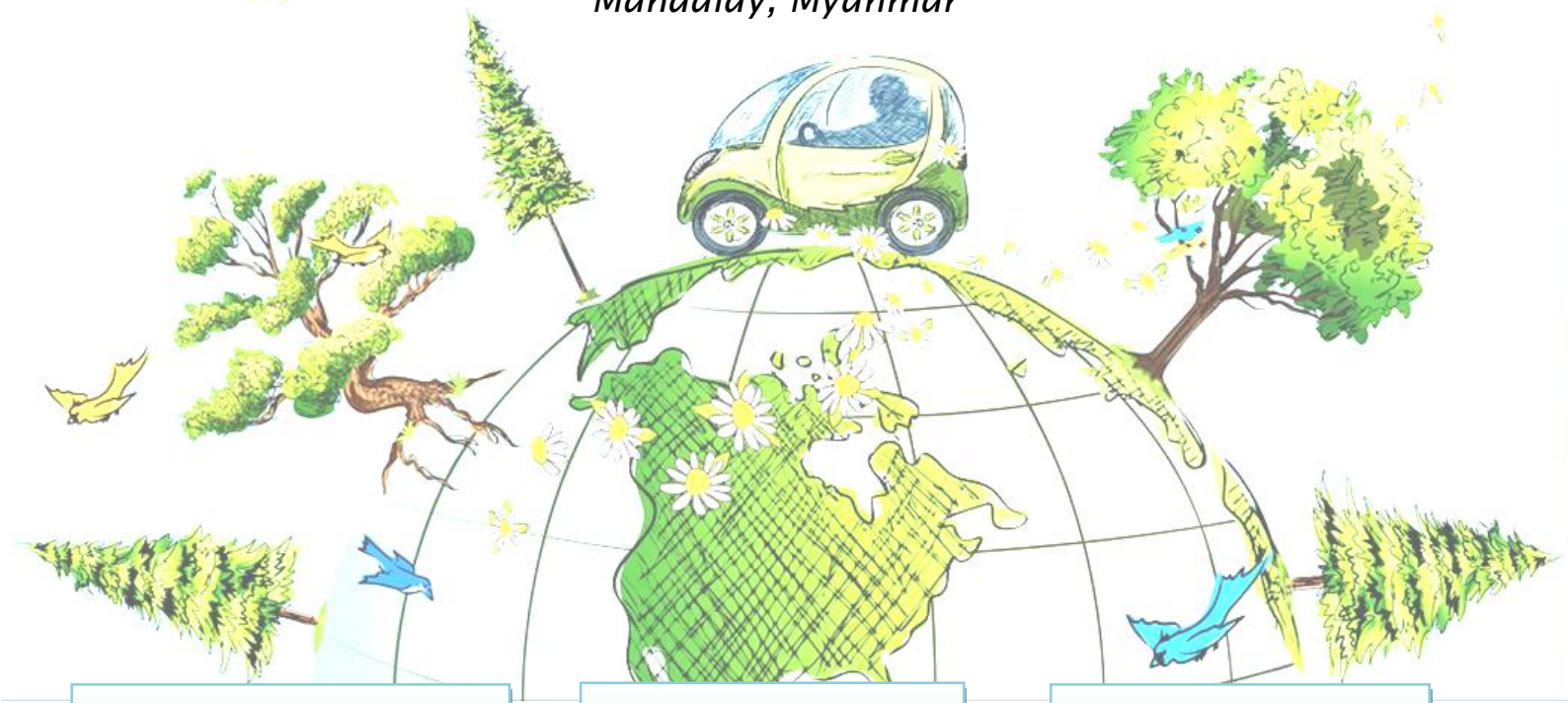
PROGRAM

THE 8TH GMSARN INTERNATIONAL CONFERENCE 2013 ON

Green Growth in GMS: Energy, Environment and Social Issues

18-20 December 2013
Sedona Hotel
Mandalay, Myanmar



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About GMSARN

The Greater Mekong Subregion (GMS) consists of Cambodia, China (Yunnan & Guangxi Provinces), Laos, Myanmar, Thailand and Vietnam.

The Greater Mekong Subregion Academic and Research Network (GMSARN) is composed of sixteen of the region's top-ranking academic and research institutions. GMSARN carries out activities in the following areas: human resources development, joint research, and dissemination of information and intellectual assets generated in the GMS. GMSARN seeks to ensure that the holistic intellectual knowledge and assets generated, developed and maintained are shared by organizations within the region. Primary emphasis is placed on complementary linkages between technological and socio-economic development issues.

The GMSARN current member institutions are the Asian Institute of Technology, Pathumthani, Thailand; The Institute of Technology of Cambodia, Phnom Penh, Cambodia; Kunming University of Science and Technology, Yunnan Province, China; National University of Laos, Vientiane, Laos PDR; Yangon Technological University, Yangon, Myanmar; Khon Kaen University, Khon Kaen Province, Thailand; Thammasat University, Bangkok, Thailand; Hanoi University of Technology, Hanoi, Vietnam; Ho Chi Minh City University of Technology, Ho Chi Minh City, Vietnam; The Royal University of Phnom Penh, Phnom Penh, Cambodia; Yunnan University, Yunnan Province and Guangxi University, Guangxi Province, China; Nakhon Phanom University, Nakon Phanom Province, Thailand; and Ubon Ratchathani University, Ubon Ratchathani Province, Thailand and another associate members are Mekong River Commission, Vientiane, Laos PDR. These institutions together with the Asian Development Bank are being represented in the GMSARN Board by their respective Rectors, Presidents and Representatives.

Contents

Greetings from Conference Chair

It is my great pleasure to chair "the Eight GMSARN International Conference 2013 on "*Green Growth in GMS: Energy, Environment and Social Issues*". On behalf of organizing committee, I take this opportunity to welcome you all to this prestigious international conference.

A Green Economy is the vital links between economy, society, and environment taking into account the transformation of production processes, production and consumption patterns, while contributing to a reduction per unit in reduced waste, pollution. The use of resources, materials, and energy in an environmental friendly manner will revitalize and diversify economies, create well-mannered employment opportunities, promote sustainable trade, reduce poverty, and improve equity and income distribution. With the growing technologies surrounding the internet there is a good opportunity to build a firm network that would contribute to promote Subregional Sustainable Development.

It is my pride that the Greater Mekong Subregion Academic and Research Network (GMSARN) Secretariat is situated in Asian Institute of Technology, Thailand. GMSARN through its Research and Education Project seeks to ensure that the holistic intellectual knowledge and assets generated, developed and maintained are shared by organizations within the Subregion. Network consists of 15 premier universities and research institution in the Subregion spreading over six member countries. GMSARN platform can also be used to develop *joint academic, research, and outreach programs* within member institutes.

The conference is organized by Greater Mekong Subregion Academic and Research Network (GMSARN) and co-organized by Asian Institute of Technology (AIT), Yangon Technological University (YTU) and Mandalay Technological University (MTU). In organizing this conference, GMSARN has been assisted and guided by our International Advisory Committee. The cooperation has been given by our co-organizers, colleagues, and friends from institutions in GMS and beyond words of appreciation.

I take this great honor to thank the co-organizers, sponsors, for their esteemed support and cooperation. Finally, I would like to thank once again the participants of the conference and wish that you enjoy the conference, your stay in Mandalay city.

Prof. Worsak Kanok-Nukulchai
Interim President
Asian Institute of Technology
P.O. Box 4, Klong Luang,
Pathumthani 12120, Thailand

Organizing Committee

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Prof. Worsak Kanok-Nukulchai
Interim President, Asian Institute of Technology

Co-Chair

Dr. Aye Myint
Rector, Yangon Technological University & Mandalay Technological University

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Conference Purposes

GMS regions are facing various common problems - water & food, energy, environment and social issues. GMS countries are to achieve the global green growth with sustainability. The concept of green growth from Ministerial Conference on Environment and Development (MCED) is a strategy for achieving sustainable development. It is focused on overhauling the economy in a way that synergizes economic growth and environmental protection, building a green economy in which investments in resource savings as well as sustainable management of natural capital are drivers of growth. To address these critical issues, the International Conference 2013 on "***Green Growth in GMS: Energy, Environment and Social Issues***" is a three-day platform for knowledge dissemination by a diverse group of researchers and participants.

The rationale of the GMSARN 2013 is to initiate and stimulate international discussion and enhance research networking. The conference can be used as a platform on a regional and global level. Thus, it can contribute to sustainable development, and solve transboundary issues related to energy, environment and social development. The GMSARN International Conference is a multi-disciplinary conference which is problem oriented focus. In this aspect, GMSARN Conference is unique hosting a wide range of disciplines that would generate shared solutions to existing problems, regionally and globally. In addition, the conference aim is to provide a forum to disseminate the research and development findings on various sustainable developments in the GMS. It is also envisaged that the conference will be able to generate shared solutions beneficial to the GMS and the findings and recommendations should also be useful for GMSARN education and research programs.

Contact Address

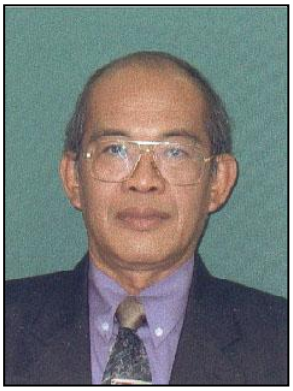
The 8th GMSARN International Conference 2013 on "*Green Growth in GMS: Energy, Environment and Social Issues*".

Assoc. Prof. Dr. Weerakorn Ongsakul
GMSARN Secretary General and Conference Coordinator
Asian Institute of Technology
P. O. Box 4, Klong Luang, Pathumthani 12120, Thailand
Office Tel: +66-2-524-6537
E-mail: gmsarn@ait.ac.th; Website: http://www.gmsarn.com

Venue

The conference venue will be held at Sedona Hotel, Mandalay, Myanmar.

Keynote Address I



"Social Business and Social Enterprise"

Mr. Wilas Techo
Vice President
Population & Community Development Association (PDA)
Bangkok, Thailand

Mr.Wilas Techo received B.Sc. in Health Education from Mahidol University, Thailand, M.A. in Population Research from University of Exeter, United Kingdom (WHO scholarship). He has started working for PDA since 1974, as one of the pioneer and founder staff member of PDA. As a vice president in PDA, he currently is a managing director of Mahasarakham-Banphai Development co.ltd., Rural Environmental and Sanitation Development co.ltd., and Krabi Khaokram development co.ltd . Furthermore, he plays an active role in International part as a director of Post-Tsunami Rehabilitation project, team Leader of the consultant team in the south (Krabi, Phang Nga and Surathani provinces) with Eu-funded project to Bank of Agriculture and Agricultural Cooperative (BAAC) on Social Support Program (SSP), during 2003-4, consultant of the Asian Development Bank (ADB), NGO center Manila, the Philippines on Civil Society Organization (CSO) in year 2002, National Coordinator on water supply and sanitation for WSSCC/WHO collaborative council, etc..

Keynote Address II

"Undergrounding Metropolitan Distribution Network: An Approach to Modernize Power Delivery towards AEC"

Mr. Asawin Rajakrom

Director of Substation and Underground Cable Installation Division
Metropolitan Electricity Authority, Bangkok, Thailand

Supplying electricity in metropolitan area is a real challenge for power distribution utility especially in preparing to approach an ASEAN Economic Community (AEC). The reliability and quality of power supply is of importance; but the electricity price shall also be competitive while the customer service is of excellence. Furthermore, the beauty of city landscape shall not be harmed by hanging network facilities. An underground power system on the other hand may pose very high cost to implement when compared to an overhead counterpart, but it seems to be an excellent choice to cope with above mentioned criteria. However, the management of underground system asset must be strategically and systematically implemented; otherwise, it may pose the other problems to system management such as impact to public lives during construction, flexibility for operation, complication of maintenance works, and so on. So that the asset management methodology shall be employed to guarantee the modernization of underground power delivery in metropolitan area. In this discussion, the difficulties in managing the underground distribution network in metropolitan area should be discussed and then an approach to effectively manage such obstacles should be proposed in order to achieve the business objectives. Based on the asset management methodology, the urban underground asset management cycle starts from asset planning which involves how to configure the network. Network configuration should provide the possibility for self-healing or automated operation. The network assets are then realized by cautiously selecting the appropriate construction methods, obtaining high quality equipment and installing and commissioning by proficient workforce. The operation and maintenance of undergrounding assets shall be adopted in such a way that the reliability and quality of power supply can be ensured. Finally, the disposal of assets when it reaches its design life shall also be carried out in strategic manner. In addition, the social and environmental impact shall also be taken into account in order to compromise impacts of implementation to the public and also help utility promote the corporate social responsibility (SCR) agenda. In this presentation, some implementation cases of undergrounding distribution network in Bangkok metropolitan area will be used to exemplify the discussion.

Mr.Asawin Rajakrom received B.Eng. in Electrical Engineering from Khon Kaen University, Thailand, M.Sc. in Electricity Industry Management and Technology from University of Strathclyde, Scotland and Ph.D. in Knowledge Management from Chiang Mai University, Thailand. He has started working for MEA since 1986, as an electrical engineer responsible for installation and commissioning of substation equipment. As a director of division, he currently manages the installation and commissioning of substation equipment and underground cables in MEA distribution system. Furthermore, he plays an active role in MEA International Service Business as a lecturer, consultant, and project manager for training and technical services that MEA provides for oversea electricity agencies.

Program at a Glance (1)

Day One: 18 December 2013 (Wednesday)			
08:00 – 08:30	**Registration & Lunch**		
Opening Ceremony			
08:30 – 08:45	**Introductory Speech by** *Assoc. Prof. Dr. Weerakorn Ongsakul, GMSARN Secretary General*		Amarupura Conference Hall
08:45 - 09:00	**Openning & Welcome Address by** *Dr.Aye Myint, Rector, Yangon Technological University, Myanmar*		
09:00 - 09:30	**Keynote Address I:** *"**Social Business and Social Enterprise**"* *Mr. Wilas Techo, Vice-President,Population & Community Development Association (PDA), Thailand*		
09:30 – 10:00	**Keynote Address II:** "***Undergrounding Metropolitan Distribution Network: An Approach to Modernize Power Delivery towards AEC***" *Mr. Asawin Rajakrom, Director of Substation and Underground Cable Installation Division, Metropolitan Electricity Authority, Thailand*		
10:15 – 10:15	**Coffee / Tea Break**		
Morning Parallel Sessions			
10:15 - 12:00	**Parallel Session** Energy I:	E01 – E06	Room No. 1
	Environment I:	Env01 – Env05, Env13-16, Env20	Room No. 2
12:00 – 13:00	**Lunch**		
Afternoon Parallel Sessions			
13:00 – 15:00	**Parallel Sessions** Energy II:	E07 – E11, E17	Room No. 1
	Sustainable Development I:	SD01 – SD08, SD25	Room No. 2
15:00 – 15:15	**Coffee / Tea Break**		
15:15 – 18:00	**Parallel Sessions** Energy III:	E12– E22	Room No. 1
	Sustainable Development II:	SD09 – SD16, SD24, SD26	Room No. 2
18:30 – 21:00	**Reception Dinner at Golden Duck Restaurant**		

Program at a Glance (2)

Day Two: 19 December 2013 (Thursday)			
04:00 – 20:30	**One Day Field Visit in Mandalay**		

Day Three: 20 December 2013 (Friday)			
Morning Parallel Sessions			
08:30 - 10:00	**Parallel Session** Energy IV:	E23– E25, E27, E28	Room No. 1
	Environment II:	Env06 – Env12	Room No. 2
10:00 - 10:15	**Coffee / Tea Break**		
10:15 – 11:45	**Parallel Session** Sustainable Development III:	SD17 – SD23	Room No. 1
	Environment III:	Env09, Env17 – Env19	Room No. 2
11:45 – 12:00	**Recap and Closing Remark by** *Assoc. Prof. Dr. Weerakorn Ongsakul, GMSARN Secretary General*		
12:00 – 13:00	**Lunch**		

Detailed Program

DAY ONE: 18 December 2013

08:30 – 10:00	**Opening Ceremony & Keynote Session**	**Confernce Hall**
08:30 – 08:45	**Introductory speech by** Assoc. Prof. Dr. Weerakorn Ongsakul, GMSARN Secretary General	
08:45 – 09:00	**Openning & Welcome address by** Dr. Aye Myint, Rector of Yangon Technological University, Myanmar	
09:00 – 09:30	**Keynote Speaker I: "Social Business and Social Enterprise" by** Mr. Wilas Techo, Vice-President, Population & Community Development Association (PDA), Thailand	
09:30 – 10:00	**Keynote Speaker II: "Undergrounding Metropolitan Distribution Network: An Approach to Modernize Power Delivery towards AEC" by** Mr. Asawin Rajakrom, Director of Substation and Underground Cable Installation Division, Metropolitan Electricity Authority, Thailand	
10:00– 10:15	**Coffee / Tea Break**	
10:15 – 12:00	**Day One Parallel Sessions in the Morning**	
10:15 – 12:00	**ENERGY I**	**Room No.1**
Session Chairman: ***Dr. Vo Ngoc Dieu, Ho Chi Minh University of Technology, Vietnam***		
E-01	Design and Feasibility Analysis of Solar Water Pumping System for Irrigation *Aye Chan Myae and Myat Myat Soe*	*Myanmar*
E-02	Energy Potential of Biogas Production From Animal Manure in the Lao People Democratic Republic *Dethanou Koumphonphakdi and Ratchaphon Suntivarakorn*	*Thailand*
E-03	A Study of Electrical Energy Consumption and Electrical Energy Conservation in Luangprabang Province, Lao People's Democratic Republic *Ratchaphon Sutivarakorn, Wasakron Treedet and Thongpan Bunsanit*	*Thailand*
E-04	Reliability Centered Maintenance (RCM) Implementation on PEA Power Distribution Systems: A Case Study of Bang-Pa-In Branch Office *Watchara Pobporn, Onurai Noohawm, and Dulpichet*	*Thailand*
E-05	The effect of contact resistance on PEA power transmission systems *Yuttana Yimprasert, Onurai Noohawm, Dulpichet Rerkpreedapong and Winai Plueksawan*	*Thailand*
E-06	Design Biogas Production from Mixed Napier Pak Chong I/Food Waste at Thermophilic Temperature by Anaerobic Digestion in Cow Dung and Chicken Dung *Lertluck Saitawee, Kanokorn Hussaro, Sombat Teekasap and Noppadon Cheamsawat*	*Thailand*

10:15 – 12:00	**ENVIRONMENT I**	**Room No.2**
Session Chairman: ***Mr. Cherid Kalayanamitr, EGAT, Thailand***		
Env-01	Effects of feed velocity on efficiency of cassava starch separation using sieve bend screen *Nut Chaiatchanarat, Ruenrom Lerdlattaporn, Wiwat Ruenglertpanyakul, Annop Nopharatana, and Warinthorn Songkasiri*	*Thailand*
Env-02	The effect of Si/Al ratios on the properties of geopolymers prepared from water treatment residue (WTR) waste material *Naprarath Waijarean, Suwimol Asavapisit, Kwannate Sombatsompop, Kenneth J.D. MacKenzie*	*Thailand*
Env-03	Carbon Dioxide Emission in KhonKaen University *Ratchaphon Sutivarakorn, Wasakron Treedet and PhumiphatSudsuk*	*Thailand*
Env-04	Adoption of Near Zero Waste Concept for the Tapioca Starch Production Industry: A Case Study in Thailand *Ruenrom Lerdlattaporn, Kanchana Saengchan, Worapod Lerdlattaporn, and Warinthorn Songkasiri*	*Thailand*
Env-05	Estimation of Greenhouse Gas Emission from Landfill in Luangprabang, Lao PDR *Xaysackda Vilaysouk and Sandhya Babel*	*Thailand*
Env-13	Organic Agriculture Subscription System in University Context *Montalee Sasananan*	*Thailand*
Env-14	Biodegradation Kinetic Coefficients of Hospital Wastewater *Tharatorn Jiamvittayasrikul, Panomchai Weerayutsil, and Kulyakorn Khuanmar*	*Thailand*
Env-15	Case Study of Wastewater Treatment from Fishing Net Softening Process *Weerapong Khantee, Panomchai Weerayutsil, and Kulyakorn Khuanmar*	*Thailand*
Env-16	Removal of Crystal Violet and Safranin by Fenton Reaction *Soraya Pimonporn, Panomchai Weerayutsil, and Kulyakorn Khuanmar*	*Thailand*
Env-20	Groundwater Contamination and Management in Urban Cities in Greater Mekong Subregion (GMS) *Chanya Pokasoowan*	*Thailand*

12:00 – 13:00	**Lunch**

13:00 – 18:00	**Day One Parallel Sessions in the Afternoon**

13:00 – 15:00	**ENERGY II**	**Room No. 1**
Session Chairman: ***Prof. Yaw-Juen Wang, National Yunlin University of Science and Technology, Taiwan***		
E-07	General Smart Grids Concepts and Future Power Supply Systems *Gumpanart Bumroonggit, Worpong Sinsukthavorn,*	*Thailand*

	SakulPochanart	
E-08	Bilateral Contract for Electricity Retailer using the Risk Adjusted Capital Asset Pricing Model: A Case of Thailand *Pasapong Gamonwet*	*Thailand*
E-09	A Comparative Study of Two Control Algorithms for Balancing a Single-phase Powered Three-phase Induction Motor *Yaw-Juen Wang, Ruey-Long Sheu, En-ChingLian and Ding-Sian Cai*	*Taiwan*
E-10	Monte Carlo Simulation of Partial Shading of Photovoltaic Arrays *Yaw-Juen Wang, Ming-Jeng Huang and Wen-Chin Zeng*	*Taiwan*
E-11	A study on measures towards Green Building case study of the AIT Energy Building *Supan Thonprom*	*Thailand*
E-17	Maximum Installed Capacity of Solar Power Plant in Thailand By Considering Actual Hourly Load Profile *Chokechai Sansilah, Vivat Chutiprapat, Pornrapeepat Bhasaputra and Woraratana Pattaraprakorn*	*Thailand*

13:00 – 15:00 **SUSTAINABLE DEVELOPMENT I** **Room No. 2**

Session Chairman: *Dr. Sandhya Babel, Thammsat University, Thailand*

SD-01	The Development of Hotel Business in Lao PDR *Saynakhone INTHAVONG, Phanhpakit ONPHANHDALA, and Zhou CHANGCHUN*	*Lao PDR*
SD-02	Street Food in Pattaya: Situation and Prospects *ApisekPansuwan, SuchedSamuhasaneetoo, KanlayaTienwong, PiyachatChaiuar, PhonpatHemwan, SuteeSunitsaku and Vitoon Nil-Ubon*	*Thailand*
SD-03	Institutional Creativity in the Human Resource Management (HRM) System in Laos: Case of Ministry of Public Works and Transports *Thongchanh KIMANIVONG, Bounlouane Douangngeune, and Ke Xing*	*Lao PDR*
SD-04	Society & Education: Lessons from Japan *Olivier Gervais and MasazumiAo*	*Japan*
SD-05	Using Experimental design in Tourism Related Research *Thitikan Peace Satchabut*	*Thailand*
SD-06	Leaching Potential of Nanosilver from Commercial Products *Pawena Limpiteeprakan and Sandhya Babel*	*Thailand*
SD-07	Community's benefits from the tourism growth and tourism site development in VangVieng district of Vientiane province, Lao PDR *Khamtanh SALIANKHAM, Bounlouane Douangngeune and Zhang Bin*	*Lao PDR*
SD-08	Tourist satisfaction of tourism growth and tourism site development in VangViengdistrict of Vientiane province , Lao PDR *Khamtanh SALIANKHAM, Bounlouane Douangngeune and Zhang Bin*	*Lao PDR*
SD-25	Simulation Modeling for Urban Freight Transportation in Vientaine City, Lao PDR	*Lao PDR*

Anousack Thammavong and Boualinh Soysouvanh

15:00– 15:15 Coffee / Tea Break

15:15 – 18:00 **ENERGY III** **Room No. 1**

Session Chairman: ***Asst. Prof. Dr-Ing. Thanapong Suwanasri, TGGS-KMUTNB, Thailand***

E-14	Investment risk management to enhance feasible of LED project in chemical industry *Suthisak Temkasemsuk, Pornrapeepat Bhasaputra, Woraratana Pattaraprakornand Kitti Tirawannavit*	*Thailand*
E-15	Failure Rate Analysis of Power Circuit Breaker in High Voltage Substation *Thanapong Suwanasri, Cattareeya Suwanasri, and May Thandar Hlaing*	*Thailand*
E-16	The Integrated Energy and Environmental Management for The Expressway Authority of Thailand. *Vivat Chutiprapat, Chokechai Sansilah, Pornrapeepat Bhasaputra and Woraratana Pattaraprakorn*	*Thailand*
E-18	Development of Power Quality Controller for Renewable Energy Electric Hybrid Generation *Warunee Srisongkram, Wanida Pusorn , Kittiwat Chiangchin, and Krischonme Bhumkittipich*	*Thailand*
E-19	Failure Frequency Analysis of Power Circuit Breaker for Preventive Maintenance *Thanapong Suwnansri, Warunee Srisongkram, and Cattareeya Suwanasri*	*Thailand*
E-20	Simulation of Potential and Electric Field Due to Defective Insulator in 115 kV Transmission Line *Siamrat Phonkaphon and Pramuk Unahalekhaka*	*Thailand*
E-21	SPP Loss Allocation by Cooperative Games *Sopa Heng, Onurai Noohawmand Dulpichet Rerkpreedapong*	*Thailand*
E-22	Outage Cost of High Energy Consumption Industry *Chaliew Ketkaew, Onurai Noohawmand Dulpichet Rerkpreedapong*	*Thailand*
E-12	*Optimal Allocation of Maintenance Resources Based on a Reliability Improvement Opportunity Evaluation of Electric Power Utilities* *N. Teera-achariyakuland D. Rerkpreedapong*	*Thailand*
E-13	*An Assessment method of Reliability Improvement on Power Distribution Systems in Large Cities* *Soraphon Kigsirisin, Noppada Teera-achariyakul, Onurai Noohawm, Vichai Surapatana and Dulpichet Rerkpreedapong*	*Thailand*

15:15 – 18:00 **SUSTAINABLE DEVELOPMENT II** **Room No. 2**

Session Chairman: ***Assoc. Prof. Dr. Vilas Nitivattananon, Asian Institute of Technology, Thailand***

SD-09	Integrated Job Analysis of Civil Servant in Lao PDR:Case of Ministry of Public Works and Transports *Souvanny RATTANAVONG*	*Lao PDR*
SD-10	Socio-Economic Impact and the Adaptation of BotenPeople under Chinese Transnationality *Sivarin Lertpusit*	*Thailand*

SD-11	Lao PDR Primary Health Care Expansion Project: A Case Study of Development Project Implementation Efficiency and Effectiveness *Anousone Rassavong, Mana Southichackand Saykhong Saynasine*	*Lao PDR*
SD-12	Consumer Perception and Attitude Study for Market Development of Hommali Organic Rice Products from Thung Kula, Thailand *Pensri Jaroenwanit and Pornpirat Kantatasiri*	*Thailand*
SD-13	Low Carbon Hotels towards Sustainable Tourism in Koh Chang and Neighboring Islands, Thailand *Rachnarin Nitisoravut, Nalikatibhag Sangsnit, Jaraspim Dhiralaksh, and Vilas Nitivattananon*	*Thailand*
SD-14	Low Cost Paper-Based and Capillary Tube-Based Microfluidic Systems *Bundit Boonkhao, Pairoh Sohsomboon and Saowanaporn Choksakulporn*	*Thailand*
SD-15	Ram Mamuat:A Reconfirmation of Thai-Khmer Cultural Identity in the Healing Ritual Context *Poonnatree Jiaviriyaboonya*	*Thailand*
SD-16	Streamflow Drought Events and Severity Analysis of Chi Basin in Thailand *Tipaporn Homdee and Pongput Kobkiat*	*Thailand*
SD-24	Public Spending, Aid Effectiveness and Poverty Reduction in Lao PDR *Keoviengxay SOURYA, Saykhong SAINASINH and Phanhpakit ONPHANHDALA*	*Lao PDR*
SD-26	Economic Rent from Hydropwoer Development in the Case of Lao PDR *Chansaveng BOUNGNONG and Daovong PHONEKEO*	*Lao PDR*

18:30 –21:00 Reception Dinner at Golden Duck Restaurant

DAY TWO: 19 December 2013

All day One day trip in Mandalay

DAY THREE: 20 December 2013

08:30 – 12:00 Day Three Paralle Sessions in the Morning

08:30 – 10:00 ENERGY IV Room No.1
Session Chairman: *Dr. Pornrapeepat Bhasaputra, Thammasat University, Thailand*

E-23	On-line Monitoring for Bushing of Power Transformer *Thanapong Suwnansri, Agkapon Pongmanee, and Cattareeya Suwanasri*	*Thailand*
E-24	Investigation on Overvoltage during No-Load Energization of 115 kV Underground Cable	*Thailand*

	Chaiwat Apianavit	
E-25	The Effect of Inter-Distance of the Main and the Auxiliary Grounding Systemin MEA's Power Distribution Substation *Att Phayomhom, Kiatiyuth Kveeyarn, Wiwat Kulwongwit and Jatuporn Thamjaroen*	*Thailand*
E-27	Implementation on LED Road Lighting in Bangkok *Jarin Halapee*	*Thailand*
E-28	The Integrated Energy and Risk Management of Lighting System for Petrol Station in Thailand: A Case Study of LED Technology *Kitti Tirawannavit, Pornrapeepat Bhasaputra, Woraratana Pattaraprakorn, and Suthisak Temkasemsuk*	*Thailand*

08:30 – 10:00 **ENVIORNMENT II** **Room No.2**

Session Chairman: *Asst. Prof. Dr. Chongchin Polprasert, Mahidol University, Thailand*

Env-06	Carbon emission from marine capture fisheries in Thailand based on a carbon-balanced model *Withida Patthanaissaranukool and Chongchin Polprasert*	*Thailand*
Env-07	Sustainable Consumption and Production Policy and Waste Management in Thailand *Alice Sharp and SiripornBoonpa*	*Thailand*
Env-08	Greenhouse Gas Emission from Municipal Solid Waste Managementin Phnom Penh, Cambodia *Chhay Hok Lis and Alice Sharp*	*Thailand*
Env-10	Current status of E-waste management in Vietnam: A case study of Ho Chi Minh City, Vietnam *Thao Quoc Tran and Alice Sharp*	*Thailand*
Env-11	Microwave-assistedSolvent-free Synthesis of Carboxylic Acid-modified Chitosan and Its Application as a Bioadsorbent for Selected Heavy Metals *Nopparat Plucktaveesak and Onnicha Kanchanamayoon*	*Thailand*
Env-12	Guidelines for E-Waste Environmental Pollution Prevention and Control of China *Liang Li and Alice Sharp*	*Thailand*

10:00– 10:15 **Coffee / Tea Break**

10:15 – 11:45 **SUSTAINABLE DEVELOPMENT III** **Room No.1**

Session Chairman: *Assoc. Prof. Dr. Gianluca Bonanno, Kyoto University, Japan*

SD-17	Pu Thala : Beliefs and Social Construction - The Sacred Land of Phuthai People in Renunakorn *Siriyaporn Saleepun*	*Thailand*
SD-18	The Model of Spending for Tourists in Nakhon Si Thammarat *Paramet Damchoo*	*Thailand*
SD-19	Website Trustworthiness: Medical Tourism in Thailand *Paramet Damchoo and Ann Suwaree Ashton*	*Thailand*
SD-20	Role of Disaster Management Capital in Japan *Saifon Suindramedhi*	*Thailand*
SD-21	The investment plan to develop the tourism sector in	*Thailand*

	Nakhonsrithammarat Thailand *Mongun Somkua, Anuman Chanthawong, and Kamolvun Laoyoung*	
SD-22	Strategies to support in term of learning for Voluntary Tourism in Thailand *Kamolvun Laoyoung, Anuman Chanthawong , Mongun Somkua*	*Thailand*
SD-23	Promising Integration: Letting the Weak Join the Game *Gianluca Bananno*	*Japan*

10:15 – 11:45 **ENVIORNMENT III** **Room No.2**

Session Chairman: ***Asst. Prof. Dr. Woraratana Pattaraprakorn, Faculty of Engineering, Thammasat University, Thailand***

Env-09	Geospatial Technology for Monitoring Status and Transformation Process of Environmental Quality in Southern Part of Myeik Archipelago Myanmar *Manjunatha V. and Theo Ebbers*	*Thailand*
Env-17	Finite Point Method for Convection-Dominated Flow Problems *Chinapat Buachart, and Worsak Kanok-Nukulchai*	*Thailand*
Env-18	Estimation of Groundwater Potential Zone Using Remote Sensing and Geographic Information System *Kyaw Zaya Htun, Myint Myint Khaing, Lal Samarakoon*	*Myanmar*
Env-19	Environmental Protection and Conservation Best Practices for Waste Management of Small Sized Hotels in the Southern Gulf of Thailand *Choosak Choosri and Ann S.Ashton*	*Thailand*

11:45 – 12:00 **Recap and Closing Remark** by Assoc. Prof. Dr. Weerakorn Ongsakul, GMSARN Secretary General **Room No. 1**

12:00 – 13:00 **Lunch**

Abstracts

Energy

E-01: Design and Feasibility Analysis of Solar Water Pumping System for Irrigation

Aye Chan Myae[1] and Myat Myat Soe[2]
[1]Mandalay Technological University, Mandalay, Myanmar. (Corresponding author to provide phone: +9592021864; e-mail: mapapa09@gmail.com)
[2]Mandalay Technological University, Mandalay, Myanmar. (e-mail: myatmyatsoe.mtu@gmail.com)

This paper presents the solar water pumping system to provide irrigation purpose for a number of innovative applications. The main objective of this paper is to design the centrifugal pump and to observe the flow analysis in the centrifugal pump with the aids of SolidWork software. The focus has been to supplement the water for 1 acre paddy field and the total head against which the pump has to work as 5m by using centrifugal pump. The flow rate of this pump is 0.0143 m^3/s and the motor speed is 1500 rpm. The flow analysis of centrifugal pump is carried out after designing the dimensions of centrifugal pump.This study focused on utilizing renewable energy, in particular solar energy, to supply water in irrigation system. The main contribution is to investigate the solar water pumping system to transport water for irrigation. According to solar radiation data of dry zone in Myanmar, system is analyzed to fulfill about 413 Wh/m^2. This system consists of one 1.1 kW centrifugal pump, photovoltaic (PV) panel (2013 OPAI 300W polycrystalline PV panels each having 300W power output together with a controller(320A) and battery(2P1101Ah lead acid battery) storage system.

E-02: Energy Potential of Biogas Production from Animal Manure in the Lao People's Democratic Republic

Dethanou Koumphonphakdi[1] and Ratchaphon Suntivarakorn[2]
[1]Department of Mechanical Engineering, Faculty of Engineering, Khon Kaen University, Thailand.
E-mail: dethanou@yahoo.com, Tel: +66 865265030
[2]head of Department of Mechanical Engineering, Faculty of Engineering, Khon Kaen University
E-mail: ratchaphon@kku.ac.th, Tel: + 66 819891983, Fax: +66 37347879

This paper presented a study of biogas production potential from animal manure in the Lao People Democratic Republic (Lao PDR). The data from four kinds of animal such as cow, buffalo, pig and chicken were surveyed and calculated in order to know the potential of biogas production. The feasibility study of biogas production from pig farm in a case study was also done in order to know the investment cost as the net present value (NPV), the internal rate of return (IRR), the payback period (PB) and the benefit cost ratio (B/C). From a study, it was found that the Lao P.D.R had 31,747,297 of all animals and the potential for biogas production was 806.70 m^3/year, which can produce the electricity of 1,129.39 million kWh/year. The highest potential for biogas production are in Salavanh, Savannakhet and Chapasack provinces, which had the potential to produce 162.96, 123.51, and 70.72 million m^3/year of biogas, respectively. In addition, from the feasibility study in a case study with 520 pigs, it was revealed that biogas production from pig manure was a high feasible project, which can produce biogas of 175.3 m^3/day or 245 kWh/day of electricity. The project cost is amount 174.70 million kip of investment for biogas production system. From the economic analysis of this study, it was found that the NPV was 144.77 million kip, the IRR was 22.96%, PB was 4.1 years and the B/C was

1.82. This project is suitable for investment and it can be a data base for set up the policy to promote the biogas production in the Lao PDR.

E-03: A Study of Electrical Energy Consumption and Electrical Energy Conservation in Luangprabang Province, Lao People's Democratic Republic

Ratchaphon Sutivarakorn[1], Wasakorn Treedet[2], and Thongpane Bounsanith[3]
[1]department of mechanical engineering, faculty of engineering, Khon Kaen university, Thailand. (corresponding author*) ; Email: ratchaphon@kku.ac.th, Tel. +66 819891983, Fax: +66 43347879.
[2]Farm Engineering and Automation Technology (FEAT) Research Group, Khon Kaen university, Thailand. ; Email: t.wasakron@gmail.com.
[3]department of mechanical engineering, faculty of engineering, Khon Kaen university, Thailand.

This research presents a study of electric energy consumption and electrical energy conservation in Luangprabang Province, Lao People's Democratic Republic. The electrical energy consumption of the province and the district of Luangprabang were collected by using the questionnaire and surveying in the households. Xieng Thong sub-district was selected to be a sample area for study the energy consumption and conservation. From the surveyed result, it was found that the energy consumption in Luangprabang Province was 83.32 million kWh/year, while the energy consumption in Luangprabang district was 58.90 million kWh/year. This was 70.80 % of the total energy consumption in Luangprabang Province. From the study of electrical consumption in Xieng Thong sub-district, it was found that Xieng Thong sub-district consumed 6.80 million kWh/year. The maximum energy consumption was mainly used in air condition system which was 789,246.53 kWh/year or 40.96 % of the total energy consumption. The next highest energy consumption was used in electrical appliance, cooking equipment and lighting system which consumed 775,092.30 kWh/year (40.23%), 210,514.69 kWh/year (10.93%) and 151,866.56 kWh/year (7.88%), respectively, The predicted energy consumption in 2015 was 11.91 million kWh/year, which was 5.11 million kWh/year or 42.91% higher than that of 2010. If the proposed projects are implemented, the energy consumption of 548,713.69 kWh/year will be decreased and the payback period will be 3.24 years.

E-04: Reliability Centered Maintenance (RCM) Implementation on PEA Power Distribution Systems: A Case Study of Bang-Pa-In Branch Office

Watchara Pobporn[1], Onurai Noohawm[2], and Dulpichet Rerkpreedapong[2]
[1]Department of Electrical Engineering, Faculty of Engineering, Kasetsart University and with Engineering & Maintenance Division, Provincial Electricity Authority (PEA), Area 1 (Central), Asia Rd., Hantra, Phra Nakhorn Si Ayutthaya 13000, Thailand. phone: 66-35-241-142 ext. 31413 Fax: 66-35-323-867; e-mail: watcharapob@hotmail.com, watchara.pob@pea.co.th
[2]Department of Electrical Engineering, Faculty of Engineering, Kasetsart University, 50 Ngamwongwan Rd., Ladyao, Chatuchak, Bangkok, 10900, Thailand. Phone: 66-2-797-9999 ext.1543; e-mail: dulpichet.r@ku.ac.th

This paper describes a Reliability Centered Maintenance (RCM) implementation on PEA power distribution systems. In order to achieve a cost-effective maintenance program, RCM is to prioritize the failure modes according to their effects, and then to select the effective maintenance activities for those failure modes. Preventive maintenance (PM) activities are mainly focused on the RCM program driven by the marginal benefit-to-cost ratio (B/C) between outage costs and maintenance costs. For a case study, Bang Pa In branch office located in Phra Nakhorn Si Ayutthaya Province, one of local power distribution utilities of Provincial Electricity Authority Central Area 1 (PEA C1) is selected for RCM implementation.

E-05: The Effect of Contact Resistance on PEA Power Transmission

Systems

Yuttana Yimprasert[1], Onurai Noohawm[2], Dulpichet Rerkpreedapong[2], and Winai Plueksawan[2]

[1]Provincial Electricity Authority (PEA Central Area 1) 46 Moo 6, Asian Highway, Tumbol Huntra, Phranakhon Si Ayutthaya, Thailand 13000. e-mail: mr_yim2@hotmail.com

[2]department of electrical engineering, Kasetsart University, 50 Ngam Wong wan Road, Lat-Yao, Chatuchak, and Bangkok, Thailand 10900. E-mail: nonurai@hotmail.com, dulpichet.r@ku.ac.th and winaiplus@yahoo.com

This paper presents hotspots inspection practices for overhead power transmission systems of Provincial Electricity Authority of Thailand (PEA). The selected inspection techniques using infrared thermography and contact resistance measurement can be performed while transmission lines are energized so that system reliability is not worsened. The Navanakorn industrial real estate located in Pathumtanee province of Thailand is selected as a case study to illustrate the inspection practices. After the detected hot spots are mitigated by appropriate corrective maintenance, the payoff is evaluated by a decrease in transmission losses resulted from hot spot correction.

E-06: Design Biogas Production from Mixed Napier Pak Chong I/Food Waste at Thermophilic Temperature by Anaerobic Digestion in Cow Dung and Chicken Dung

Lertluck Saitawee[1], Kanokorn Hussaro[1], Sombat Teekasap[2], and Noppadon Cheamsawat[3]

[1]Rattanakosin College for Sustainable Energy and Enviroment, Rajamangala University of Technology Rattanakosin, Puthamonthon Sai 5, Salaya, Puthamonthon, Nakhon Pathom, 73170, Thailand (corresponding author to provide phone: 66-2-441-6065; Fax:66-2-441-6065; e-mail: uki_ae@yahoo.com/lc_techno@yahoo.com)

[2]Eastern Asia University, Thanyaburi, Pathum Thani, 12110, Thailand. He is now with the department of Mechanical engineering, e-mail: teekasap@hotmail.com.

[3]University Technology Office for SMEs, King Mongkut's University of Technology Thonburi, Bangkok, Thailand. e-mail: noppadon.che@kmutt.ac.th.

Anaerobic digestion (AD) is a beneficial and efficient technique for the treatment of agricultural wastes, food wastes and wasteswater to produce renewable energy. Solid agricultural are potential renewable energy resoures. Biogas production by co-digestion of mixed napier pak chong I and food waste at thermophilic temperature using anaerobic digestion in cow dung and chicken dung as the seed inoculums were investigated. The total reactor volume of the co-digester reactor was 7.94 m^3, which was equipped with pump, and it was operated continuously for the 20 days as a pilot scale at 50 °C. The Napier pak chong I was cut into 2 mm sections and the initial volatile solids (VS) was 30%. The initial volatile solids (VS) of food waste were 70%. Two pilot-scale digesters filled with Napier pak chong I and food waste, which both digesters contained 476 kg of Napier pak chong I mixed 305 L of food waste, and 1,305 L of water. There were carried out to investigate the optimum carbon to nitrogen (C/N) ratio for effective biogas production. The slurry raw materials provided sufficient buffering capacity to maintain appropriate pH values (between 7.0 and 8.0). Digester I was designed for 1.98 m^3 of cow dung as the seed inoculum while digester II was designed to establish 1.98 m^3 of chicken dung as the seed inoculum. Analysis gas production is performed by gas detector. The experimental results indicate that total biogas production was 2.19 m^3/day in digester I and 1.86 m^3/day from digester II, resulting in specific methane yields of 1.26 and 1.07 m^3 CH_4/kgVS added, respectively. Biogas production in digester I was directly correlated with temperature.

E-07: General Smart Grids Concepts and Future Power Supply Systems

Gumpanart Bumroonggit, Worpong Sinsukthavorn, Sakul Pochanart

Electricity Generating Public Company Limited (EGCO), 222 EGCO Tower, 14th, 15th Fl., Moo 5, Vibhavadi Rangsit Road, Tungsonghong, Laksi, Bangkok 10210 Thailand. (66-2-998-5999; e-mail: gumpanart.bum@egco.com).

Distributed generation (DG) technologies such as wind systems, photovoltaic, fuel cells and micro turbines are integrating and becoming an alternative energy supply to assist the conventional power plants. The increased grid integration of these DG leads to control changes and significant structural in power supply systems. The efficient strategy and management are definitely required. This led to the idea of a "smart grid" which is an intelligent concept to handle the changing in future power supply systems. However, the existing conventional power systems could not be completely changed as they are enormous. Any new integration system should follow and base on the concepts of conventional power systems (i.e. hierarchy automation control, grid code, communication and etc.). In the paper, examples of conventional and distributed power plants in EGCO group are presented for understanding description and technical background of the reality operating plants. Finally, the general definition and concepts of smart grid are discussed.

E-08: Bilateral Contract for Electricity Retailer using the Risk Adjusted Capital Asset Pricing Model: A Case of Thailand

Pasapong Gamonwet
Provincial Electricity Authority, Thailand

Under the competitive market structure, the retailers have to purchase the electricity power from the spot market at the Market Clearing Price (MCP) or consider through bilateral contract at agreed price, while most customers pay for their electricity bill to the retailers at the fixed price. According to these different methods of purchasing and selling, there is a hardly avoidable risk associated with financial return for the retailers. This paper will use the methodology to offer a range of bilateral quantity and participatory price for retailer to guarantee their risk-limited payoff. The paper will provide two scenarios which are single retailer in the market provide electricity to the specific customers and two competitive retailers provide power to those royal customers and switched customers. The retail price will be defined by using financial quantitative method. Capital Asset Pricing Model (CAPM) will be used for financial analysis. Apart from that, the risk factor will be considered by using Risk Adjustment Recovery on Capital (RAROC). Additionally, Provincial Electricity Authority plan to install Smart Grid technology to the system. Under the Smart Grid technology, customers enable to manage their load via AMI. Hence, the paper will also define and compare the bilateral quantity and price for retailer under two scenarios - with and without installation of AMI.

E-09: A Comparative Study of Two Control Algorithms for Balancing a Single-phase Powered Three-phase Induction Motor

Yaw-Juen Wang[1], Ruey-Long Sheu[2], En-Ching Lian[3] and Ding-Sian Cai[3]
[1]department of electrical engineering, National Yunlin University of Science and Technology, Touliu, Yunlin County 64002, Taiwan. (Phone: +886-5-5342601; Fax: +886-5-5312065; e-mail: wangyj@yuntech.edu.tw)
[2]department of electrical engineering, Wu Feng University, Chiayi 62153, Taiwan, e-mail: rlsheu@wfu.edu.tw.
[3]the master program, department of electrical engineering, National Yunlin University of Science and Technology, Touliu, Yunlin 64002, Taiwan, e-mails: m10012206@yuntech.edu.tw, w3748414@hotmail.com.

Two algorithms are proposed in this paper for controlling a pair of static var compensators (SVCs) to balance a three-phase induction motor that is supplied from a single-phase source. By controlling the firing angles of the two SVCs, the motor is able to operate under balanced

conditions. The first algorithm is the speed-feedback method that directly computes the required values of the firing angles according to the motor speed. This method is straightforward and quick, but the motor parameters must be known and kept invariant. The second algorithm is the two-dimensional perturbation and observation method that searches the appropriate firing angles and balances the supply voltage of the motor. Simulation of the operation of the motor controlled by the two algorithms has been carried out using the ATP/ATPDraw. The both proposed algorithms are able to control the motor with satisfactory results.

E-10: Monte Carlo Simulation of Partial Shading of Photovoltaic Arrays

Yaw-Juen Wang[1], Ming-Jeng Huang[2], and Wen-Chin Zeng[2]

[1]department of electrical engineering, National Yunlin University of Science and Technology, Touliu, Yunlin County 64002, Taiwan. (Phone: +886-5-5342601; Fax: +886-5-5312065; e-mail: wangyj@yuntech.edu.tw)

[2]the master program, department of electrical engineering, National Yunlin University of Science and Technology, Touliu, Yunlin 64002, Taiwan, e-mails: sun49630240@hotmail.com, owayneo0803@gmail.com.

Partial shading often happens to photovoltaic (PV) arrays because of fallen tree leaves, snow, or bird dung that covers a part of PV modules. Partial shading of a PV array reduces its energy conversion efficiency and may cause hot spots that damage PV cells. While the performance of a shaded PV module can be analyzed using a simulation program, it is not that easy when the number and the location of shaded PV modules exhibit some degree of uncertainty. In this paper, Monte Carlo method is used to study the performance of a PV array with a random location of shaded modules. The influence of module connection configurations on the array performance when random partial shading occurs, is also studied.

E-11: A Study on Measures Towards Green Building Case Study of the AIT Energy Building

Supan Thonprom

Provincial Electricity Authority, 200 Ngamwongwan Road Jatujak Bangkok 10900, Thailand. Email: sup_ee@hotmail.com.

Building sector had shared 15 percent of final energy consumption in a year. This study proposes the preliminary assessment of GreenBuilding Standard for an existing building. This can reduce materials, resources and energy utilizations in building sector. However, it can keep thermal comfort and environmental friendly. For Green Building Standard, This study used Leadership in Energy and Environmental Design (LEED) Version 2009.

The LEED rating system was established by U.S. Green Building Council (USGBC). There provides building owners and operatorsand option and measures for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions. It has a 5 rating system. The study selectedGreen Building Operation Existing Building: Operation & Maintenance (EB: O&M) Rating System. The system is assessed in 5 groups.

Preliminary assessment, Energy Building earned 24 points and there did not passed all prerequisites. The major prerequisites were on Sustainable Sites and Water Efficiency. The study had conducted a review for improving and achieving higher points. There are 45 points, 57 points, 70 points and 89 points for certified, silver, gold and platinum respectively. For platinum level, the total investment cost was $ 316,640. The major groups are Facility Alterations and Additions, space condition system, photovoltaic system and building management system. This level could give the total annual income was $ 46,711/year. These are by energy saving, revenue

of photovoltaicand water bill reduction. By this, the payback period was 6.78 years.

E-12:

Optimal Allocation of Maintenance Resources and Reliability Benchmarking of Electric Power Utilities

N. Teera-achariyakul[1], and D. Rerkpreedapong[2]

[1]Department of Electrical Engineering, Faculty of Engineering, Kasetsart University, 50 Ngamwongwan Rd., Ladyao, Chatuchak, Bangkok, 10900, Thailand. Phone: 662-797-0999 ext. 2004 ; Fax: 662-797-0999 ext. 2006 ; e-mail: noppada@hotmail.com.

[2]Department of Electrical Engineering, Faculty of Engineering, Kasetsart University, 50 Ngamwongwan Rd., Ladyao, Chatuchak, Bangkok, 10900, Thailand. Phone: 662-797-0999 ext. 1543 ; Fax: 662-797-0999 ext. 1550 ; e-mail: dulpichet.r@ku.ac.th.

This paper develops a practical procedure to optimally allocate the maintenance resources for all 12 regions of Provincial Electricity Authority (PEA) of Thailand. In this research, supplementary maintenance activities are selected by the modified reliability centered maintenance analysis (RCM) to increase the reliability level of each region. Then, the reliability improvement opportunity (RIO) of power distribution systems can be assessed for each PEA region. The regional RIO curves are used for allocation of maintenance resources in order to minimize the customer-minute of interruptions (CMI) of the whole PEA system. The most cost-effective maintenance activities allocated by the proposed method can be further used to set a reliability benchmark for all PEA regions.

E-13:

An Assessment method of Reliability Improvement on Power Distribution Systems in Large Cities

Soraphon Kigsirisin, Noppada Teera-achariyakul, Onurai Noohawm, Vichai Surapatana and Dulpichet Rerkpreedapong

Department of Electrical Engineering, Kasetsart University, Bangkok, Thailand, 10900. E-mail: dulpichet.r@ku.ac.th

This paper presents an assessment method of reliability improvement on power distribution systems in large cities. First, appropriate activities are selected for reliability improvement such as converting overhead distribution lines to underground cables, replacing bare conductors (BC) and partial-insulated cables (PIC) with spaced aerial cables (SAC), installing load break switches with a Fault Detection Isolation and Restoration (FDIR) system. Then, the method of reliability assessment, which will be employed after the systems are improved, is proposed. For underground sections, the reliability is evaluated from the failure rate of installed compact type unit substations. For those remaining overhead power distribution systems (OPDS), the reliability indices can be evaluated by using interruption records classified by type of protective devices. Finally, the numerical results are obtained through the given procedure in terms of improved reliability indices, SAIFI and SAIDI, of the selected feeders in large cities of Thailand.

E-14:

Investment Risk Management to Enhance Feasible of LED Project in Chemical Industry

Suthisak Temkasemsuk[1], Pornrapeepat Bhasaputra[2], Woraratana Pattaraprakorn[3] and Kitti Tirawannavit[2]

[1]Department of Electrical and Computer engineering, faculty of engineering, Thammasat University, 99 M18 Phaholyothin Road. Khlongluang, Pathumthani 12120, Thailand. Phone: +66-81-8644123, +66-81-982-1001; E-mail: suthisak_t@hotmail.com.

[2] Department of Electrical and Computer Engineering, Faculty of Engineering, Thammasat University, 99 M18 Phaholyothin Road. Khlongluang, Pathumthani 12120, Thailand.

[3]Department of Chemical Engineering, Faculty of Engineering, Thammasat University, 99 M18 Phaholyothin Road. Khlongluang, Pathumthani 12120, Thailand

This paper studies risk management of the lighting replacement with LED in chemical industry. The comparison of existing fluorescent lamp, highbay mercury and metal halide with LED lamp luminaries was investigated and verified the best lighting system for office building and production area in the chemical industry. The investment cost, and financial analysis of different cases were evaluated to clarify the opportunities for investment. However the unit cost of LED is still higher than that of the existing lamps; the replacement plan with the appropriate time schedule and portion is concerned. Longer operating time per day is the first priority. The results from this study show that LED can be applied for energy saving which can reduce 45-65% of energy depending on the type and service hour of the existing lighting. In addition, chemicals industry in Thailand has used the existing lamps 5,000 – 15,000 lamps depending on the size of industry. Moreover, some parts of the existing lighting in chemical industry are necessary to protect the explosion from flammable chemicals. The unexpected accident of explosion is protected by setting up the standard of lighting explosion proof IEC and NEC standards. .

E-15:

Failure Rate Analysis of Power Circuit Breaker in High Voltage Substation

Thanapong Suwanasri[1], May Thandar Hlaing[2] and Cattareeya Suwanasri[3]

[1]the Sirindhorn International Thai – German Graduate School of Engineering (TGGS), King Mongkut's University of Technology North Bangkok (KMUTNB), 1518 Pracharat 1 Rd., Bangsue, Bangkok, 10800 Thailand. E-mail: thanapongs@kmutnb.ac.th.

[2]a master student of Electrical Power and Energy Engineering at TGGS, KMUTNB. E-mail: thandar.mtdh@ gmail.com.

[3]Department of Electrical and Computer Engineering, Faculty of Engineering, KMUTNB, Tel. +66-255-2000 Ext. 8518, Fax. +66-2585-7350, E-mail: cattareeyas@ kmutnb.ac.th.

This paper proposes the failure rates of power circuit breakers at the system voltage level of 115kV for control and protective system in power substation. Firstly, the recorded failure data of the existing power circuit breakers in the high voltage substations are analyzed. Secondly, the data analyzes are performed such as the classification of different failure types by separating three main groups such as live parts and insulation, control parts, and operating mechanism parts during the failure event year period from 1989 to 2011 including the total number of failed 607 power circuit breakers. Finally, failure rates and mean time between failures (MTBF) for all components in each main part can be estimated by using Weibull distribution technique is discussed for improving the reliability of the high voltage substations such as correct maintenance schedule or renovation tasks of equipment. The proposed method can also used with other high voltage equipment in the power system.

E-16:

The Integrated Energy and Environmental Management for The Expressway Authority of Thailand

Vivat Chutiprapat[1], Chokechai Sansilah[2], Pornrapeepat Bhasaputra[3], and Woraratana Pattaraprakorn[4]

[1]Thammasat University, Thailand. He is now the Ph.D candidate with the department of electrical and computer engineering, e-mail: vivat_chu@hotmail.com

[2]Thammasat University, Thailand. He is now the Ph.D candidate with the department of electrical and computer engineering, e-mail: vivat_chu@hotmail.com

[3]Thammasat University, Thailand. He is now with the department of electrical and computer engineering, e-mail: bporr@engr.tu.ac.th

[4]Thammasat University, Thailand. She is now with the department of chemical engineering, e-mail: pworarat@engr.tu.ac.th

This paper proposes the integrated energy and environmental management by considering high efficiency equipment, which is light-emitting diode (LED) lamp, inverter and

evaporative condensing air conditioner for The Expressway Authority of Thailand (EXAT). The EXAT spends two thirds of energy cost in electricity consumption, mainly from lighting and air conditioner. The comparison of the existing equipment with new proposed equipment is evaluated in term of energy consumption, environmental comfort and financial index. Lower energy consumption can be converted to the reduction of carbon dioxide equivalent. The result of this research will be a prototype of suitable solution for energy and environmental management.

E-17: Maximum Installed Capacity of Solar Power Plant in Thailand By Considering Actual Hourly Load Profile

C. Sansilah[1], V. Chutiprapat[2], P. Bhasaputra[2] and W. Pattaraprakorn[3]

[1]department of electrical engineering, Faculty of engineering, Thammasat University, 99 M18 Phaholyothin Road, Khlongluang, Pathumthani, 12120 Thailand.(corresponding author to provide phone: 66-89-1589-885)
e-mail: Chokechais@gmail.com

[2]department of electrical engineering, Faculty of engineering, Thammasat University, 99 M18 Phaholyothin Road, Khlongluang, Pathumthani, Thailand, 12120,
e-mail: vivat_chu@hotmail.com and bporr@engr.tu.ac.th

[3]department of chemical engineering, Faculty of engineering, Thammasat University, 99 M18 Phaholyothin Road, Khlongluang, Pathumthani, 12120 e-mail: pworarat@engr.tu.ac.th

This paper proposes an approach to determine the maximum installed capacity of solar power plants in Thailand by considering actual hourly load profiles and the various generated profiles of solar power. Load flow analysis has been applied to analyze the abnormality of the power system due to incremental uncertain generators. The capacity of solar power is limited by voltage stability and frequency response, depending on a characteristic of each power system. In this study, various generated profile and different capacities of solar power were integrated on difference location of the IEEE 30 bus test system under conditions of Thailand's load profiles. The results shown that in the case of spinning reserve of the system is 25 percent, the maximum installed capacity of solar power that can be integrated on each local bus are 20 percent of peaked load. While minimum voltage was observed at 0.92 p.u. on the weakest bus. However, the installed capacity of solar can be increased by increasing the spinning reserve of the system to maintain system reliability. Using this approach, the system operator can be utilized the results to make the protection and planning in order to integrate uncertain renewable source to the electric power system.

E-18: Development of Power Quality Controller for Renewable Energy Electric Hybrid Generation

Warunee Srisongkram[1], Wanida Pusorn[2], Kittiwat Chiangchin[2], and Krischonme Bhumkittipich[3]

[1]a lecturer and researcher at the Faculty of Engineering and Architecture, Rajamangala University of Technology Suvarnabhumi (RMUTSB), Nonthaburi Campus, 7/1 Nonthaburi 1 Road, Suanyai, Muang, Nonthaburi 11000, THAILAND. Email: waruneesri@hotmail.com

[2]researcher at RMUTSB. Email: pusorn_aa@hotmail.com

[3]currently a lecturer at Faculty of Engineeirng, Rajamangala University of Technology Thanyaburi, 39 Moo 1, Rangsit-Nakhonnayok Rd. Klong 6, Thanyaburi Pathum Thani 12110, THAILAND. Email: krischonme@rmutt.ac.th.

This paper presents the development of STATCOM for power quality controller of electric hybrid generation in renewable energy system. This voltage compensator compensates the STATCOM current signal with wind turbine generated voltage signal to constantly voltage supply to load that is less than 400 watts. In addition, the power electronic device so called SSCB is applied to be protective device in order to protect load from system fault that is detected

by microcontroller. The result shows that the voltage supplying to load is smoothly sinusoidal waveform. The system is fast in maintaining system voltage with instantaneous action.

E-19:

Failure Frequency Analysis of Power Circuit Breaker for Preventive Maintenance

Thanapong Suwnansri[1], Warunee Srisongkram[2], and Cattareeya Suwanasri[3]

[1]currently the lecturer at the Sirindhorn International Thai German Graduate School of Engineering (TGGS), King Mongkut's University of Technology North Bangkok (KMUTNB), 1518 Pracharat 1 Rd, Wongsawang, Bangsue, Bangkok, Thailand 10800. E-mail: thanapongs@kmutnb.ac.th.

[2]currently a doctoral student at the TGGS, KMUTNB. She is also a lecturer at Rajamagala University of Technology Suvarnabhumi, 7/1 Suan-Yai, Muang, Nonthaburi, Thailand 11000. Email: waruneesri@hotmail.com.

[3]currently the lecturer at Department of Electrical and Computer Engineering, Faculty of Engineering, KMUTNB. E-mail: cattareeyas@kmutnb.ac.th

This paper presents an analysis of historical failures of HV circuit breakers in Thailand's transmission network. The historical data of circuit breakers installed since 1989 to 2011 at three voltage levels as 115 kV, 230 kV and 500 kV are analyzed. The data has been classified into different types of circuit breakers and components. The main components are classified as major HV components, operating mechanism, and control circuit and others whereas the sub-components are also differentiated. The failure frequencies of those sub-components are then assessed in order to observe their failure characteristics in form of Bath-tub pattern, which is classified into three zones as teething, random and ware-out zone. The results show failure frequency of sub-components of only 230 kV circuit breakers. Finally, the preventive maintenance for the circuit breakers can be effectively managed due to actual failure behavior. Consequently, the failure rate of the equipment can be reduced resulting in better power system reliability.

E-20:

Simulation of Potential and Electric Field Due to Defective Insulator in 115 kV Transmission Line

Siamrat Phonkaphon[1] and Pramuk Unahalekhaka[2]

[1]Dept. of Electrical Engineering, Faculty of Industrial Education, Rajamangala University of Technology Suvarnabhumi, 7/1 Nonthaburi 1 Rd, Nonthaburi, 11000, Thailand, P_siamrat@hotmail.com

[2]Dept. of Electrical Engineering, Faculty of Engineering and Architecture, 7/1 Nonthaburi 1 Rd, Nonthaburi, 11000, Thailand, Pramuk@rmutsb.ac.th

This paper described to study the potential and electric field of suspension insulator in 115 kV transmission line associated with ANSI type 52-3. The suspension insulator type 52-3 was used by Provinical Electricity Authority (PEA) in Thailand. The suspension insulator was the disc insulators; it is an assembly of one or more shells with metallic fittings. This structure can enabled them form the insulator string by fitting into themselves one another as per voltage requirement. A suspension insulator set complete with the fittings was used to carry a line conductor or conductors at its lower end. The top of insulator string was fixed to the cross arm of the tower. The potential and electric fields were simulated by using the Finite Element Analysis (FEA) program. This simulation was compared the characteristic of suspension insulator due to defective insulator between normal and abnormal condition. The defective insulator was based on percentage of damage and surface pollution levels. However, the percentage of damage and surface pollution influence on the dielectric behavior of the insulators has been examined in order to reduce the effect of system.

E-21:

SPP Loss Allocation by Cooperative Games

Sopa Heng[1], Onurai Noohawm[2] and Dulpichet Rerkpreedapong[2]

[1]Rajamangala University of Technology Rattanakosin, Salaya, Thailand. Email:

Sopa.Hen@rmutr.ac.th, sopa_heng@hotmail.com.
[2]Department of Electrical Engineering, Faculty of Engineering, Kasetsart University, Bangkok, Thailand. Email: onurai@hotmail.com, dulpichet.r@ku.ac.th.

This paper presents the calculation method of transmission loss allocation including active and reactive losses when an SPP sells electrical power to its customers through 115 kV PEA networks. The concept of circuit theorem and cooperative game theory are together employed in the proposed method. Then, power losses can be allocated to each power producer by using the Shapley value method, and the simulation is performed by the PowerWorld Simulator. From the results, it is found that the SPP location is the key factor of loss allocation. In addition, impartial and reasonable results of loss allocation have been obtained from verifying the effectiveness of the proposed method.

E-22: Outage Cost Modeling of High Energy Consumption Industries

Chaliew Ketkaew[1], Onurai Noohawm[2] and Dulpichet Rerkpreedapong[2]
[1]Ragamangala University of Technology Suvarnabhumi, Suphanburi campus, 450 M.6, Suphanburi-Chainat Road, Yan-Yao, Samchuk, Suphanburi, Thailand 72130, E-mail: kchaliew@yahoo.com
[2]department of electrical engineering, Kasetsart University, 50 Ngam Wong Wan Road, Lat-Yao, Chatuchak, Bangkok, Thailand 10900. E-mail: nonurai@hotmail.com and dulpichet.r@ku.ac.th

This paper presents modeling of customer outage cost of large industries in Thailand considered from electrical energy consumptions. The selected industries are classified into six Thai Standard Industrial Classification (TSIC) customer groups consisting of foods, textiles, chemical and rubber, iron and steel, cement and fabricated metals industries. The 279 factories in the central region of Thailand were surveyed to collect information for outage cost evaluation. Next, customer outage costs of those factories are modeled by using the statistic regression and fuzzy regression methods. Then, both modeling are analyzed and compared using statistical techniques. Finally, the method of selection between both modeling is presented in order to obtain a better model for industrial customers of each TSIC. Consequently, the customer outage cost assessment can be achieved from the proposed methodology, which is simple and offers a fit model for individual industries.

E-23: On-line Monitoring for Bushing of Power Transformer

Thanapong Suwnansri[1], Agkapon Pongmanee[2], and Cattareeya Suwanasri[3]
[1]currently Head of the Electrical and Software System Engineering Department at the Sirindhorn International Thai German Graduate School of Engineering (TGGS), King Mongkut's University of Technology North Bangkok (KMUTNB), 1518 Pracharat 1 Rd, Wongsawang, Bangsue, Bangkok, Thailand 10800. E-mail: thanapongs@kmutnb.ac.th.
[2]currently a master student at the TGGS) KMUTNB. E-mail: thanapongs@kmutnb.ac.th.
[3]currently the lecturer at Department of Electrical and Computer Engineering, Faculty of Engineering, KMUTNB. E-mail: cattareeyas@kmutnb.ac.th.

This paper presents the on-line monitoring system for bushing of large power transformer. The system is aimed to detect the degradation of bushing and provides the alarm before bushing failure. Generally the high voltage bushing is produced as a condenser type bushing, consisting of several paper insulation layers separated with conductive foils for each layers. Thus the degradation of internal insulation will affect the value of capacitance and power factor of insulation. These two parameters can be monitored on-line by installing the sensing device at the test tap of bushing. Then the changing of insulation capacitance will lead to the change of leakage current value through bushing insulation. In case of perfect bushing, the leakage current of each bushing should be equal and the summation of all three phase leakage current should be zero. If one bushing has problem with internal insulation, the leakage current will be higher. This makes the summation of current to be greater than zero. This knowledge is used to develop the detection and decision making algorithms in microcontroller and the

hardware will be developed to implement as on-line monitoring system for bushing of large power transformer in transmission system.

E-24: Investigation on Overvoltage during No-Load Energization of 115 kV Underground Cable

Chaiwat Apithanawit[1] and Asawin Rajakrom[2]

[1]an Assistant Chief of Power System Analysis Section at the Metropolitan Electricity Authority (MEA), 30 Soi Chidlom, Lumpini, Patumwan Bangkok, Thailand, 10330; E-mail: chaiwat.a@mea.or.th.

[2]a Director of Substation Equipment and Underground Cable Installation Division at the Metropolitan Electricity Authority (MEA), 1192 Rama IV Rd., Klongtoey, Bangkok, Thailand, 10110; Email: asawin.raja@mea.or.th.

There are several failure causes of power cable and its accessories during operation in MEA sub-transmission system. With an assumption that one of the root causes of XLPE insulation failure is the electrical stress resulting from switching overvoltage during no-load energization. Therefore, this paper presents a hypothesis regarding the 115 kV underground cables which damaged as a result of switching overvoltage. By applying the ATP-EMTP program, the maximum magnitude of the transient overvoltage between sending end and receiving end of MEA sub-transmission under *consideration* is *investigated*. The simulation results are *then* compared with the measurement results in order to investigate the cause of XLPE insulation failure based on the hypothesis.

E-25: The Effect of Inter-Distance of the Main and the Auxiliary Grounding System in MEA's Power Distribution Substation

A. Phayomhom[1], K. Kveeyarn[2], W. Kulwongwit[3], and J. Thamjaroen[4]

[1]Power System Planning Department, Metropolitan Electricity Authority (MEA), 1192 Rama IV Rd., Klong Toey, Bangkok, 10110, Thailand. phone: +66-2-348-5561; Fax:+66-2-348-5133; e-mail:att_powermea@hotmail.com, attp@mea.or.th

[2]Department of Electrical Engineering, Faculty of Engineering, Kasetsart University, 50 Ngam Wong Wan Rd., Ladyao, Chatuchak, Bangkok, 10900, Thailand. Phone: +66-2-797-0999 ext.1516; e-mail: fengkyk@ku.ac.th

[3]The Engineering Institute of Thailand (EIT) and with Watts Consultant Co., Ltd., 5/1250 Baan Prachachuen Soi 8, Samakee Street, Pakred, Nonthaburi, 11120, Thailand. phone: +66-2-980-0596-7; Fax: +66-2-503-7071; e-mail: watkul@ksc.th.com

[4]Power System Planning Department, Metropolitan Electricity Authority (MEA), 1192 Rama IV Rd., Klong Toey, Bangkok, 10110, Thailand. phone: +66-2-348-5559; Fax: +66-2-348-5133; e-mail: jatupornt@mea.or.th

This paper presents the electrical effect of two neibouring distribution substation during the construction phase. The study performed in the paper can be divided in 3 parts. 1) The effect of unconnected grids versus their inter-distances and soil resistivity: the greater their inter-distance, the more the ground potential rise (GPR) and maximum touch voltage, but the less the maximum step voltage. 2) The effect of connected grids versus their different inter-distance and soil resistivity: All the three voltages are trend to decrease when the grids are connected, with the exception that when the grids' inter-distance is short and the grid conductor buried in the two-layered soil that the upper soil layer resistivity is lower and the size of auxiliary grounding system (auxiliary ground grid) is equal or smaller than the main ground grid, their maximum touch voltages will not come down *but* go up instead. 3) The effect of size of grid of auxiliary grounding system: the bigger the size of auxiliary grounding grid, the lower the GPR, maximum touch and step voltage, with the exception that when the two grids are unconnected, i.e. the bigger the size of auxiliary grounding grid, the higher the maximum step voltage. The results in this paper could be served as design guideline of grounding system, and perhaps remedy of some troublesome grounding grids in MEA's power system.

E-27: Implementation on LED Road Lighting in Bangkok

Jarin Halapee
An Electrical Engineer 8 in Research and Development Department, MEA. E-mail: jarinh@mea.or.th

This paper presents the study on implementation of a light-emitting diode (LED) luminaire for road lighting in metropolitan area that is been responsible by the Metropolitan Electricity Authority (MEA), Thailand. The LED luminaire were carefully selected in accordance with the MEA and international standards. This is to ensure that such LED luminaire can provide the same value of illuminance as offering by existing luminaires using High Pressure Sodium (HPS) and High-pressure Mercury Vapour (HQV) lamps; but it consumes much lower power. Upon the study, the DIALux program was used to simulate the roadway illumination in several site installations of different landscapes. Various conditions were carefully selected and implemented. The illumination provided by new LED luminaire was then compared against that by the existing luminaires using HPS 250W and HQV 125W lamps. The result shows that the replacement of HPS 250W by LED 140W can reduce power consumption by 169 W/luminaire, which is accounted for 56.5 % reduction. The energy saving can be achieved by 740.22 kWh/luminaire/year, which corresponds to reduction of CO_2 of 0.444 ton/luminaire/year. Furthermore, the replacement of HQV 125W by LED 55W can also reduce power consumption by 92.7 W/luminaire, which is accounted for 64.4 % reduction. As well, the energy saving can be realized by 406.03 kWh/luminaire/year, which corresponds to reduction of CO_2 of 0.243 ton/luminaire/year. Finally, the total energy consumption and cost from the road lighting load can be effectively reduced.

E-28: The Integrated Energy and Risk Management of Lighting System for Petrol Station in Thailand: A Case Study of LED Technology

Kitti Tirawannavit[1], Pornrapeepat Bhasaputra[2], Woraratana Pattaraprakorn[3], and Suthisak Temkasemsuk
[1]Department of Electrical and Computer engineering, faculty of engineering, Thammasat University, 99 M18 Phaholyothin Road. Khlongluang, Pathumthani 12120, Thailand.
[2]Pornrapeepat Bhasaputra and Suthisak Temkasemsuk are with Department of Electrical and Computer Engineering, Faculty of Engineering, Thammasat University, 99 M18 Phaholyothin Road. Khlongluang, Pathumthani 12120, Thailand.
[3]Woraratana Pattaraprakorn is with Department of Chemical Engineering, Faculty of Engineering, Thammasat University, 99 M18 Phaholyothin Road. Khlongluang, Pathumthani 12120, Thailand.

This paper studies risk management of replacement the lighting with LED in petrol station. The comparison of existing fluorescent lamp and metal halide with LED lamp luminaries was investigated and verified the best lighting system for canopy area light and C-store in the petrol station. The investment cost, economics and financial analysis of different cases were evaluated to clarify the opportunities for investment. However the unit cost of LED is still higher than that of the existing lamps; the replacement plan with the appropriate time schedule and portion is concerned. Longer operating time per day is the first priority. The results from this study show that LED can be applied for energy saving which can reduce 51.77- 63.62% of energy depending on the type and service hour of the existing lighting.

Environment

Env-01: Effects of Feed Velocity on Efficiency of Cassava Starch Separation using Sieve Bend Screen

Nut Chaiatchanarat[1], Ruenrom Lerdlattaporn[2], Wiwat Ruenglertpanyakul[1], Annop Nopharatana[2], and Warinthorn Songkasiri[3]
[1]Department of Chemical Engineering, Faculty of Engineering, King Mongkut's University of

Technology Thonburi, 126 Prachauthit Road, Bangmod, Tungkru, Bangkok, 10140 Thailand. e-mail: wiwat.rue@kmutt.ac.th
[2]Pilot Plant Development and Training Institute (PDTI), King Mongkut's University of Technology Thonburi, 49 Soi Thian Thale 25 Thakham, Bangkhuntien, Bangkok, 10150, Thailand. e-mail: ruenrom.lerd@gmail.com e-mail: pon.ponna65@gmail.com
[3]Excellent Center of Waste Utilization and Management (ECoWaste), National Center for Genetic Engineering and Biotechnology (BIOTEC), 49 Soi Thian Thale 25 Thakham, Bangkhuntien, Bangkok, 10150, Thailand. (corresponding author to provide phone: 66-2-470-7524 ; Fax: 66-2-452-3455; e-mail: warinthorn@biotec.or.th.)

In this research, lab-scale sieve bend screen machines were designed and constructed to investigate the effect of feed velocity of cassava starch slurry on the separation efficiency and capacity. Experiments were conducted with the machines with one and two nozzles of feed inlet. Inlet velocities were varied at 0.65, 1.16, 2.61, and 10.44 m/s for one nozzle, and at 0.33, 0.58, 1.31, and 5.22 m/s for two nozzles. Experimental results showed that as the feed velocity increased, starch at undersize increased due to the reduction of cake formation and subsequently cake resistance on the screen. Moreover, the amount of starch loss with oversize gradually decreased. The optimum feed velocities for separating cassava starch from fine pulp for the sieve bend screen with 120° screen arc were 2.61 and 1.31 m/s for one and two nozzles, respectively.

Env-02: The effect of Si/Al ratios on the properties of geopolymers prepared from water treatment residue (WTR) containing heavy metals

N. Waijarean[1], S. Asavapisit[1,2], K. Sombatsompop[3], K.J.D. MacKenzie[4]*
[1]Environmental Technology, School of Energy, Environmental and Materials, King Mongkut's University of Technology Thonburi, Pracha U-thit Road, Bangmod, Thung-kru, Bangkok 10140, Thailand. e-mail address: wnaprarath29@gmail.com
[1,2*]National Center of Excellence for Environmental and Hazardous Waste Management,Department of Environmental Engineering, King Mongkut's University of Technology Thonburi, Pracha U-thit Road, Bangmod, Thung-kru, Bangkok 10140, Thailand. e-mail address: suwimol.asa@kmutt.ac.th
[3]Civil and Environmental Engineering Technology, College of Industrial Technology, King Mongkut's University of Technology North Bangkok, 1518 Pibulsongkram Road, Bangsue, Bangkok 10800, Thailand. e-mail address: kwn@kmutnb.ac.th
[4]MacDiarmid Institute for Advanced Materials and Nanotechnology, School of Chemical and Physical Sciences, Victoria University of Wellington, P.O. Box 600, Wellington, New Zealand. e-mail address: Kenneth.MacKenzie@vuw.ac.nz

The aim of this research was to develop a geopolymer cementing material using water treatment residue (WTR) as the aluminosilicate source, with the addition of rice husk ash (BHA) as a source of crystalline silica, and a heavy metal added to the binders (WTR and NaOH) at 30, 50 and 70% by weight. The geopolymers were prepared by NaOH activation of WTR and BHA mixtures of eight different compositions, followed by curing at ambient temperature. The compressive strengths of the geopolymers were determined up to 60 days. The samples cured for 28 days were examined by microstructure. The samples prepared with a Si/Al ratio of 2.00 without heavy metal and with 30% heavy metal were found to produce the greatest strength at all curing times. After 28 days, all samples had gained 30% greater strength than the 7 day-samples. XRD revealed the presence of sodium aluminium silicate hydrate, and sodium zinc silicate, sodium iron silicate oxide and sodium aluminum hydroxide chromium oxide in geopolymer matrices, while an FTIR vibration band related to the geopolymer product shifted to 1002 cm^{-1}. WTR and BHA are useful waste materials for geopolymer synthesis and produce useful products for applications such as heavy metal immobilization.

Env-03: Carbon Dioxide Emission in Khon Kaen University

Ratchaphon Suntivarakorn[1], Wasakron Treedet[2], and Phumiphat Sudsuk[3]
[1]department of mechanical engineering, faculty of engineering, Khon Kaen university, Thailand.

(corresponding author) ; Email: ratchaphon@kku.ac.th, Tel. +66 819891983, Fax : +66 43347879.
[2]Farm Engineering and Automation Technology (FEAT) Research Group, Khon Kaen university, Thailand. ; Email: t.wasakron@gmail.com.
[3]department of mechanical engineering, faculty of engineering, Khon Kaen university, Thailand.

This research presents a study of an approach to reduce carbon dioxide emissions in Khon Kaen University. The quantity of Carbon Dioxide emission was calculated by using the data collected from electrical energy consumption, fuel consumption quantity of waste and animal manures in the Khon Kaen University. The calculation was based on IPCC Guidelines of National Greenhouse Gas Inventories, 2006. From the study, it was found that Khon Kaen University has the quantity of carbon dioxide emission of *45,867. 31*tCO_2/year. The average emission per person is *0.855* tCO_2/man/year. The sector which emits the highest of carbon dioxide emissions is the energy sector, which is 39,135.62 tCO_2/year. The next highest sector is the waste sector which has the emission of 6,889.76 tCO_2/year. On the other hand, the agricultural sector and forest areas can absorb carbon 308.38 tC/year. To reduce the carbon dioxide emissions, Khon Kaen University should 1) determine the obvious policy to reduce carbon dioxide emission, 2) increase green areas, 3) encourage and promote a earnestly energy conservation, 4) develop an alternative energy from waste water and animal manure by using biogas technology and 5) develop a bio-fuel from energy crop in the University.

Env-04:

Adoption of Near Zero Waste Concept for the Tapioca Starch Production Industry: A Case Study in Thailand

Ruenrom Lerdlattaporn[1], Kanchana Saengchan[1], Worapod Lerdlattaporn[1], and Warinthorn Songkasiri[2]

[1]Pilot Plant Development and Training Institute (PDTI), King Mongkut's University of Technology Thonburi, 49 Soi Thian Thale 25 Thakham, Bangkhuntien, Bangkok, 10150, Thailand. e-mail: ruenrom.lerd@gmail.com e-mail: kanch.sc@gmail.com e-mail: worapod.lerd@gmail.com
[2]Excellent Center of Waste Utilization and Management (ECoWaste), National Center for Genetic Engineering and Biotechnology (BIOTEC), 49 Soi Thian Thale 25 Thakham, Bangkhuntien, Bangkok, 10150, Thailand. (corresponding author to provide phone: 66-2-470-7524 ; Fax: 66-2-452-3455; e-mail: warinthorn@biotec.or.th.)

Tapioca starch industry is a major agro-industry in Thailand. However, the industry's growth has resulted in a large amount of solid waste and wastewater. This research implemented the near zero waste concept in the tapioca starch industry to reduce starch loss, raw material, water and energy consumption. Six native starch factories in Thailand have adopted the near zero waste concept. This paper presents a case study of one factory in the Eastern region of Thailand. Its starch production efficiency or yield was increased 2.6% from the reduction of starch loss in wastewater and pulp. Further, water and electricity consumption were reduced from 11.8 to 8.5 m^3 of fresh water and from 236.7 to 193.9 kWh of electricity per ton of starch produced, respectively.

Env-05:

Estimation of Greenhouse Gas Emission from Landfill in Luangprabang, Lao PDR

Xaysackda Vilaysouk[1] and Sandhya Babel[2]

[1]School of Biochemical Engineering and Technology, Sirindhorn International Institute of Technology (SIIT), Thammasat University, P.O. Box 22, Pathum Thani 12121, Thailand. email: xaysackda@hotmail.com
[2]School of Biochemical Engineering and Technology, Sirindhorn International Institute of Technology (SIIT), Thammasat University, P.O. Box 22, Pathum Thani 12121, Thailand. (corresponding author to provide phone: Tel.: +66 2986 9103 Ext. 2307; fax: +66 2986 9103 Ext. 2301; e-mail: sandhya@siit.tu.ac.th)

Greenhouse gas (GHG) emission from municipal solid waste (MSW) management contribute to 3% of GHG globally. GHG from treatment and disposal of MSW is of significant concern. Social-economic activities and seasonal variation are strongly correlated with the composition and the amount of MSW. Luangprabang (LPB), a tourist city, located in north of Lao PDR, is facing challenges due to lack of proper MSW management. This study aims to estimate GHG emission from landfill in LPB, considering the amount and characteristic of MSW at disposal year. International Panel on Climate Change (IPCC) 2006 model is used in this study. Result from this study indicates that from 57.75 Gg/year of MSW disposed on landfill, of which 83% is biodegradable material (food waste, garden waste, paper and textile), 2.42 Gg CH_4 as GHG is produced. As Lao PDR has agriculture oriented economy, and as most waste is biodegradable, composting can be adopted. This can reduce amount of MSW disposed on landfill and give the compost and also reduce amount of GHG emission.

Env-06:

Carbon Emission from Marine Capture Fisheries in Thailand Based on a Carbon-Balanced Model

Withida Patthanaissaranukool[1] and Chongchin Polprasert[2]

[1]Department of Environmental Health Sciences, Faculty of Public Health, Mahidol University, Bangkok 10400 Thailand. Fax: 66-2-354-8525; E-mail: withida.pat@mahidol.ac.th.

[2]Department of Sanitary Engineering, Faculty of Public Health, Mahidol University. Bangkok 10400 Thailand. Phone: 66-81-912-1991; Fax: 66-2-354-8540; E-mail: chongchin.pol@mahidol.ac.th.

Marine capture fisheries have been the main subsector of captured fisheries in Thailand for the past two decades, contributing to 89 percent of the total capture products. Hence, the concept of a carbon-balanced model was applied to evaluate the carbon movement occurring in the marine harvest sector and its downstream industries. Field surveys in major fisheries piers of the country were carried out so as to determine the unit amounts of energy and materials used and produced. They were analyzed and interpreted into the carbon equivalences, which can be categorized into three groups – namely, carbon emission, fixation, and reduction. The equivalent carbon emissions from the marine capture were found to be 1078±332 kg CE/ton fish captured, due to the use of fossil energy in harvesting in the deep sea and transportation of the products to the piers. Major source of emission comes from diesel fuel used to operate the trawlers. Carbon transfer efficiency of marine capture was computed to be equal to 27%, indicating that fisheries activities emit to the atmosphere the carbon amount larger than that fixed in the products captured. From the findings of this research, it is recommended that more research on culturing of several marine fisheries be carried out so as to compensate for the decreasing amount of marine products captured from the sea.

Env-07:

Sustainable Consumption and Production Policy and Waste Management in Thailand

Alice Sharp[1] and Siriporn Boonpa[2]

[1]School of Bio-Chemical Engineering and Technology, Sirindhorn International Institute of Technology, Thammasat University, P. O. Box 22 TU-Rangsit Post Office, Pathumthani, 12121, Thailand. (Corresponding author phone: 66-2-986-9009 Ext. 1805; Fax:66-2-986-9112~3; e-mail: alice@siit.tu.ac.th)

[2]Department of Common and Graduate Studies, Sirindhorn International Institute of Technology, Thammasat University, P. O. Box 22 TU-Rangsit Post Office, Pathumthani, 12121, Thailand. e-mail: boonpa_ying@yahoo.com

Changing of consumption patterns has resulted in an increasing of municipal solid waste (MSW) quantity and have become an issue for urban and rural municipalities. One method for dealing with municipal solid waste is converting it into energy. This paper presents an overview of consumptions patterns and trends both at global and country levels. Current policies on waste

management and renewable energy were also discussed. More than 15 million tons of solid waste is generated annually and very limited amount were being recovered back for utilization. However, this requires an enormous budget allocation for waste management. Currently the budget is insufficient to provide adequate solid waste management services. Thailand has adopted sustainable and environmentally sound ways of processing municipal solid waste. In order to increase the efficiency in solid waste management, waste-to-energy technologies are provided as a solution towards a successful policy. Waste-to-energy is perceived as a means to dispose of municipal solid waste, produce energy, recover materials, and free up scarce land that would otherwise have been used for landfill. Thailand considers waste-to-energy, incineration, refuse derived fuel (RDF), anaerobic digestion, pyrolysis and gasification, and landfill gas recovery to be a renewable technologies. While the available waste-to-energy technologies would suggest that the cost of waste-to-energy is somewhat higher than other renewable sources, it should be kept in mind that waste-to-energy facilities serve a dual role of waste disposal and energy production. Although the cost per municipal waste of capacity may be greater than other renewable sources, the benefits of waste management, energy and metals recovery, and reduction of greenhouse gas (GHG) emission need to be considered.

Env-08:

Greenhouse Gas Emission from Municipal Solid Waste in Phnom Penh, Cambodia

Chhay Hoklis[1] and Alice Sharp[2]

[1]Department of Common and Graduate Studies, School of Bio-Chemical Engineering and Technology at Sirindhorn International Institute of Technology (SIIT), Thammasat University, P.O. Box 22, Pathum Thani 12121, Thailand. Email: hoklischhay@yahoo.com

[2]Department of Common and Graduate Studies, Sirindhorn International Institute of Technology (SIIT), Thammasat University, P.O, Box 22, Pathum Thani 12121, Thailand. Email: alice@siit.tu.ac.th

Municipal solid waste generation in Phnom Penh has steadily increased after the civil war in 1979. Currently, Cambodia, particular Phnom Penh, is focused on methods to reduce greenhouse gas emission from the waste sector. GHG emission in this paper was calculated based on the Intergovernmental Panel on Climate Change (IPCC) to estimate the GHG emission from municipal solid waste in Phnom Penh in 2009. The result of this calculation shows that the GHG emissions were 321.71 Gg (CO_2 eq) for CH_4, 325.85 Gg (CO_2 eq) for CO_2, and 6.43 Gg (CO_2 eq) for N_2O. Therefore, two waste management scenarios were proposed. In the actual situation, all the municipal solid wastes are dumped into landfill without any gases captured for electricity generation. In the two proposed scenarios, waste materials will be recycled by separation of waste at landfill, and composting of organic wastes at landfill as well. The result from these scenarios showed that greenhouse gas emission can be reduced by 52.43% for the first scenario and 63.39% for second scenario. This study revealed that the implementation of the proposed scenarios provides tremendous benefits. It can reduce the volume of waste entering landfill site, recycle waste materials, and minimize health problem.

Env-09:

Geospatial Technology for Monitoring Status and Transformation Process of Environmental Quality in Southern Part of Myeik Archipelago Myanmar

V. Manjunatha[1] and Theo Ebbers[2]

[1]Aqua Outreach Program/ Wetlands Alliance, Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani 12120, Thailnad (Phone: 66-2-524-5413; Fax:66-2-524-5439; e-mail: manju@ait.asia)

[2]Aqua Outreach Program/ Wetlands Alliance, Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani 12120, Thailnad (Phone: 66-2-524-5413; Fax:66-2-524-5439; e-mail: thebbers@ait.asia)

Development and establishment of an appropriate management plan for coastal resources and ecosystems requires thorough understanding of the current state of coastal resources their uses and the potential threats they are facing. Monitoring Coral reef and water quality features using contemporary geospatial technology data may prove to be a cost-effective and time efficient tool for reef surveys, change detection, and management. This analysis is to understand current state of coastal habitats and initial mapping of coral reef areas and suspended sediments process in southern part of Kawthaung region in Myeik Archipelago Marine Ecosystem (MAME), Myanmar through the use of Geospatial applications. Multi- temporal Landsat5 Thematic Mapper (TM) images (2000, 2005 and 2010) were used to assess and comprehend temporal variation of water quality (Suspended Sediment (SS)) and habitat shifting/Reef risk. High spatial resolution 2-meter multispectral Thailand Earth Observation System (THEOS) pan sharpened level 2A image (2011) was used to represent the current status of coral reef in the study area. Reef maps produced using supervised multispectral image classification after atmospheric and water column corrections. By Landsat temporal data, we obtained a comparative uniform model for the retrieval of suspended sediment concentrations. Image-Processing techniques ERDAS Imagine and GIS tools were employed to determine the characteristic reflectance values of each habitat. Analysis of remote sensing data resulted in the mapping of coral reefs, current status and potential threats, particularly from sedimentation. Comparison of the classified images from 2000 to 2010 illustrates spatial changes of the habitat (coral reef) and increase of sedimentation in the study area. The result of this study is a good example on how time series analysis of remotely sensed data can be a tool to monitor the changes in the state of critical coastal habitats and eco-systems that are impacted by coastal development and to identify areas exposed to higher risk/threat levels.

Env-10:

Current Status of e-Waste Management in Vietnam: A Case Study of Ho Chi Minh City, Vietnam

Thao Quoc Tran and Alice Sharp
Sirindhorn International Institute of Technology, P.O. Box 21, Klong Luang, Pathum Thani 12121, Thailand (corresponding author to provide phone: +66 888 50 18 84; e-mail: thao.tranquoc@gmail.com)

Each year, there are 20 to 50 million tonnes of household electronics and electrical wastes generated worldwide. Ho Chi Minh City (HCMC) also is the major source of e-waste. This paper reviews the e-waste management situation in the past through refurbishment/repair status, collection and disposal processes as well as the status of policy implementation and development. There are many gaps in e-waste management in Vietnam, HCMC in particular. Because the capacity of environmental management institutions in Vietnam remains weak and disproportionate to the tasks, this results in many serious problems. Problems in e-waste management in Vietnam are affected by the increase of industrial production and electronic consumer products, along with changing consumer's consumption trends. The growth in the electronics market will soon result in an increased number of discarded household appliances. The increase in consumer's demand also come with the demand to change to new devices. The study found the e-waste generation and the disposal activities are both rising at an uncontrollable rate in HCMC. The results also indicate that e-waste contributes to environmental contamination through their related activities, such as informal recycling and illegal disposal. The current management situation in HCMC could be improved by focusing on each E-waste management steps to fill the management gaps.

Env-11:

Microwave-Assisted Solvent-Free Synthesis of Carboxylic Acid-modified Chitosan and Its Application as a Bioadsorbent for Selected Heavy Metals

Nopparat Plucktaveesak[1] and Onnicha Kanchanamayoon[2]

[1]Department of Chemistry, Faculty of Science and Technology, Thammasat University (Rangsit Center), 99 M.18, Paholyothin Road, Klong-Laung, Pathum Thani, 12121, Thailand. Tel. No.: 66-2-564-4483; Fax:66-2-564-4483; e-mail: nopparat@tu.ac.th
[2]Center for Innovation Development and Technology Transfer, Faculty of Medical Technology, Mahidol University, 999 Putthmonthon Road, Salaya, Phutthamonthon, Nakhon Pathom, 73170, Thailand, e-mail: onnicha_kan@mahidol.ac.th.

In this study, chitosan extracted from shrimp shell wastes was modified with various carboxylic acids via microwave-assisted solvent-free technique. These modified chitosan samples were then applied to act as bioadsorbent for the removal of heavy metal ions from solutions. The heavy metal adsorption ability was investigated with varying two factors namely metal solution's pH and polymer concentration, using UV-visible spectrometer. The results reveal that chitosan samples, modified with different organic acids, show different adsorption selectivity property. To take up Cu(II) or Co(II) ions, succinic acid-modified chitosan shows the best results. On the other hand, adipic acid-modified chitosan gives the highest Ni(II) ion uptake capacity. Compared among heavy metals selected for this study, the polymer exhibits the metal ion uptake capacities for Cu(II) > Co(II) > Ni(II). When compared with unmodified chitosan samples, the organic acid-modified chitosan samples show either comparable or better metal ion adsorption capacities than that of unmodified chitosan samples. The results from this study indicate that organic acid-modified chitosan samples can be easily prepared from wastes with the properties that can be used as a biomaterial adsorbent for the removal of some common heavy metal ions from contaminated water.

Env-12: Guidelines for E-Waste Environmental Pollution Prevention and Control of China

Li Liang[1] and Alice Sharp[2]

[1]Department of Common and Graduate Studies, Sirindhorn International Institute of Technology, Thammasat University, P. O. Box 22 TU-Rangsit Post Office, Pathumthani, 12121, Thailand. (Phone: +66-2-986-9009 Ext. 1805; Fax: +66-2-986-9009 Ext. 1801; E-mail: liangli08@gmail.com)
[2]School of Bio-Chemical Engineering and Technology, Sirindhorn International Institute of Technology, Thammasat University, P. O. Box 22 TU-Rangsit Post Office, Pathumthani, 12121, Thailand. E-mail: alice@siit.tu.ac.th

E-waste is a newly emerged solid waste. Due to the advent of technology, electrical and electronic equipment or tools have become a daily necessity worldwide. As such, different countries need to develop policies suited their unique technical, cultural and environmental needs as to how to reduce, reuse, and recycle the e-waste. China promulgated a policy on "Guidelines for Electronic Waste Environmental Pollution Prevention and Control", which has a total of 26 articles in five chapters. The guidelines on dissemblance, utilization, and treatment of e-waste targeting six major groups, including manufacturers, importers, distributers, utilizers, dissemblers, and recyclers were studied. Also studied were the monitoring and management of dissemblance, utilization, and treatment of e-waste; responsibilities of related parties; and the penal codes and enforcement actions. Lack of enforcement data on the actual fines or other enforcement actions taken against violators makes it difficult to evaluate the effectiveness of the guidelines in preventing or controlling environmental pollutions caused by transboundary movement, improper disposal, dissemblance, utilization or treatment of e-waste. Thus, only through comparisons with the comparable laws, rules or guidelines adopted by other countries in the Greater Mekong Sub-region can the strengths or weaknesses of the e-waste management guidelines established in China be better understood.

Env-13: Organic Agriculture Subscription System in University Context

Montalee Sasananan

Department of Industrial Engineering, Thammasat University, Klong Luang, Pathumthani 12120,

Thailand. e-mail: smontalee@yahoo.com

This article presents two case studies of organic agriculture subscription system (OASS) in a university environment. A survey was conducted to identify the number of interested persons and the characteristics of system. At the same time, two pilot projects were established at the Faculty of Engineering, Thammasat University. These ongoing projects involve organic rice and vegetables, which are supplied by two different farmer groups. It is found that the rice OASS project is much easier to manage than the vegetable OASS, and that OASS projects in Thailand should be market-oriented.

Env-14: Biodegradation Kinetic Coefficients of Hospital Wastewater

Tharatorn Jiamvittayasrikul, Panomchai Weerayutsil , and Kulyakorn Khuanmar
Department of Environmental Engineering, Faculty of Engineering, Khon Kaen University, Khon Kaen 40002, Thailand. Email: kulyakorn@kku.ac.th

Hospital wastewater is generated from various activities which contains a variety of organic and inorganic substances. To design the wastewater treatment, biokinetic coefficients usually apply in the design of activated sludge processes. This study reported the biokinetic coefficients of activated sludge processes for hospital wastewater. The experiment was conducted by using solids retention time (SRT) with 10-20 day. The biokinetic coefficients were found to be as follows: biomass yield (Y) = 0.6471 mg VSS/mg COD, endogenous decay coefficient (kd) = 0.0509 1/day, Ks = 9.373 mg COD/L and k = 0.3015 1/day. The COD removal was increasing as SRT increased and also produced higher amount of MLVSS. Comparing biokinetic coefficients of municipal wastewater and hospital wastewater with previous studies, the values of biomass yield (Y) of this study was in the normal range of other reports for both of municipal wastewater and hospital wastewater. Endogenous decay coefficient (kd) of hospital wastewater, the value of this study (0.0509 1/day) was different from the previous study (0.01 1/day), but also μ_{max} (0.1951 < 0.048 1/day) and Ks (9.373 < 121.12 mg COD/L) both values were lower than previous report, although the experiment used the same substrate that was taken from the same source, Khon Kaen hospital center, Khon Kaen ,Thailand. These result may cause from the characteristic of wastewater was changed, due to the activities in hospital may change and chemical used as well as an increasing facilities in hospital area.

Env-15: Case Study of Wastewater Treatment from Fishing Net Softening Process

Weerapong Khantee, Panomchai Weerayutsil, and Kulyakorn Khuanmar
Department of Environmental Engineering, Faculty of Engineering, Khon Kaen University, Khon Kaen 40002, Thailand. Email: kulyakorn@kku.ac.th

The objective of this research was to examine the optimum dose for pre-treatment wastewater from fishing net softening process by using alum, lime, and polymer. The optimum dose should have a lowest cost of chemical usage and the final mixing of both wastewater sources (wastewater from dyeing process and supernatant form pre-treatment process) in equalization tank should have COD less than 800 mg/L. The experiment results shown that all three type formulas gave pH drop from 7.48 to acidic range of pH 5.42-5.56. Type 1 and Type 2 had shown a lower TDS than TDS of untreated wastewater, only Type 3 gave a higher TDS than original wastewater. COD removal efficieny for three type were 66%, 64%, and 91% respectively. Consider on COD removal, Type 3 was the best condition with final COD of 91%, but it gave high chemical cost and also shown highest TDS which was higher than TDS of untreated wastewater acorrding to the highest alum uasge. Type 1 and Type 2 presented COD removal of 66% and 64% that was removal efficiency unsignificant different, thus Type 1 condition was the most interested formula. Inaddition mass balance of COD loading after mixing

in equlization pond, should not exceed 800 mg/L due to the capability of the wastewater treatment plant and the operation control. The calculation of mass balance of COD loading, Type 1 presented a final mixing liquid in equlization pond of 781.54 mg/L that was less than the optimum COD loading of wastewater treatment plant. As a result, Type 1 was selected for pre-treatment process.

Env-16: Removal of Crystal Violet and Safranin by Fenton Reaction

Soraya Pimonporn, Panomchai Weerayutsil , and Kulyakorn Khuanmar
Department of Environmental Engineering, Faculty of Engineering, Khon Kaen University, Khon Kaen 40002, Thailand. Email: kulyakorn@kku.ac.th.

COD removal efficiency of Crystal violet solution and Safranin O solution with reaction time 50 minutes, the maximun efficiency of COD removal was 56.43% and 66.95 %, respectively. The efficiency trends to increase as reaction time increasing. The experiment result for the mixed solution of crystal violet solution and Safranin O solution illustrated that after the first 10 minute until 50 minute, the efficiency of COD removal was about 50%. The efficiency trends to still remain of 50% removal as reaction time increasing. This can summarize that to achieve a higher efficiency of wastewater treatment for single solution of Crystal violet and Safranin O, the reaction time should increase. The mixed solution of Crystal violet and Safranin O, to gain higher efficiency, the ratio between Fe^{2+} and H_2O_2 supposed to increase.

Env-17: Finite Point Method for Convection-Dominated Flow Problems

Chinapat Buachart[1] and Worsak Kanok-Nukulchai[2]
[1]Chiang-Mai University, Thailand. (e-mail: chinapat@eng.cmu.ac.th)
[2]Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani 12120, Thailand. (e-mail: worsak@ait.asia)

In this paper, the new upwinding scheme incorporate to meshfree technique has been proposed to overcome the instability issues in convection-dominated flow problem. This techniques is then demonstrated in one and two-dimensional problems using meshfree point collocation method. Numerical results for example problems demonstrate the techniques developed in this paper are effective to solve convection dominated problems.

Env-18: Estimation of Groundwater Potential Zone Using Remote Sensing and Geographic Information System

Kyaw Zaya Htun[1], Myint Myint Khaing[2], and Lal Samarakoon[3]
[1]Remote Sesning Department, Mandalay Technological University, Myanmar
E-mail: kyawzaya.htun@gmail .com .
[2]Remote Sesning Department, Mandalay Technological University, Myanmar
E-mail: mmkhaing@gmail.com.
[3]Geoinformatics Center, Asian Institute of Technology, Thailand
E-mail: lalsamarakoon@gmail.com.

Water is an important natural resource and proper management of water resources both on surface and underground is essential for economic and social development of a country. Development of underground water resources is really needed for recent population explosion, development of new businesses and industrialization. In this study, prospective groundwater zones for Kyaukse Township, Mandalay division can be delineated from satellite imagery, using information derived on geomorphic features and land forms such as alluvial fans, buried channels, flood plains, pediments and valley fills, lineaments/fractures, vegetation and land cover etc. Weighted index overlay method is followed to delineate groundwater prospective zones and used for the selection of groundwater potential zone. Remote Sensing and GIS technology has

been found to be very effective in identification of prospective zones for groundwater exploitation.

Env-19: Environmental Protection and Conservation Best Practices for Waste Management of Small Sized Hotels in the Southern Gulf of Thailand

C. Choosri[1] and Ann S. Ashton[2]

[1]Ph.D. Candidate in the Graduate School of Tourism Management at the National Institute of Development Administration, 118 Moo 3, Sereethai Road, Klong-Chan, Bangkapi, Bangkok 10240 Thailand. Phone Number: +66 818 925 550. E-mail: krutae47@ hotmail.com.

[2]Lecturer in the Graduate School of Tourism Management at the National Institute of Development Administration, 118 Moo 3, Sereethai Road, Klong-Chan, Bangkapi, Bangkok 10240 Thailand. Phone Number: +66820323055. E-mail: suwareeasthon@hotmail.com.

This study was designed to explore the management of waste in the small sized hotels (SSHs) in the Southern Gulf of Thailand. This study involves the policies of agencies that affect the management of waste within the hotel operations in various departments, for example food and beverage and kitchen It investigates environmental management systems (EMSs) to evaluate the position of the small sized hotels (SSHs) on environmental issues and to impart this knowledge to interested parties, including other scholars. However, to achieve the basic objectives of social responsibility and the environment it is essential for system development and integration between policies and practices relating to the management of waste in small hotels. Therefore, it is necessary to perform small hotel training related to waste management, and assessment of incident, training in accordance with local policy, and involve all staff in environmental protection and sustainable development together.

Env-20: GROUNDWATER CONTAMINATION AND MANAGEMENT IN URBAN CITIES IN GREATER MEKONG SUBREGION (GMS)

Chanya Pokasoowan[1], Yamin Thu

[1]Energy and Environmental Management, School of Management Technology, Shinawatra International University (SIU), Thailand.

E-mail address: chanya.p@siu.ac.th

Groundwater plays an important role of global water supply for domestic consumption, irrigation, and industrial process, particularly in dry regions and high population density where surface waters could not provide sufficient quantity. It also functions as baseflow of surface waters and helps sustain ecosystems. In most developing countries, rapid urbanization and socio-economic development significantly boosts water demand. Several urban cities have demand over its capacity of water infrastructure. Groundwater abstraction faster than replenishment results in sinking of water table, land subsidence, and also saltwater intrusion along the coastlines. Groundwater pollution takes place by both natural environments and human activities. Arsenic is major pollutant in groundwater that poses adverse health effect. High concentration of arsenic in groundwater is reported in mining areas, low-lying areas or river-delta plains with organic-rich sediments including Irrawaddy delta (Myanmar), Hat Yai city (Thailand), Red River delta (Vietnam), and Mekong delta (Cambodia-Vietnam). Anthropogenic pollutant arise from inappropriate activities on land surface and gradually contaminate the underlying aquifer, such as urban runoff, leaking sewers, unsanitary landfill leachates, excessive pesticide/fertilizer application, industrial chemical spill and waste discharge. It is impractical to prohibit the use of groundwater. Environmental protection agencies generally attempt to minimize the negative impacts by controlling the volume and timing of groundwater abstraction, or relocating the boreholes. Nonetheless, the issues of unclear rights and ownership to access

groundwater as well as weak law enforcement and monitoring of water authorities makes it difficult to efficiently stabilize groundwater level and quality. The use of economic incentive/disincentive is powerful tool to supplement regulation approach, but it should be carefully designed and implemented to avoid inequalities or conflicts among water users. The objective of this paper is to present the overview on groundwater contamination by natural and anthropogenic sources, existing mitigation technologies and practices, and development of sound pollution control approach for sustainable groundwater management and in urban cities in GMS.

Sustainable Development

SD-01:

The Development of Hotel Business in Lao PDR

Saynakhone INTHAVONG[1], Phanhpakit ONPHANHDALA[2], and Zhou ChangChun[3]

[1]PhD Candidate of Program on Management Scient and Engineering at National University of Laos or NOUL and Kunming University of Science and Technology or KUST. Corresponding author. Contact: saynakhone@gmail.com

[2]Senior Lecturer, Faculty of Economic and Business Management, NUOL. Contact: phanhpakit@hotmail.com

[3]Deputy Dean, Faculty of Management and Economy, KUST, Kunming, P.R China. Contact: zhoushir@kmust.edu.cn

Lao PDR is selected as the World Best Tourism Destination for 2013 by European Council on Tourism and Trade. Enriched with natural and cultural spots, Lao PDR attracted more than 3.2 million visitors in 2012 or a half of its population, which has increased by over 3-folds as compared to 2005. This achievement suggests that the boom in hotel industry will be continuing in the following years. Thus, the paper aims to review the development of hotel business in Lao PDR. The study finds that the recent development of hotel business in Lao PDR can be devided into three phases as of Prior to 1986, 1987 to 1999, and from 2000 until the present. About 40% of hotels in the country concentrate in the Vientiane Capital. The birth rate is especially high in recent years. Domestic private firms still dominate the majority of the total, whereas foreign investment and joint venture show a fast growing. In addition, the study also finds a continuous emphasis from the Lao government on the promissing supportive development policy on tourism and hotel industry.

SD-02:

Street Food in Pattaya: Situation and Prospects

A. Pansuwan[1], K. Tienwong[1], S. Samuhasaneetoo[2], P. Chaiuar[2], P. Hemwan[3], S. Sunitsaku[4], and V. Nil-Ubon[5]

[1]Department of Geography, Faculty of Arts, Silpakorn University, Nakornpathom 73000, Thailand. phone: 66-34-253-840; Fax:66-34-255-794; e-mail: apisekpan@yahoo.com

[2]Department of Department of Food Technology, Faculty of Engineering and Industrial Technology, Silpakorn University, Nakornpathom 73000, Thailand.

[3]Department of Geography, Faculty of Social Sciences, Chiang Mai University, 50200, Thailand.

[4]Regional *Health Promotion Center 3, Chonburi 20000, Thailand.*

[5]Regional & Rural Development Planning field of study, Asian Institute of Technology, P.O. Box 4, Klong Luang, Pathumthani 12120, Thailand.

Street food vending is considered important to employment and income generation, particularly for poor people. Besides, the street food vending is also the source of affordable food in town. This research examines the characteristics and attitudes of street food vendors and their consumers, including their street food. In addition, business locations and relevant business factors, government policies, and relevant laws are also investigated. Finally, findings and conclusion lead to suggestions to development and management in vending areas and food sanitation in Pattaya City.

SD-03: Institutional Creativity in the Human Resource Management (HRM) System in Laos: Case of Ministry of Public Works and Transports

Thongchanh KIMANIVONG
Graduate Office (GO), National University of Laos (NUOL) and Kunming University of Science and Technology (KUST). Email: Thongchanh_k@yahoo.com.

Human resource management plays an important role in maximising all professional employees to achieve organisational objectives. However, this should be done in accordance with employees' willingness and feeling as the part of organisational success. The Ministry of Public Works and Transports (MPWT) obtains a variety of professional competences from diversified job responsibilities. This paper firstly examined the perception of the MPWT personnel on the existing performance management system, performance appraisal, and induction; and secondly, identifying strengths and weaknesses of performance management system at the ministry.

SD-04: Society & Education: Lessons from Japan

Olivier Gervais and Masazumi Ao
Yokohama City University. Email: ogervais@yokohama-cu.ac.jp.

The Tohoku earthquake which struck Japan on March 11th, 2011 has been a turning point for Japan, in terms of energy policy, but from a social perspective as well. The main aim of this study is to analyze the trends in the wake of these events in a comprehensive social context. What do these tell us about the general mindset of the population with regards to sustainability issues central to the development of our societies? It is essential to examine the roots of the problems in order to improve the long-term outlook and ensure that the nation is able to make educated decisions regarding issues which are critical to the future sustainability of society. Based primarily on an analysis of secondary data, this study shows that this could be achieved through the development of lifelong learning, as a tool for the population to be able to participate more actively in society. While education is a central issue in this regard, it is also believed that social welfare measures, government transparency, as well as the implementation of better communication channels between experts and the general public are prerequisites to achieve this.

SD-05: Using Experimental design in Tourism Related Research

Thitikan Peace Satchabut
Department of Tourism management, Business School, University of Thai Chamber of Commerce, Building 1, Floor 1, Vibhavadi Rangsit Road, Din Daeng, Bangkok 10400, Thailand (phone: 66-2-697-6124; e-mail: titikant_peace@yahoo.com)

While it is common to see correlational studies in social science research, this study offers another perspective on how to launch a study grounded in experimental design. This example study was part of the author's Phd Dissertation at Texas A&M University. The research inquiry was to assess whether outdoor recreation programs and/or park interpretation programs influence park visitors' environmental concern. Data were collected through an experimental design. Two hundred forth participants were randomly assigned to eight groups of activities (photography, photography with interpretation, birding, birding with interpretation, motorcycling, motorcycling with interpretation, motor boating, and motor boating with interpretation). While nature photography and birding were considered as appreciative recreation, motorcycling and motor boating were considered as consumptive recreation. Results suggest that participants' environmental concern is enhanced when recreation is joined with interpretation services.

SD-06: Leaching Potential of Nanosilver from Commercial Products

Sandhya Babel[1] and Pawena Limpiteeprakan[2]

[1]School of Biochemical Engineering and Technology, Sirindhorn International Institute of Technology (SIIT), Thammasat University. P.O. Box 22, Klong Luang, Pathumthani 12121, Thailand (corresponding author to provide phone: 66-2-986-9009 Ext.2307; Fax: 66-2-986-9009 Ext. 2301; e-mail: sandhya@siit.tu.ac.th).

[2]School of Biochemical Engineering and Technology, SIIT, Thammasat University. Thailand, e-mail: pawenal@yahoo.com

This study aimed to investigate the potential of leaching of nano-Ag from commercial products by using Toxicity Characteristic Leaching Procedure (TCLP) test according to USEPA method 1311. Nano-Ag fabrics in different concentrations were also prepared in laboratory scale with different concentration. Eight nano-Ag products were purchased from the market. Only the product that has potential to be disposed into the landfill after end use, were selected. The concentrations of nano-Ag were quantified by Inductively Coupled Plasma – Mass Spectroscopy (ICP-MS). The concentrations of silver in eight samples ranged from 0.946 to 6.348 µg/g of product. The silver concentration of nano-Ag fabrics were found in the same range with the commercial products between 1.949-2.315 µg/g of product. The silver concentrations of the TCLP leaching test for all samples ranged from 0.014 to 163 µg/L in the commercial products and ranged from 116 to 280 µg/L in the nano-Ag fabrics. All the concentration from leaching test under TCLP did not exceed the regulatory limit of 5.0 mg/L for TCLP silver. However, the increasing use of nano-Ag in many types of consumer products may lead to an increase level of silver in the environment while the regulatory control for the use and disposal is still lagging behind. The silver being used in products will somehow release into the environment through their life cycle. It is very important to assess the potential of nano-Ag and Ag^+ release during disposal phase and their release into the environment in long term since Ag is toxic to bacteria in the environment.

SD-07: Community's benefits from the tourism growth and tourism site development in VangVieng district of Vientiane province , Lao PDR

Khamtanh SALIANKHAM, BounlouaneDouangngeune**, and ZhangBin****

*PhD Candidate of Program on Management Science and Engineering (National University of Laos –KMUST Kunming University of Science and Technology), khamtanh44@hotmail.com

**Dr. Bounlouane DOUANGNGEUNE, PhD, Associate Professor of Economics, Senior Deputy Director of Laos-Japan Human Resources Development Institute (LJI); Vientiane Capital, Lao P.D.R,dbounlouane@gmail.com;

***Prof. ZhangBinKunming Ph.D., Professor at University of Science and Technology, China, zhangbing65@hotmail.com

This study attempts to measure benefits of the local residents of Vangvieng from tourism growth and tourism site development. Here, community benefits involve not only economic benefits but including also social, cultural and environmental benefits. The data used in this analysis are primary data provided through a questionnaire by the residents of Vangvieng district, a famous tourist spot in Lao PDR. The results are mixed results. On the negative side, the community faces some risks as a result of tourism development. On the positive side, tourism growth and tourism site development bring about improvements in living conditions and conservations of residents' attitudes towards tourism improvement development.

SD-08: Tourist Satisfaction on Tourism Growth and Tourism Site Development in Vangvieng District of Vientiane Province, Lao PDR

Khamtanh SALIANKHAM[1], Bounlouane Douangngeune[2], and Zhang Bin[3]

[1]PhD Candidate of Program on Management Science and Engineering (National University of Laos –KMUST Kunming University of Science and Technology), khamtanh44@hotmail.com
[2]PhD, Associate Professor of Economics, Senior Deputy Director of Laos-Japan Human Resources Development Institute (LJI); Vientiane Capital, Lao P.D.R,dbounlouane@gmail.com;
[3]Professor at University of Science and Technology, China, zhangbing65@hotmail.com

This study attempts to understand tourist satisfaction on their visit for recreation and leisure purposes in Vangvieng of Lao PDR. Here, tourist satisfaction is measured in tourists' perceptions and opinions on tourism site development and services they receive during their stay in Vangvieng. The data collected for purposes of this study were provided by tourists through the use of questionnaire where the tourists were asked to express their opinions and perceptions on economic, social and cultural benefits received from their stay in Vangvieng. Tourist satisfaction is one condition for achieving sustainable tourism development. In recent decades, Lao PDR has been a very attractive tourist destination, indicating that the satisfaction levels of the tourists would be high. This study will show results for this hypothesis. It is found that tourists are generally satisfied in their visits to Vang Vieng although personal characteristics of the tourists cause significant variations in the satisfaction levels.

SD-09: Integrated Job Analysis of Civil Servant in Lao PDR: Ministry of Public Works and Transport

Souvanny Rattanavong
The Graduate Office (GO), National University of Laos (NUOL) and Kunming University of Science and Technology (KUST). Email: souvannyr@gmail.com.

Job analysis is a key effectiveness in building a strong foundation to enhance staff and organisational performances since it focuses attention on what staff are anticipated to do, and determines employees' tasks, duties, responsibilities and their relationships to the job, the conditions under which the job is performed, and the personal capabilities needed for satisfied performance. This paper aims at firstly analyzing the current situation in preparing and implementing the job analysis in Ministry of Public Works and Transports (MPWT) by identifying key obstacles and challenges in implementing the job analysis; secondly investigating the steps, procedures and best practice of the organisation. Both quantitative and qualitative research methodologies were employed. Questionnaire and in-depth interviews were deployed. It was found that the current practice of job analysis in the MPWT faced with difficulties and challenges since many of employees were not recruited according to their field of expertise. As a result, the work implemented did not seem to be well functioned as it should be since the job description has been designed from top-down, no detailed tasks has been described, as well as job specification was not in detailed and not effectively reinforced. Although the job description was broad, it was officially appointed and has been monitored and evaluated consistently, thus strengthening human resource management in MPWT. It was recommended that MPWT needed human resource management tools for job analysis, detailed job descriptions in the foundation or at grass-root level by designing workload for each position appropriately; improving job description in accordance with knowledge specification, educational qualification, experience and capabilities.

SD-10: Socio-Economic Impact and the Adaptation of Boten People Under Chinese Transnationality

Sivarin Lertpusit
College of Interdisciplinary, Thammasat Univesity, Hangchat, Lampang 52190, Thailand. Tel: 66-87-788-3905; Fax: 66-54-268-702; e-mail: Tusivarin@gmail.com

This research paper is about Socio-Economic Impact and the Adaptation of Boten people under Chinese Transnational influences. Its aims are 1.) To find out the transnational issues and the influences of Chinese capital in Laos: Boten 2.) To study the socio-economic impact on Boten people, this paper uses quantitative research methodology by gathering information from documents and field research, analyzing the information with Transnational Enclosure theory, Territorialization and Periphery framework.

The research finds that the transnational enclosure and territorialization were acting and processing in parallel. Chinese capital power spread its influences on economics and politics in Lao which is the strategic country that China can connect itself to South East Asia. The influences slowly enclosed Lao local people's authority on their own spaces. Meanwhile, Lao government did not act against these Chinese investments, in contrary, it set up regulations to support and facilitate these Chinese capitals.

Both procedures directly impacted Boten people and pushed them to margin. They moved out of their hometown and adapted themselves to the new environment. They were suffered by the unfair compensation that is non-negotiable. Lastly, they were victims of the development and were forced to surrender to the government and the capitalism.

SD-11: Lao PDR Primary Health Care Expansion Project: A Case Study of Development Project Implementation Efficiency and Effectiveness

Anousone Rassavong[1], Mana Southichack[2], and Saykhong Saynasine[3]

[1]Ph.D. Candidate at the National University of Laos (NUOL) and Kunming University of Science and Technology, Program on Management Science and Engineering (PMSE), phone: 856 21 350236-7, fax: 856 21 314796, e-mail: anousone3388@gmail.com.

[2]An Economist and Director of Lao Intergro Ltd, Research Advisor at ERIT, Ministry of Industry and Commerce and Macroeconomic Advisor at Swiss Agency for Development and Cooperation (Laos Program), e-mail: ms@intergro-inc.com.

[3]an Associate Professor at NUOL, PMSE, e-mail: ssaynasine@hotmail.com.

This paper examines the effectiveness and efficiency of the Primary Health Care Expansion Project in eight provinces in northern part of Lao PDR to draw lessons for improving levels of efficiency and effectiveness of future project coordination and management. This case study provides lessons, from a management perspective, to larger questions concerning effective and efficient use of scarce financial resources, especially those of foreign loans, on development projects beyond the health sector. Our analysis finds that the implementation of the PHCEP was effective but inefficient, due to cost overrun and abnormally large miscellaneous spending. To improve implementation efficiency, we recommend that project fund from each partner, especially from government's share of financial commitment, should be in place prior to issuing contracts to avoid rising costs due to delays, and keep miscellaneous spending at a minimum. In addition, to improve allocation efficiency, more funding should be allocated for expansion of village-based health service centers, where responses to health care service expansion were highest and the poor benefited most.

SD-12: Consumer Perception and Attitude Study for Market Development of Hommali Organic Rice Products from Thung Kula, Thailand

Pensri Jaroenwanit[1] and Pornpirat Kantatasiri[2]

[1]An Associate Professor of Marketing at the Faculty of Management Sciences, Khon Kaen University, Khon Kaen, Thailand. 123 Mitrapharp Road, Muang, Khon Kaen, 40002. Corresponding author, Tel. 081-9743732, Fax 043-202402, e-mail: penjar@kku.ac.th

[2]D.B.A (candidate) in Doctoral Business Administration Program Khon Kaen University, Khon Kaen, 40002 Thailand 123Mittraphap Road, Muang, Khon Kaen 40002, Thailand, and a teacher

assistant at Mahidol University, Nakhonsawan campus Corresponding author to provide phone: 087-234-7419; e-mail: pornpiratk@gmail.com

This research aims to study consumers' perceptions and attitudes toward Hommali Organic Rice Products for the purposes of market development in Thailand. Hommali Organic Rice Products from Thung Kula, Roi-Et Province were used for the case study in this quantitative research. Field survey research was conducted using questionnaires to collect data from 440 test subjects who were Thai Hommali Organic Rice Product consumers; 240 people were surveyed in Bangkok, 100 people in Khon Kaen, and another 100 people were in Roi-Et. Test subjects were selected using purposive sampling. Descriptive statistics and inferential statistics were used in the data analysis. The research found that all research subjects knew of and had consumed Hommali Organic Rice Products; however, only 56.8% knew of Hommali Organic Rice Products specifically from Thung Kula. They had a low level of awareness in terms of differences between Hommali Organic Rice Products from Thung Kula and from other areas and knew little about the distribution of such products from Thung Kula. This study suggests that marketing communication should be developed in order to build positive perceptions and attitudes towards Hommali Organic Rice Products from Thung Kula. As consumers pay a lot of attention to their health, the selling points of these products should focus more on the benefits of consumption, lack of poisonous substances,and relatively aromatic and soft qualities when compared to Hommali Rice from other areas. Development of product distribution, marketing, and the domestic market are needed in order to expand the product's reach and to be accessible for the target group.

SD-13: Low Carbon Hotels towards Sustainable Tourism in Koh Chang and Neighbouring Islands, Thailand

Rachnarin Nitisoravut[1], Nalikatibhag Sangsnit[2], Jaraspim Dhiralaksh[2], and Vilas Nitivattananon[3]

[1]the Sirinthorn Institute of Technology (SIIT), Thammasart University, Thailand
[2]Designated Areas for Sustainable Tourism Administration, Thailand
[3]the Urban Environmental Management Field of Study, Asian Institute of Technology (AIT), P.O. Box 4, Klong Luang, Pathumthani 12120, Thailand (corresponding author to provide phone: 66-2-524-5601; Fax:66-2-524-6380; e-mail: vilasn@ait.asia)

Tourism is considered as one of the most growing economic sectors, and also one of the emerging concerns faced by policy makers and stakeholders due to its potential implications to environment and climate change. Efforts should therefore be made to balance the economic benefits of the tourism industry and protection of the environmental values. This paper presents the results of a project, which developed guidelines for low carbon hotels in Koh Chang and its neighboring islands, under the Designated Areas for Sustainable Tourism Administration (DASTA), Thailand. The aim of the project is to develop criteria and indicators for measuring resource use and carbon emissions of hotels and related enterprises, with participation of local stakeholders. Primary data were collected through field surveys and unstructured interviews with key stakeholders. In addition, secondary data were gathered from review of related literature and existing supporting documents used in developing the guidelines. The analysis revealed nine categories ranging from policy and administration to carbon emissions, with each having several supporting indicators and criteria in the proposed guidelines. The results of the project suggest that the success of implementing the low carbon guidelines depends primarily on management support and development of supporting systems such as monitoring and auditing, documentation and database, and capacity strengthening for staff and related personnel. Real experiences from on-going pilot applications of the guidelines are expected to improve effectiveness and efficiency of actual implementation of the guidelines, before it can be adapted as a formal low carbon standard for Koh Chang, and other tourism areas.

SD-14: Low Cost Paper-Based and Capillary Tube-Based Microfluidic Systems

Bundit Boonkhao[1], Pairoh Sohsomboon[2] and Saowanaporn Choksakulporn[3]
[1]the Division of Industrial Engineering, Faculty of Industrial Technology, Nakhon Phanom University, Nakhon Phanom 48000 Thailand (corresponding author to provide phone: 66-4-251-1484; Fax: 66-4-251-1484; e-mail: bundit@npu.ac.th)
[2]Division of Science, Faculty of Liberal Arts and Sciences, Nakhon Phanom University, Nakhon Phanom 48000 Thailand.

Microfluidic systems have advantages on many fields however the cost of fabrication is quite expensive. This paper describes the low cost fabrication of paper-based microfluidic system (PMS) and capillary tube-based microfluidic system (CMS). Both of the systems have been tested with the organic reaction between rose extracted solution (red colour) and bromophenol blue (yellow colour) to obtain blue color solution.

SD-15: *Ram Mamuat*: A Reconfirmation of Thai-Khmer Cultural Identity in the Healing Ritual Context

Poonnatree Jiaviriyaboonya
Faculty of Liberal Arts and Science (Social Study), Nakhon-Phanom University, Nakhon Phanom 48000, Thailand (corresponding author to provide phone: 66- 4258-7100; Fax:66-4258-7100; e-mail: poonnatree@gmail.com)

Ram Mamuat, is a healing ritual performance in Northeastern Thailand, which largely exists in the Thai-Khmer border provinces including Sisaket, Surin, and Buriram. This paper applies theoretical discussions on ritual analysis including ritual symbols and ritual actions, to study the larger context of the Ram Mamuat ritual, including ritual functionaries, ritual structure, and ritual offerings. The researcher combines two research methods, including formal and informal interviews, plus participant observations, which took place at a Thai-Khmer village of Sisaket Province, and the city of Surin. The ethnographic data indicates that the Thai-Khmer ethnic group who calling itself Khamen Sung (Northern Khmer) practice Ram Mamuat for the veneration of their ancestral spirits, called Phi Puta. Additionally, the concept of Khru and Mamuat plays a major role in the local religious cosmology of the Khamen Sung group. A previous ethnography studied the Mamuat ritual as a way of alternative health management for the Khamen Sung group. This paper, however, will approach the Mamuat ritual as a system of symbolic action for conceptualizing the local religious worldview, as well as for constructing the ethnic identity.

SD-16: Streamflow Drought Events and Severity Analysis of Chi Basin in Thailand

Homdee Tipaporn[1] and Pongput Kobkiat[2]
[1]Water resource engineering department, Faculty of engineering, Kasetsart University, Bangkok 10900 Thailand and the Division of Civil Engineering, Faculty of Industrial Technology, NakhonPhanom University, NakhonPhanom 48000 Thailand (corresponding author to provide phone: 66-4-251-1484; Fax:66-4-251-1484; e-mail: tipaporn.homdee@gmail.com)
[2]Water resource engineering department, Faculty of engineering, Kasetsart University, Bangkok 10900 Thailand.

It has been projected that climate change will extremely increase water scarcity in the future, so drought forecasting is an essential concern for water resources planning and management, to mitigate the severity of drought damages. The objective of this study is an application of a hydrological model to analyzestreamflow drought events in the Chi river basin, northeastern Thailand. A Soil and Water Assessment Tool (SWAT) model is firstly employed to simulate streamflow. The model calibration and validationwere carried out. Then, streamflow

drought analysis was conducted using the threshold level approach as a fixed 95 percentile of the flow duration curve in order to classify dry conditions. The results show that the SWAT model performs sufficient is well in simulatingflows with relatively high values of coefficient of determination and Nash-Sutcliffe coefficient. The drought analysis indicates that trends of water scarcity on river have occurred noticeably since early 1980s and there has been a shift toward even dryer conditions during the mid and late 1990s. Moreover, drought events computed by threshold method show similar trends corresponding to the atmospheric phenomena, "El Niño".

SD-17: *Pu Thala:* Beliefs and Social Construction - The Sacred Land of Phuthai People in Renunakorn

Siriyaporn Saleepun

The Pu Thala Shrine is regarded as a sacred space in reverence where ceremonies are organized with regard to sacred beings and the spirits of their ancestors. This study aims to study the Phuthai's beliefs and spiritual ceremonies, the importance of Pu Thala in influencing their thoughts and construction of sacred space reflecting their identities based on related documents and data obtained from fieldtrips using participant observations and surveys, in-depth analysis and group discussions. It was found that their beliefs could be classified into 2 patterns; (1) regarding spiritual worship and ancestor reverence and (2) regarding religious beliefs with regard to Buddhism. Pu Thala is the Phuthai's highly revered spirit. He is believed to have been a late brave fighter in ancient time. Welcoming receptions are held, not exclusively for the spirit but also for other ancestors as Pu Thala's companions. The head of each household are required to prepare liquor as visitors come. However, Pu Thala would be symbolically served before other community seniors. Furthermore, the Phuthai hold an annual festival for the spirit of Pu Thala during the 6th waxing moon during the year's sixth month. At the beginning of the ceremony, a cow would be sacrificed as a source of food supply and as a token for the revered spirits. As what the people had prayed for the spirits yielding fruitful, a number of them could be seen in line to give their tokens to Pu Thala, their high spiritual being. The spirit is locally believed to have a magical power with success being unable to explain using scientific evidence. The reason why Pu Thaila is a famous spirit he was believed to use his supernatural power in granting wishes of the devouts; therefore, he reflects a part of the Phuthai's identity in beliefs in ancestor worship deeply ingrained in their mindset. The Phuthai, therefore, built a sacred space and their high places of worship for organizing spiritual ceremonies and ancestor reverence. These are considered an outstanding identity reflecting their beliefs to be passed on to the next generations as a way of living.

SD-18: The Model of Spending for Tourists in Nakhon Si Thammarat

Paramet Damchoo
Lecturer Tourism Department, Faculty of Business Economic and Communication at Naraesuan University. E-mail: parametd@nu.ac.th

This research aims to study the data of tourism place in Nakhon Si Thammarat and spending Model of tourists to Nakhon Si Thammarat Province, using primary data from interviews with 440 tourists (Thai tourists 400 and 40 foreign tourists) and in-depth interviews Stakeholder in tourism 30 people . The results are summarized as follows: Nakhon Si Thammarat Province is very diverse province with variety resources. According to the Tourism Authority of Thailand, Nakon Si Thammarat, (2012) it can be divided geographically into four tourism categories: 1) Recreational tourism (island/beach), 2) Eco-tourism (forests, lakes, rivers and caves), 3) Cultural tourism (museums, historic monuments and temples) temples and 4) Urban tourism (community cultural centers and housing market). Visitors are men and women aged 20-40, who are students or people employed in the private sector earning between 10,000 and 30,000 baht per month. Most tourists are traveling within the province, mostly by car and

bus. Their average expenditure is 8,865 baht with 24.00 percent spent on accommodation, 22.79 percent for tickets and 15.79 percent for fuel. They spend 12.30 percent on gifts and give 2.31 percent to the temples (merit). Only 36.59 percent of the tourists travel overnight. Accommodation types vary and include private homes, hotels of all types and resorts. Most resorts are located on the beach in Khganom and Sichon, but also include some resorts near the forest areas (Phrom Khiri, Amphoe Lan Saka, Nopphitam). Most tourists travel with spouses accounting for an overall satisfaction level of 41.14 percent. Those who travel with friends account for 16.14 percent level of satisfaction while traveling in the province. Most mentioned aesthetic satisfaction, the variety of attractions available and the convenience of travel. The travel services infrastructure, promotion of attractions to attract tourists were cited as areas that could be improved.

SD-19:

Website Trustworthiness: Medical Tourism in Thailand

Paramet Damchoo[1] and Ann Suwaree Ashton[2]

[1]Ph.D. Candidate in the Graduate School of Tourism Management at the National Institute of Development Administration,Bangkok,Thailand and a lecturer at the Faculty of Business Economic and Communication, E-mail: m.damchoo@yahoo.com

[2] Lecturer The Graduate School of Tourism Management at the National Institute of Development Administration Email: suwareeasthon@hotmail.com

This research determines to investigate the possibility of designing a user interface for websites that will evoke customer's feelings, particularly in medical tourism. The focus is on the factors that impact on visual design for the feeling of trustworthiness effecting the websites user preferences. Due to high competition among many medical tourism countries they heavily promote their own medical tourism package to attract the target market to travel to their own country. Trustworthy websites are the most important part of user interface design because once the tourists trust the information from the websites the number of tourists will be increased respectively, furthermore, they may be the best marketing tool in advertising, such as word of mouth about hospital services. In this paper the model of trust for e-commerce (MoTEC) proposed by Egger (2000) underpins this study and use as a tool to group factors affecting online user's trust into four main areas. Firstly information reliability, secondly usability, thirdly interface design and lastly information contents. These factors can be pivotal and instrumental in designing future trustworthy websites. The paper concludes by discussing the significant implications of a study from a literature review on the design and implementation of customer interfaces to websites for medical tourism and recommendations for future research.

SD-20:

Role of Disaster Management Capital in Japan

Saifon Suindramedhi

College of Interdisciplinary Studies, Thammasat University, Lampang Center, Hangchat, Lampang,52190,Thailand phone: 66-5-426-8701; Fax:66-5-426-8701; E-mail: nsaifon@tu.ac.th.

Disaster management in Japan has been divided into 2 categories which are Human Made Disaster and Natural Disaster. Human Made Disaster is resulting from an atomic bomb in Nagasaki while Natural Disaster is focusing on earthquake, tsunami, Fukushima power plant disaster (3/11 disaster) Kobe earthquake(Hanshin-Awaji earthquake). The objective is to study Capital Role in Japan Disaster Management.

SD-21:

The Investment Plan to Develop the Tourism Sector in Nakhonsrithammarat Thailand

Mongun Somkua, Anuman Chanthawong, Kamolvun Laoyoung

Suratthani Rajabhat University. Email: anuman3@hotmail.com.

This research aims to construct a plan to develop investment of tourism industry in Nakorn Si Thammarat province. The study reveals that there are five issues which should be promptly taken action from related organizations. Tourism information as well as publicity every tourism activity should be concerned. In addition, the skills of human resource in tourism sector should be strengthened. Furthermore, the government should grant entrepreneurs or help them to easily access financial sources. Other to consider is that developing destination management systems to sustain tourism destinations. Finally, it is important to note that the strategic plans should be continuously developed including initiating new tourism routes.

SD-22: Strategies to Support in Term of Learning for Voluntary Tourism in Thailand

Kamolvun Laoyoung, Anuman Chanthawong, Mongun Somkua
Surathani Rajabhat University. Email: anuman3@hotmail.com.

The objectives of this research were to analyze the government policies and conditions that promote the process voluntary tourism in Thailand. The result shows that the government policies and conditions that promote the process voluntary tourism in Thailand should be developed in 4 issues. The first issues about all sectors are participating on the strongly about voluntary tourism. The second issue about make ensure the safety of voluntary tourism about the rules and system to ensure in safety standards for foreign tourists, preparing the guide for safety such as safe travel on the road and cooperation of the relevant agencies with the Tourism Authority of Thailand. The third issue involved thedevelop on information and publicity activities to promote the voluntary tourism and the last issue to create and communication on brand volunteer products.

SD-23: Promising Integration: Letting the Weak Join the Game

Gianluca Bonanno
Centre for Southeast Asian Studies, Kyoto University,
46 Shimoadachi-cho Yoshida, Sakyo-ku, Kyoto, Japan

This paper is divided into three sections. The first introduces the decades-long development efforts in the GMS, by particularly analysing implementation priorities that have been considered by member states and the international community. The second section looks at the two countries that currently face the most serious challenges in catching up with the pace of development in the sub-region, namely Cambodia and Laos. The third section analyses the implications that some of the recent global crises and natural disasters have had on the sub-region, explaining how external factors can reverse the gains of years of cooperation efforts. The concluding part will therefore provide and support some recommendations to minimise an adverse distribution of benefits between GMS countries and to pre-emptively mitigate the negative impacts of unforeseeable events. The core of this paper is about the participation of the bloc's weakest countries to development projects that are more and more global in scope, and the underlying message is the importance of the interdependence factor in promoting regional integration.

SD-24: Public Spending, Aid Effectiveness and Poverty Reduction in Lao PDR

Keoviengxay SOURYA[1], Saykhong SAINASINH[2] and Phanhpakit ONPHANHDALA[3]
[1]Ph.D. candidate at National University of Laos (NUOL), and Kunming University of Science and Technology. (Corresponding author, contact: ksourya@hotmail.com)

[2]Vice President to NUOL [3]Senior Lecturer to NUOL

The allocation of the budget (both domestic resource and foreign aid) is a key instrument for governments to promote economic development and reduce absolute poverty. In the case of Lao PDR, the government and donors have increased their spending significantly over the past decades. The critical challenge is how to strike the right balance between the spending by domestic/foreign fund and by sector that focuses primarily on reducing poverty.Existing studies face a debate on the methodology intensively used time-series, cross-countries and CGE analysis. The paper attempts to revisit this issue by provincial panel data analysis using public spending and aid over 1995/96 to 2011/12. This study finds that both domestic budget and foreign aid contribute to the poverty reduction, though statistically insignificant. The major determinants are initial poverty level and the scale effect of each province's population. This means the current success in poverty reduction is more pronounced relatively to less poor and large provinces. Moreover, expenditure on education is significantly helpful compared other sectors. Therefore, both the Lao government and donors should strengthen the cooperation to tailor the budget allocation in further fighting against the poverty in Lao PDR.

SD-25: Simulation Modeling for Urban Freight Transportation in Vientaine City, Lao PDR

Anousack Thammavong[1] and Boualinh Soysouvanh[2]

[1]Department of Road-Bridge and Transport, Faculty of Engineering, National University of Laos
Lao-Thai Friendship Road, Sokpaluang Campus, Vientiane Capital, Lao PDR
Tel: +856 21 312424, Mobile: +856 20 56997722, E-mail: anousakth@yahoo.com
[2]Dean, Faculty of Engineering, National University of Laos
Lao-Thai Friendship Road, Sokpaluang Campus, Vientiane Capital, Lao PDR
Tel: +856 21 312072, fax: +856 21 951315, Mobile: +856 20 55507321, E-mail: boualins@fe-noul.edu.la

This paper purposes a simulation model for urban freight transportation in which the behaviour of freight agent and their relationship, the purpose of model is developing a simulation model the urban freight traffic flow, the result from model will be truck OD matrices is estimate on the basis of the collected real data, theses paper will discuss the issues on the model framework, model formulation and results of model applying to analyze the urban freight transportation in Vientiane City.

SD-26: Economic Rent from Hydropwoer Development in the Case of Lao PDR

Chansaveng BOUNGNONG[1] and Daovong PHONEKEO[2]

[1]PhD Candidate, of Joint Doctor Degree program on Management Science and Engineering, National University of Laos(NUOL) and Kunming University of Science and Technology, China
Email: cboungnong@yahoo.com
[2] Deputy Director General of Department of Electricity, Ministry of Energy and Mines, Nong Bone Road, Vientiane, Lao PDR Email: daovongph@yahoo.com

Hydro Power is the backbone of the Lao economy. The rugged terrain, compounded by the fact that the Country is land locked does not provide much economic advantage to Lao PDR. Transportation costs are high and unless Lao PDR can think of certain niche products, its exports are not going to be competitive. The decision by the Lao Government to exploit its water resources for production of electricity has changed the economic scenario for Lao PDR. The mountainous and rapid rivers have made Lao PDR a natural haven for hydro power production. The neighboring countries have provided the necessary political will and the market for Lao's power, as Thailand and Vietnam has a huge power deficit.

While electricity has provided the much needed revenue, the Lao Government has also prioritized network expansion in the Country. It is expected that by 2020, the entire Country will have access to electricity about 90%. Industrial activities are expected to increase with the commissioning of Hydroelectric Projects. There is however, a need to ensure that internal electricity tariff is kept affordable so that it becomes the main source of energy in the Country and also to stimulate industrial activities.

This paper highlights the role and importance of hydropower for social and economic development of Lao PDR and covers aspects related to planning and policy initiatives being pursued by the Hydropower sector to fulfill the national objectives. The introductory sections provide the baseline information on hydropower resources of Lao PDR, development potential and existing situation in the supply and demand of hydroelectricity. Subsequent sections cover the planning and policy interventions that the Lao Government is undertaking in order to maximize on the benefits from hydropower development.

Guidelines for Paper Presentation

This guideline gives some instructions to authors for their presentation of papers in the *8th GMSARN International Conference 2013* sections. Please be advised that the authors should carefully follow these instructions in order to make the best of your presentation.

- **The total presentation time including questions and answers for each paper at the GMSARN International Conference 2013 should be limited to less than 20 minutes.**

- **The maximum number of slides for your presentation should be limited to around 15 slides. Do not overload your figures with text and make sure that the figures are clarity in a big audience. It is recommended that you should use font size of 20pt or bigger for all texts and formulae so that the audience can read them clearly.**

- **Make sure that you use international standard fonts like Times New Roman or Arial in your PowerPoint (ppt.) file to avoid corrupted presentations due to incompatible font to the local computers.**

- **Should not use dark color as background in your PowerPoint slides and should use a color of font sharply contrasting with the background.**

- **Use spelling and grammar available in PowerPoint to check the errors you might have made.**

- **The use of overhead transparencies is strongly discouraged. A PowerPoint file is the most convenient for both you and the organizers.**

- **Feel free to include your latest research results in your presentation even if they are not included in your paper before.**

- **Speak clearly and slowly when presenting. Please remember that most of the persons in the audience are non-native English speakers.**

- **Computers and beamers are available in each conference room providing PowerPoint and Acrobat Reader software installed on Windows operating system. If you need any other software for your presentation, please contact the Secretary General by email at *gmsarn@ait.ac.th* to check the availability of the software in advance.**

- **Please try to be presence in the room around 5 minutes in advance of the session in order to copy your file onto the local computer and fill in a presentation form. Staffs will be available to assist you.**

- **In each session, there will be a Chairperson who will be in charge for introduction of presenters and discussion time for each presentation.**

- **Please feel free to contact assistant staffs in your presentation room if you need any help for your presentation.**

Thank you for your cooperation and we hope you will have your good presentation at the conference.

Itinerary for Visiting Mandalay

Thursday 19 December 2013

Morning Session

03.30 – 03.45 am. Meet at Hotel's Lobby

04.00 am. Arrive at **Mahamuni Pagoda** for ritual of washing the Face of Maha Muni Image

06.00 am. Go back to the Hotel & Breakfast

08.30 am. Meet at Hotel's Lobby and leave to Pier

09.00 am. Go to **Mingun** by boat (11km up river) from Mandalay on the opposite bank of Ayeyarwaddy River. Tour highlights includes the huge unfinished Mingun Pagoda, Mingun Bell which weighs 90 tons, and Myatheindan Pagoda with seven concentric terraces at the base.

Lunch

12.00 pm. Luncheon at the Mya Nandar River View restaurant

Afternoon Session

13.00 pm. Visit **Mandalay Royal Palace**, **Shwe Nandaw Monastery** (Golden Palace) where you can marvel the superb example of Myanmar traditional woodcarving.
After that, go to **Kuthodaw Pagoda** known as World's Biggest Book for its 729 marble slabs engraved with Buddhist scriptures.

17.00 pm. Enjoy the sunset and panoramic view of **Mandalay Hills**.

Dinner

18.30 pm. Dinner at Oriental House

20.30 pm. Go back to Hotel

Remark: *English-speaking tour guide service & transportation (Bus & Boat) are provided. The programs maybe change without prior notice.*

GMSARN International Journal

The GMSARN International Journal is dedicated to advance knowledge in energy, environment, natural resource management and economical development by the vigorous examination and analysis of theories and good practices along with encouraging innovations needed to establish a successful approach to solve an identified problem.

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