in selected electronic devices. The current WEEE management system for mobile and smartphone waste streams has been explored to identify the potential for closure of

the resource cycle. Subsequently, a cost-benefit analysis for the end-of-life management of mobile phones and smartphones was developed to find out whether there is a significant potential for saving by recycling these products. This leads to the development of Product Service Systems (PSS) to deliver new innovative business models and a closed supply chain for strategic and precious metals in small electronic products.

Date of start: April 11, 2016.

Intended date of finish: April 1, 2019.

Energy from renewable sources for the mining and minerals sector

The PhD project of Kateryna Zharan aims to develop a mathematical model as a decision-making tool towards implementing renewable energy (RE) into the mining industry. The decision itself refers to a substitution of the genset by the hybrid system in the sense of no return (to the conventional system).

The PhD thesis consists of the three main parts as follows: (i) a mathema-

tical model on the integration of RE in the mining industry: break-even times of diesel and hybrid PV-diesel systems, (ii) a survey analysis, and (iii) a case studies analysis, a cost analysis, a SWOT analysis. The outcomes of the survey allow for identifying the factors that favor and disfavor decision-making on the use of RE in mining operations. (continued on the next page)

The case studies and cost analysis derive a practical decision rule based on a cash flow approach. The SWOT analysis evaluates RE integrated into the mining industry in a wider context, giving a perspective on RE applicability within the range of external and internal opportunities and

constraints. This PhD project intends to enhance the attention of decision makers on RE and fossil fuel technologies towards increasing the attractiveness of RE in powering the mining industry.

Date of start: September 9, 2014

Intended date of finish: Mai 31, 2019

Selecting “green” construction products generated in mining operations as a complex issue of decision-making

The PhD project of Mariia Rochikashvili focuses on the essential criteria that a user considers during a decision-making process involving interior paints. Therefore, a quantitative study with a questionnaire survey was conducted on trade fairs for the construction products in Germany. This study involved end-users of construction products. Additionally, a qualitative study with a similar questionnaire survey was conducted on trade fairs for the construction products. Architects, engineers, sales engineers, product managers working for the manufacturers of paint products or companies who use painting pigments in their manufacturing process participated in this survey. The studies have following objectives: (i) an investigation of end-users’ and experts’ opinions on

questions related to the importance of providing Material Safety Data Sheets for interior paints, (ii) an investigation of end-users’ and experts’ opinions towards transferring the information regarding the Life Cycle Assessment to end-users, and (iii) a comparison opinions of end-users with those of experts. Material properties of paints, legislation certificates in the European Union, and other criteria are involved in the decision-making process within the construction industry. Paints with ecological labels receive the highest attention in this PhD project that discusses consumption of construction products with respect to sustainability.

Date of start: December 17, 2013.

Intended date of finish: March 31, 2019.

Environmental innovation at local government level

The PhD project of Florian Unger analyses the influences and framework conditions for the implementation of environmental innovations at a local government level. The scientific consideration of environmental innovations as one option to reduce environmental damage costs through behaviour, products and production processes, usually focuses on the market sector. The local government level however, as one possible actor and initiator of environmental innovations is rarely investigated. The local government level represents the level that has immediate means of action for the achievement of local and national climate protection goals.

The main objective of the PhD project is to generate an insight into the evolution of environmental innovations in municipal administrations in Germany. Therefore the work deals

with the question of: What factors and circumstances have an impact on the innovation behaviour of local governmental employees? The methodical design for the empirical data collection and their evaluation is based on the Grounded Theory.

The aim of the Grounded Theory is to generate theoretical statements in the course of research through a gradual data collection process and the repeated test of their theoretical relevance. This approach is finally used to provide a visual model of the impact of environmental innovation in municipal administrations in the field of local climate protection.

Currently Florian Unger is summing up the main results of the Grounded Theory process. The PhD project has already been conducted for several years additionally to Florian's day-to-day work at the energy agency of the City of Frankfurt am Main.

Publications

Bongaerts, J. C. 2018. *A Novel Approach Towards Stakeholder Management: Complete Flexibility for the Assessment of Stakeholders and Their Interests and Concerns: The Analytic Hierarchy Process: Advances in research and Applications*, Nova Science Publishers, Hauppauge, NY, ISBN9 78-1-53613-333-2

Bongaerts, J. C. 2018. *A Model for the Optimal Recovery of Multiple Substances from Waste Water with a Focus on Phosphate". Sustainability. 10 (8), 2867, Special Issue "Phosphorous Circular Economy: Closing Loops through Sustainable Innovation" doi: 10.3300/su/10082867 (Research Article)*

Gurita, N., Fröhling, M., Bongaerts, J., 2018. *Assessing potentials for mobile/smartphone reuse/remanufacture and recycling in Germany for a closed loop of secondary precious and critical metals. Journal of Remanufacturing (8), 1-22. DOI 10.1007/s13243-018-0042-1*

Liu, J.X., Grafe, B., Rosin, K. Bongaerts, J., Hesse, M., 2018. *Assessment of a new highly selective process chain in mining using quality function deployment (QFD) (Abstract accepted for the 9th International Conference on Sustainable Development in the Minerals Industry)*

Rochikashvili, M., Bongaerts, J.C. 2018. *How Eco-Labeling Influences Environmentally Conscious Consumption of Construction Products. Sustainability, 10 (2), 352, Special Issue Management Strategies and Innovations for Sustainable Construction; MDPI AG, Basel, Switzerland, 2018, pp. 1-23. doi: 10.3390/su10020351*

Zharan, K., and Bongaerts, J.C. 2018. *Survey on Integrating of Renewable Energy into the Mining Industry". Journal of Environmental Accounting and Management, 6(2), 149-165. DOI: 10.5890/JEAM.2018.06.006. (Research Article)*

Zharan, K., and Bongaerts, J.C. 2018. *Mathematical Model on the Integration of Renewable Energy in the Mining Industry: Break-Even Times of Diesel and Hybrid PV-Diesel Plants. Ulaanbaatar, Mongolia. (Abstract)*

<p>69. BHT-Freiberger Universitätsforum, International Workshop e-mobility & Circular Economy, 7 Juni 2018: Titel of presentation: "A holistic investigation of circular economy implementation challenges and opportunities for critical metals". Participant: Nicoleta Gurita</p>
<p>PhD Seminar "Qualitative Research Methods", TU Dresden Participant: Nicoleta Gurita</p>
<p>International DAAD Alumni Seminar 2018: PV Technologies and Projects – Focus on mature and developing markets. Freiberg (Sachsen) / Munich, Germany Title of poster: "Mathematical Model on the Integration of Renewable Energy in the Mining Industry: Break-Even Times of Diesel and Hybrid PV-Diesel Plants" Participant: Kateryna Zharan</p>
<p>CEMEREM Summer School: "Aspects of environmental & resources management in Germany ". Freiberg, Germany Title of workshop: "Implementing RE into the mining industry with the focus on the survey analysis" Participant: Kateryna Zharan</p>
<p>IMRE Alumni Seminar. Sino - German Co-operation for a Low-Carbon Economy. Chengdu, China (presentation). Title of presentation: "Implementing RE into the mining industry: a case-studies analysis, hybrid energy systems, and a mathematical model." Participant: Kateryna Zharan</p>
<p>International Urban Cooperation Conference, 10-11 October, Brussels, Belgium Participant: Florian Unger</p>
<p>12th Saxon Raw Material Day, 21 June Participant: Katarina Rosin</p>

Abdul Saboor Hamza	A GIS-based approach and a multi-criteria optimality model to identify best suitable locations for wind power plants in Afghanistan
Abdul Saboor Rasoli	Analysis and assessment of renewable energy for electrification of rural areas in Afghanistan
Anna Strelkova	The impact of green logistics on the sustainable development of a company
Ardian Candraputra	Analysis of the copper commodity market in Indonesia - Case of the current mineral protection law
Elvis Owsu Acheampong	Analysis of trace elements in soil and water from Agbogbloshie E-waste dump site in Accra, Ghana. A contribution to sustainable management approach
Freshta Hassan Hasmimi	Assessment and analysis of water resources—Management issues and productive solutions in Afghanistan
Gokul Mahadev	Selection of preferred airlines with a specific focus on perceptions of financial performance
Gokul Nair Mahadev	Selection of preferred airlines with a specific focus on perceptions of financial performance
Jie Meng	Analysis and assessment of straw-biomass power generation in Jilin province of China's Northeastern area
Joshua Holland	Investigation into the development potential of biogas technologies for small-scale farmers in Taita Taveta, Kenya
Karan Hiteshbhai Shah	Analysis of the potential of Additive Manufacturing technologies in the HVAC&R (heating, ventilation, air-conditioning and refrigeration) industry
Khusbu Niroula	Analysis of change management during the implementation of Purchasing 4.0 with a case study on Amadeus
Meera Vijayakumar	Improvement of new business acquisition through process intelligence – a case study at Bosch Engineering GmbH
Nabil Bouarroudj	The integration of farmers in the agricultural information system – the case of Algeria
Rohit Raju	Integration of Quality Function Development (QFD) and the Analytical Hierarchy Process (AHP) for an Evaluation of the performance of Distributors of Medical Devices
Sana Achkrou	Potential of Industry 4.0 for improvement of Environmental Management Systems
Shangqing Wang	Marketing analysis for combined natural and engineered systems for water treatment in Asia
Shanjahan Kabber	Analysis of Capitalization Guidelines according to the IFRIC 20 Standard with a focus on other categories of expenditures than those covered by the Standard

International DAAD Alumni Conference Photovoltaic Technologies and Projects — Focus on Mature and Developing Markets

12 – 22 June: In preparation of the Munich Intersolar Europe Trade Fair, a DAAD funded seminar was organized for German Alumni from developing countries with personal professional experience on PV technologies and PV projects. Already in the selection of the participants, preference was given to practical experience evidenced in projects of implementation beyond research and development. As a result, a group of participants from Africa, Asia and Latin-America could be recruited who proved to have the best possible opportunities for the exchange of mutual experiences and for networking. Lecturers from TU Bergakademie Freiberg gave insights in current research on materials for semiconductors used in PV technologies and the current markets for PV technologies and PV electricity. Participants organized a poster session to show their work to each other. Excursions were organized to a PV assembly factory and generators / users of PV electricity both in urban and rural environments.



In the week after the seminar, all participants visited Intersolar Europe Trade Fair in München and the accompanying events programmed by DAAD.



Trade Fair München

Alumni Seminar in Freiberg



Excursion



Visit of Inter Solar Trade Fair in München



Alumni Conference in Chengdu, China

12 – 18 November the IMRE Alumni Seminar “Low-Carbon Economic” took place in Chengdu, Sichuan, China. Participants comprised 25 Alumni, 4 children of Alumni, 3 experts from Germany and Professors from Sichuan University and Sichuan Jiaotong University. They were conducted through a dense program comprised of various lectures and excursion in Chengdu. The program started with a guest lecture “Integrated Evaluation of Fossil Energy Projects in Germany” given by Dr. Stefan Bartz (RWE Power), who has worked as IMRE lecturer since 2002. His lecture focused on Germany’s Climate Action Plan 2050 and the social economic costs evaluation of the energy transition process. In his lecture, Florian Unger, Head of Energy Efficiency of City of Frankfurt am Main, showed how the Climate Action Plan is implemented at the city level, especially, with a focus on a 100 percent renewable energy use. Prof Gou Rui of Sichuan Jiaotong University and Prof. Bongaerts explained the role of eco-design and the behaviour of customers in low-carbon economic.

Mr. Yunhong Wang, Sichuan Federa-



tion of Industry Economics took the opportunity to present the development of Sichuan province and highlighted the interest of Sichuan government in further co-operation with German companies and universities in high technologies and eco-technologies.

As the last part of the seminar, alumni and experts were invited to participate in the 2018 Industrial Design and Branding Symposium organised by the Chengdu government. Prof Bongaerts, Florian Unger and Stefan Bartz were member of a panel discussion. They pointed out the importance to search for new design solutions for the environment protection and the reduction in the consumption of resources.

Alumni Seminar in Chengdu



Excursions



Participation at the 2018 Industrial Design and Branding Symposium



Muhammad Niazi - Smart Biogas System development in Mexico

After the successful development of Smart Biogas system in Kenya, Indonesia, and Pakistan with support of Prof. Bongaerts and IMRE Alumni (see Page 5 and URM Annual Report 2017), in 2018, Muhammad Azim Niazi Khan and his company Nagaro have achieved another milestone by extending its business in Mexico through its partnership with Ecomadi, a renewable energy company in Mexico in partnership with Mr. Augusto (an IMRE Alumnus). Ecomadi becomes the sole distributor and licensed assembler of Nagaro systems. In future, Ecomadi will assemble Smart Biogas plants for Nagaro and will sale and distribute in Mexico as well as other Latin American countries.

Mexico is a new market for Bioenergy, and there is a huge demand of biogas in private and industrial sector. The initial focus of Nagaro will be on urban market to solve the organic waste problem through the efficient Biogas systems. Nagaro has recently installed 3 smart biogas plants in Mexico with further standing orders. The aim is to cover the urban market including households, restaurants and schools.

Moreover, 20 Smart Biogas Systems will be shipped to Timor Leste and a same amount to Bali, Indonesia. Nagaro is now in process of agreement with UDIANA University Bali for the launch of Smart Waste Management Solutions for Bali.



Muhammad Azim Niazi Khan and Augusto showing theirs Smart Biogas Plant

Ricardo - Educational projects in climate change in east Colombia

Ricardo Agudelo, IMRE 2009, is currently working at the department of environmental engineering at University of San Gil in the Colombian Orinoco Basin located in Casanare. Orinoco Basin is considered to be the 3rd most important river system and one of the most biologically diverse areas of the world. However, in the last decades this region threatened by deforestation, pollution, and impact of climate change. Colombia has shown a strong commitment to climate action and encourage conservation ecosystems.

The increasing of awareness of students and local communities on the climate change plays an important role for climate policies. Besides the improving communication and leadership skills of engineering students, the lecture of Ricardo is also related to the issue of climate change and promoting sustainability. Ri-



Ricardo in the Alumni Seminar Chengdu

cardo leads various activities in his region, such as workshops, photography projects, in collaboration with local institutions like city hall of Yopal and primary schools. He also invited Experts from agriculture, industry and energy sectors to deliver lectures to the local community about their experiences in sustainable development. These activities helps to build a network among academics, official and private institutions in the region to reach the national goals of GHG reduction and energy transition.



Casanare, Colombia

Varun Agarwal - Building Climate Capacity in the Indian Industry

Varun Agarwal, IMRE alumnus 2017, is working as a technical consultant for the Confederation of Indian Industry (CII), New Delhi, India, on the topic of climate change. CII is a non-government, not-for-profit organization, with over 8,500 members from public and private sector industry in India.

In the area of climate change, CII provides advisory and capacity building services for its members and works closely with the government on policy issues. Projects on which Varun is currently working include:

Climate Action Program (CAP 2.0°): An annual assessment program started by CII in 2017 that rates Indian companies on climate change mitigation and adaptation activity, using sector-specific indicators based on international standards and benchmarks. Each participating company is provided a gap report, with specific suggestions on addressing gaps and initiatives to follow up on progress.

Technology Needs Assessment (TNA): TNA is a process established by the UNFCCC to understand a country's climate technology needs. Varun is working on a TNA study for

the Indian industry, which basically involves a sector-wise assessment of the greenhouse gas (GHG) emissions reduction potential of various new technology options, as opposed to the technology currently being used (baseline).

Improving Accuracy of India's National Greenhouse Gas Inventory:

As a party to the Paris Agreement, India must submit its national greenhouse gas (GHG) inventory to the UNFCCC every two years. Varun is working on a project to investigate the data and capacity requirements for using tier-3 methods (as defined in the IPCC Guidelines, 2006) for GHG emissions estimation for the industrial process and product use (IPPU) sector in India.



Participants of the CII certified training on ISO 14064 in October

Yi Lin - Bring Kids Closer to the Nature

Yi Lin, IMRE 2004, is currently working for Qyer, the biggest outbound travel platform in China. After IMRE study he worked many years in South Pole Group, a carbon finance consultancy. He has involved in various environmental projects such as water purification project in Kenya, efficient firewood project in Sichuan province in a co-operation with the World Wide Fund for Nature (WWF).

After 2015 he turned his hobby as a traveller into his career, joined Qyer. He combined his IMRE study and previous working experiences into his new job and started to promote

the eco-tourist and inspire more people to become responsible traveller. He travelled to many places around the world, watched polar bears in Churchill, Canada, experienced the wildness in Poluostrov Kamchatka, Russia, claimed the Mountain K2 in Pakistan. In his journeys, he has also seen the impact of climate change on the nature.

Now, he goes to primary schools to share stories about polar bears. He and his friends started the "Nature Education" for children, bringing the kids to outdoor to explore the nature and learn to care for animals.



Left: Yi Lin gave presentation about polar bears and the impact of climate change in a primary school

Right: „Natural Education“ for children

DAAD International Alumni Seminar: Mining 4.0

For developed countries, such as Germany, Mining Dependent Countries, especially in the Developing World, are essential suppliers of minerals and metals for their technological and economic progress. Demand for “classic” metals, such as Copper, Nickel and Zinc is increasing and “new or high-tech” minerals, such as Cobalt, Lithium, Nickel and Rare Earths are considered as inevitable for digitalisation, Industry 4.0 and the “Energiewende”.

The digitalization of industrial operations and processes is rapidly moving into a level of technology known as Industry 4.0 and the Internet of Things, bringing a direct integration of networked physical devices through electronics, sensors, actuators and software with computer-based systems. The new technology level, referred to as Automated Mining and Mining 4.0, is now entering “rich” Mining Dependent Countries, such as Australia and Canada (e.g. in driver-less trucks and in automated trains) and Mining Dependent Countries in the Developing World, notably in Africa.



For these reasons, a DAAD funded seminar for expert alumni from developing countries on Mining 4.0 will take place in Freiberg in anticipation of the Berlin re.publica 2019 IT Trade Fair and Conference. Participants must show evidence of experience with the subject as demonstrated in a poster which is to be submitted as a requirement for successful application. The seminar will give first-hand experience on Mining 4.0 in the current research activities of TU Bergakademie Freiberg and in the mining industry in Germany.



IMRE Alumni Meeting 2019 in Mongolia



The 2019 IMRE Alumni Seminar will take place at German Mongolian Institute for Resources and Technology (GMIT).

The general theme of the seminar is devoted to mining activities and nature protection. Both issues are of high relevance in this country, which generates a very large portion of its income from mining and, at the same time, has vast areas of its territory devoted to nature protection. The topics include:

- Assessment and evaluation of water resources – hydrology and

availability

- Evaluation of soils and soil management
- Evaluation of ecological services of forests
- Economics of rehabilitation and recultivation of mining sites
- Costs and benefits of national parks and nature conservation areas
- Re-evaluation of traditional and artisanal techniques of natural resources for human consumption
- Nature and natural resources represented in art works



The GMIT Campus