



NASKAH SEMINAR INTERNASIONAL

Judul:

Potential of Wind Energy and Design Configuration of Wind Farm on Puger Beach at Jember Indonesia

Oleh :

**Triwahju Hardianto, Bambang Supeno, Azmi Saleh,
Dedy Kurnia Setiawan, Gunawan, Setya Indra**

Makalah disajikan pada “World Engineers Summit – Applied Energy Symposium & Forum: Low Carbon Cities & Urban Energy Joint Conference, WES-CUE 2017, 19–21 July 2017, Singapore”. (<http://www.wes-ies.org/>)

**Diselenggarakan oleh The Institution of Engineers, Singapore
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WES-CUE 2017

WORLD
ENGINEERS
SUMMIT

APPLIED ENERGY
SYMPOSIUM & FORUM

World Engineers Summit 2017-
Applied Energy Symposium & Forum: Low Carbon
Cities and Urban Energy (WES-CUE 2017)
18 - 21 JULY 2017 | SUNTEC SINGAPORE CONVENTION & EXHIBITION CENTRE, LEVEL 3

Joint
Conference 2017
Programme Highlights



- WELCOME TO WES-CUE 2017
- ACKNOWLEDGMENT
- COMMITTEES
- PROGRAMME
- KEYNOTE SPEAKERS
- TRACK KEYNOTE SPEAKERS
- PRE-EVENT WORKSHOP
- SIDE-EVENTS
- PRACTICAL GUIDE
- SPEAKER'S GUIDE
- FLOOR PLAN



Joint Welcome Message

By Prof S.K. Chou and Prof J. Yan

Co-Chairs of WES-CUE 2017

Dear WES-CUE delegates,

Welcome to the World Engineers Summit – Applied Energy Symposium & Forum: Low Carbon Cities and Urban Energy (WES-CUE 2017) Joint Conference.

With the Paris Agreement entering into force in November 2016, it is time to scale up action to achieve the goal of limiting global temperature rise to well below 2 degrees Celsius above pre-industrial levels. WES-CUE 2017 aims to provide a platform for knowledge exchange on the latest research findings and engineering innovations so critical to realising a low carbon future and sustainable development.

The Institution of Engineers, Singapore is pleased to join hands with the International Conference on Applied Energy and The Applied Energy Innovation Institute to present the third WES conference. While retaining its focus as a platform for engineering-centric dialogues on sustainable urban development, this year's WES has also notably bolstered its technical content line-up leveraging the Applied Energy's CUE series. It will feature a record 157 technical paper presentations from 25 countries, alongside a robust line-up of keynote presentations from world-renowned sustainability experts. We thank all speakers and presenters for your participation and support.

We have chosen "Low Carbon Cities & Urban Energy" as the conference theme as affordable, scalable energy solutions are fundamental to reducing greenhouse gas emissions and building carbon-free and climate-resilient economies. By organising discussions along six tracks: transport, building, industry, environment, power generation & energy storage and urban planning, we hope to drive positive change in all these sectors through advancements in engineering and science.

Thank you for participating in WES-CUE 2017 and for being a keen contributor to a sustainable future. We hope that all delegates will have a fruitful conference, be it in furthering your research, developing your innovations, commercialising your ideas or seeking financing. Let us work in collaboration to make the world cleaner, more energy-efficient and more liveable.

Welcome Message

By Er. Edwin Khew Teck Fook

Co-Chairs of WES-CUE 2017

Dear IES members, conference delegates and friends,

On behalf of The Institution of Engineers, Singapore (IES), I welcome you to the third edition of the World Engineers Summit (WES 2017).

As the national society of engineers in Singapore, IES is steadfast in our mission of advancing and promoting the science, art and profession of engineering for the well-being of mankind. This commitment led IES to choose climate change as its focus when it hosted the inaugural WES in 2013 during the inaugural general assembly of the World Federation of Engineering Organisations (WFEO) in Singapore. This focus was also to support and provide a platform for engineers to discuss and appreciate the increasingly prominent risks that climate change poses to global economies and human lives.

IES's aim at WES is to create and provide this platform to facilitate the exchange of knowledge, experience and expertise amongst the world's engineers that would generate innovative solutions to mitigate and adapt to the impact of climate change. The global engineering community has responded enthusiastically to this call during the past two summits. Together with sustainability professionals, academia, policy makers and business leaders, engineers have participated in dialogues and discussions that have been vital in driving global climate action and resilience.

This year, IES is pleased to present the World Engineers Summit – Applied Energy Symposium & Forum: Low Carbon Cities and Urban Energy (WES-CUE 2017) Joint Conference together with our partners - International Conference on Applied Energy (ICAIE) and The Applied Energy Innovation Institute (AEII). The summit will deal with critical issues of energy in relation to climate change with the aim of fostering dynamic international exchange of research findings in urban energy systems that favours low carbon emission and sustainable development.

Apart from WES, IES has continued to strive to enhance the ability of engineers to respond to global challenges such as climate change by establishing strong linkages with regional and international professional engineering organisations. IES is currently representing Singapore in the World Federation of Engineering Organisations (WFEO), ASEAN Federation of Engineering Organisations (AFEO) and the Federation of Engineering Institutions of Asia and the Pacific (FEIAP).

Locally, IES has also been actively strengthening the technical competencies and knowledge of IES members and engineers through our many courses, seminars and talks organised by more than 15 Technical Committees (TCs) at IES. During the inaugural WES in 2013, IES also launched the Chartered Engineers Programme to raise both the professional standing of engineers and standards of engineering practice in Singapore. IES will continue to do more

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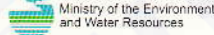
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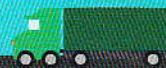
Local Organising Secretariat

The Institution of Engineers, Singapore

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Daily Programme Line-up

Date	Time	Programme Description	Room
18 July	9.00 am – 5.00 pm	Pre-event Workshop: Floating Structures by The Institution of Structural Engineers (IStructE) <i>[Separate workshop fee payable]</i>	335
19 July	9.00 am – 12.30 pm	WES-CUE Opening Ceremony & Plenary Session	324 - 326
	12.30 pm – 4.30pm	Test Drive by BlueSG <i>[Must have valid driving license]</i>	Booth B17
	2.00 pm – 5.00 pm	Track Break-out Sessions (Please refer to Paper Schedule)	324 - 330
	2.00 pm – 4.00 pm	Side-event: Low Carbon Technologies Forum by IChemE Energy Centre <i>[Free to participate as part of the conference]</i>	303
	5.00 pm – 6.00 pm	Special Session: Peer Review Workshop by Elsevier Science <i>[Free to participate as part of the conference]</i>	324
20 July	9.00 am – 5.00 pm	Track Break-out Sessions (Please refer to Paper Schedule)	324 - 330
	9.00 am – 12.30 pm	Side Event: WISER Forum by IES-Women in Science, Engineering and Research Group <i>[Free to participate as part of the conference]</i>	335
	10.00 am – 4.30pm	Test Drive by BlueSG <i>[Must have valid driving license]</i>	Booth B17
	1.30 pm – 3.30 pm	Special Session by CIBSE	324
	4.00 pm – 5.00 pm	Special Session on Nuclear Energy	329
	6.30 pm – 9.30 pm	WES-CUE Conference Dinner	404AXF
21 July	9.00 am – 12.30 pm	Track Break-out Sessions (Please refer to Paper Schedule)	324 - 329
	9.00 am – 6.00 pm	Side-Event: Distinguished Lecturers Seminar by ASHRAE <i>[separate event fee payable]</i>	335
	10.00 am – 4.30pm	Test Drive by BlueSG <i>[Must have valid driving license]</i>	Booth B17
	2.00 pm – 5.00 pm	Technical Site Visits (Please refer to Technical Site Visits)	offsite

Important Note:

- Morning tea-break will be served from 10.30 am – 11.30 am; lunch will be served from 12.00 pm – 2.00pm; afternoon tea-break will be served from 3.30pm – 4.30pm
- Information is correct at time of print. Please go to the Registration Counter for announcement or updates.
- All PE, SCEM, RE/RTO must sign in to receive their PDU/STU points everyday.



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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 19 July, 2.00 pm – 3.30 pm

Room 324	Room 325	Room 326	Room 327	Room 329	Room 330
Session Chairs: Looi Teik Soon / Yu Xiaoling	Session Chairs: Lee Poh Seng / Kozo Takase	Session Chairs: Norman Lee / Lalit Saini	Session Chairs: Dalson Chung / Ren Hongbo	Session Chairs: Li Hailong / Lee Kwee Hiong	Session Chairs: Geoffrey Hammond / Eugene Khoo
TRANSPORT	BUILDING	INDUSTRY	ENVIRONMENT	POWER & ENERGY	URBAN PLANNING
<p>Keynote Speaker: Fong Saik Hay, Chief Technology Officer, ST Engineering</p> <p>Papers for Energy Management: (123) A highway multi-lane partition model for the introduction of unmanned vehicles (256) Development of a multi-purpose infrastructure for sustainable mobility. A case study in a smart cities application (277) Autonomous Vehicles and Energy Impacts: A Scenario Analysis</p>	<p>Papers for Green Buildings: (103) Enhanced bamboo composite with protective coating for structural concrete application (122) Eco-friendly building: using ceramic waste and laterite as ingredients in mortar (167) Overcoming Solar PV Intermittency using Demand Response Management in Green Buildings (203) Framework for evaluating and optimizing algae façades using closed-loop simulation analysis integrated with BIM</p>	<p>Papers for Industrial Processes: (16) Numerical investigation on ash deposition on the surface of tube bundle (52) Enhancing Energy Efficiency of FMCG Sector Through Efficient Use of Steam (56) Energy Efficiency in Industrial Processes (97) Innovative Organic Rankine arrangements for Water Savings in Waste Heat Recovery Applications</p>	<p>Keynote Speaker: Joseph Boey, Project Director, IWMF, NEA</p> <p>Papers for Waste to Energy: (7) Recycling Solid Waste and Bioenergy Generation in MFC Dual- Chamber Model (29) Bio Gas plant green energy from poultry wastes in Singapore (67) Biomethanation of different household wastes using laboratory scale anaerobic digester</p>	<p>Keynote Speaker: Frank Phuan, Managing Director, Sunseap</p> <p>Papers for Energy Storage: (6) Effects of Void Spaces in a Phase Change Material Based Thermal Energy Storage System (117) Investigation of storage materials for packed bed cold storages in liquid air energy storage (LAES) systems</p>	<p>Keynote Speaker: Hee Li Min, Director, Centre for Liveable Cities</p> <p>Papers for Smart and Sustainable Urban Design: (9) Development of Solar City: Experience and Lessons learned from Turpan Demonstration District, China (23) Smart & Safe Energy Society - Toward durable peace and evolution (107) Harvesting 3D Multiphysics Modelling Techniques for Smart and Sustainable University Campus</p>

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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 19 July, 4.00 pm – 5.00 pm

Room 324	Room 325	Room 326	Room 327	Room 329	Room 330
Session Chairs: Catherine Ross / Eugene Khoo	Session Chairs: Kozo Takase / Lee Poh Seng	Session Chairs: Lee Kwee Hiong/ Li Hailong	Session Chairs: Ren Hongbo / Dalson Chung	Session Chairs: Lee Jim Yang / Lalit Saini	Session Chairs: Geoffrey Hammond / Ho Kwong Meng
TRANSPORT	BUILDING	INDUSTRY	ENVIRONMENT	POWER & ENERGY	URBAN PLANNING
<p>Papers for E-Mobility:</p> <p>(11) Electric Vehicle Deployment in Singapore and Technical Considerations for Public Charging Infrastructure</p> <p>(76) The prospect of electric vehicles in the absence of policy support</p>	<p>Papers for Green Buildings:</p> <p>(262) Development of an Innovative Energy Modelling Framework for Design and Operation of Building Clusters in the Tropics</p> <p>(273) Practice of net Positive Energy House in the Suburb of Tokyo</p> <p>(281) Facilitating systemic changes towards green buildings: Developing a conceptual framework of socio-technical transitions</p>	<p>Papers for Industrial Processes:</p> <p>(58) - Corrosion monitoring of pipelines in critical locations using ultrasonic guided wave tomography</p> <p>(97) Experimental Observation of CO2 Dry-Ice Behavior in Evaporator/Sublimator in Ultra-Low Temperature Cascade Heat Pump System</p> <p>(129) Optimal configuration for propylene-propane separation using vapor recompression and self-heat recuperation</p>	<p>Papers for Waste to Energy:</p> <p>(75) Environmental performance assessment of the application of high temperature phase change materials in waste-to-energy plants</p> <p>(224) Waste to Energy Solution – The Sludge Treatment Facility in Tuen Mun, Hong Kong</p> <p>(240) Experimental study on the safety of R32 domestic air conditioner in the process of recovering the refrigerant</p> <p>Abstract for Waste to Energy:</p> <p>(31) Enhanced bioenergy production from wasted sludge in an extreme thermophilic single-stage anaerobic sludge digester</p>	<p>Papers for Energy Storage:</p> <p>(63) Lithium Iron Phosphate (LiFePO4) Battery Power System for Deepwater Emergency Operation</p> <p>(118) Improving liquefaction process of small scale Liquid Air Energy Storage through waste heat recovery and absorption chiller</p> <p>(223) The thermal conductivity of molten NaNO₃, KNO₃, and their mixtures.</p> <p>(239) Morphological Studies of Mixed Methane Tetrahydrofuran Hydrates in Saline Water for Energy Storage Application</p>	<p>Papers for Others:</p> <p>(113) To Construct Buildings onto Seabed Directly Without Land Reclamation</p> <p>(301) Study of the secondary energy products' prices and financial analysis of distributed energy station project</p> <p>Urban Planning (others) Abstract:</p> <p>(98) Truly Smart City? Gaps and challenges of Chinese smart cities- the case of Ningbo China</p> <p>(102) The practice of ecological sustainability in China: a study of three types of ecological development in Chongming Island</p>

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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 20 July, 9.00 am – 10.30 am

Room 324	Room 325	Room 326	Room 327	Room 329	Room 330
Session Chairs: Mervyn Sirisena / Catherine Ross	Session Chairs: Michael Leung / June Tay	Session Chairs: Hang Yu / Ong Eng Hong	Session Chairs: Song Jie / SK Chou	Session Chairs: Ngin Hoon Tong / Pushpendra Jain	Session Chair: Jin Liwen
TRANSPORT	BUILDING	INDUSTRY	ENVIRONMENT	POWER & ENERGY	POWER & ENERGY
<p>Keynote Speaker: Paul Stein, Chief Technology Officer, Rolls Royce</p> <p>Papers for Energy Management: (304) Recovering energy from train braking for traction and grid use (73) Progressing Towards DC Electrical Systems for Marine Vessels</p> <p>Papers for Others: (156) Optimal selection of charging stations for EV users</p>	<p>Keynote Speaker: Heah Soon Poh, Assistant Chief Executive, JTC Topic: Engineering Sustainable Infrastructure</p> <p>Papers for Energy Efficiency: (8) The status quo of operation of HVAC water-side systems in China: a perspective from BAS data (18) Effect of different renovation actions, their investment cost and future potential (24) Role of ICT in Creating Intelligent, Energy Efficient Buildings</p>	<p>Paper for Industrial Processes: (207) Low-grade waste heat driven hybrid systems for cooling and power (208) Monitoring compressed air systems energy performance in industrial production: lesson learned from an explorative study in large and energy-intensive industrial firms. (215) Dynamic study of orc evaporator operating under fluctuating thermal power from waste heat sources</p>	<p>Keynote Speaker: Suneet Manjavkar, Water Solutions Consultant-South Asia, Bentley Systems, India</p> <p>Papers for Waste to Energy: (274) Research on Production Decision and Sharing Responsibility Mechanism of Dual Responsibility Closed-loop Supply Chain</p> <p>Papers for Others: (14) A Study on Mechanical Properties and Leaching Behaviour of Municipal Solid Waste (MSW)</p>	<p>Keynote Speaker: Lester Chia, Senior Engineer, Energy Research Building and Research Institute, HDB</p> <p>Papers for Renewable Energy: (15) Experimental and numerical study on the combustion of a 32 MW wood-chip grate boiler with internal flue gas recirculation (20) Innovative Microgrid Solution for Renewable Energy Integration within the REIDS Initiative</p>	<p>Abstracts: (109) Field Test Analysis of A Urban Sewage Source Heat Pump System Performance (121) Preparation and Performance of Composite Building Materials with Phase Change Material for Thermal Storage (194) Research on The Clean Energy Heating Systems in Rural Beijing (197) The Study on Thermal Comfort Simulation of Airflow in Air Conditioning, Heating and Natural Ventilation in Ancient Buildings (198) Technical Feasibility Analysis of Biomass Stove Heating System</p>

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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 20 July, 9.00 am – 10.30 am (continued)

Room 324	Room 325	Room 326	Room 327	Room 329	Room 330
Session Chairs: Mervyn Sirisena / Catherine Ross		Session Chairs: Hang Yu / Ong Eng Hong	Session Chairs: Song Jie / SK Chou		
TRANSPORT	BUILDING	INDUSTRY	ENVIRONMENT	POWER & ENERGY	POWER & ENERGY
(285) Analytical and Experimental Study of Micro Gas Turbine as Range Extender for Electric Vehicles in Asian Cities		Papers for Others: (10) Development of a multidisciplinary approach to compute sustainability index for manufacturing plants - Singapore perspective (40) Smart Aquaponics System for Urban Farming	(45) Super well point technology with advancements in soil improvements for land reclamations (46) Analysis of heavy metals in Incineration Bottom Ash in Singapore and potential impact of pre-sorting on ash quality		

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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 20 July, 11.00 am – 12.30 pm

Room 324	Room 325	Room 326	Room 327	Room 329	Room 330
Session Chairs: Gongsheng Huang / Chan Yun Ching	Session Chairs: June Tay / Michael Leung	Session Chairs: Ong Eng Hong / Hang Yu	Session Chairs: SK Chou / Song Jie	Session Chairs: Pushpendra Jain / Ngin Hoon Tong	Session Chair: Jin Liwen
BUILDING	BUILDING	INDUSTRY	ENVIRONMENT	POWER & ENERGY	POWER & ENERGY
<p>Keynote Speaker: Jeffery Neng, Asst. Managing Director, Building Environment Research & Innovation Institute</p> <p>Papers for Smart Homes: (114) Implementation of Smart LED Lighting and Efficient Data Management System for Buildings (137) Energy storage systems for refrigerated warehouses (166) Promoting Energy Efficiency of HVAC Operation in Large Office Spaces with a Wi-Fi Probe enabled</p>	<p>Papers for Energy Efficiency: (53) Probabilistic analysis of mist coolers for chiller systems in commercial buildings (110) Distributed Pumping Chilled Water Hydronic System for Air-conditioning Systems (134) Implementation of effective and low-cost building monitoring system(BMS) using raspberry PI (138) Integrating Composite Desiccant and Membrane Dehumidifier to Enhance Building Energy Efficiency</p>	<p>Papers for Others: (93) Optimization of a compact falling-droplet absorber for cooling power generation (104) Tracking Multilayer Energy Flows Embodied in China’s Interregional Trade: An Input-Output Network Analysis (185) Computational Fluid Dynamics for Industry Optimization (195) Design and Costing of a PVSA-Based Industrial Scale Propylene/Propane Separation Process</p>	<p>Papers for Others: (94) Modelling the clogging dynamism of dual-media pre-treatment rapid filters for seawater desalination (115) Deployment of green materials as alternative coarse media in dual-media rapid filters (120) Environmental and resource burdens associated with an urban community and its surrounding bioregion (180) Fabrication of conductive carbon nanomaterial from carbonaceous waste</p>	<p>Papers for Renewable Energy: (27) Modelling of ash deposition in biomass boilers: a review (34) Design and Development of an Automatic Solar Tracker (38) Study on offshore wind farm layout optimization based on decommissioning strategy (70) Implementation of a Fuzzy Controlled Buck-Boost Converter for Photovoltaic Systems</p>	<p>Abstracts: (214) Design method of radiant cooling area based on the relationship between human thermal comfort and thermal balance (228) Heat transfer performance of buried extremely long ground-coupled heat exchangers with concentric pipes (231) Experimental investigation on the charge-discharge performance of the commercial lithium-ion batteries</p>

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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 20 July, 11.00 am – 12.30 pm (continued)

Room 324	Room 325	Room 326	Room 327	Room 329	Room 330
Session Chairs: Gongsheng Huang / Chan Vun Ching	Session Chairs: June Tay / Michael Leung		Session Chairs: SK Chou / Song Jie		
BUILDING	BUILDING	INDUSTRY	ENVIRONMENT	POWER & ENERGY	POWER & ENERGY
Paper for Green Buildings: (300) Model Predictive Control Based Energy Optimization in Building Environment Using IoT Platform	(142) Thermodynamic and thermo-economic analysis of integrated organic Rankine cycle for waste heat recovery from vapor compression refrigeration cycle		(201) Municipal solid waste management in Indonesia – A study about selection of proper solid waste reduction method in D.I. Yogyakarta Province		

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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 20 July, 1.30 pm – 3.30 pm

Room 324	Room 325	Room 326	Room 327	Room 329	Room 330
Session Chairs: Loh Hsieh-Min / Ang Choon Keat	Session Chairs: Clive Ford / Yat H. Yau	Session Chairs: Lalit Saini / Seow Tiang Keng	Session Chairs: Adrian Law / Alfred Wong	Session Chairs: Victor Nian / Lee Kwee Hiong	Session Chairs: Subhrajit Guhathakurta / Looi Teik Soon
BUILDING	BUILDING	INDUSTRY	ENVIRONMENT	POWER & ENERGY	URBAN PLANNING
<p>CIBSE Keynote Speaker: Peter Bull, Principal, ARUP</p> <p>CIBSE Abstracts: (191) Building Performance Evaluations (192) Hemis-Designing for Zero Carbon in the Himalayas</p> <p>Papers for Energy Efficiency: (237) A data mining approach to discover critical events for event-driven optimization in building air conditioning systems (303) Technical Economy Feasibility Analysis of Biomass Stove Heating System</p>	<p>Papers for Energy Efficiency: (172) A prediction approach of energy station's output in community energy system based on the attenuation and delay of pipes (177) Thermal Analysis for Underground Data Centres in the Tropics (199) Getting Nature to Help in Energy Efficiency (221) Experimental Investigation on Moisture Transfer of Carbon Nanotube Membranes (230) Operation strategy optimization for building cooling heating and power system with thermal energy storage</p>	<p>Papers for Others: (25) Asset Performance Management for Power Grids (112) Dynamic exergetic and environmental assessments of the small-scale LNG cold utilized micro power generation systems. (168) Persistent and adaptive power system for solar powered sensors of Internet of Things (IoT) (232) Recovering Natural Gas from Gas Hydrates using Horizontal Wellbore (308) Three Phase Fully Controlled Converter with SAF controlled by optimized I.Cosϕ control algorithm</p>	<p>Papers for Others: (241) Numerical Simulation of Soil Thermal Response Test with Thermal-dissipation Corrected Model (242) Estimation of the urban heat island using remotely sensed thermal infrared data (243) Calculation of turbulent stress through steady-state RANS and LES validation (245) Assessment and improvement of the accuracy of radiation heat transfer estimation in simplified urban canopy models</p>	<p>Keynote Speakers: Bernard Nee, Deputy Chief Executive, EMA</p> <p>Papers for Renewable Energy: (72) Investigation on the mid-temperature solar thermochemical power generation system (77) Solar Energy Hybrid System for Seawater Distillation in the Coastal Regions (86) Optimal Scheduling of Multi-Source Microgrid Considering Power to Gas Technology and Wind Power Uncertainty</p>	<p>Keynote Speaker: Lam Wee Shann, Group Director (Technology & Industry Development) Land Transport Authority, Singapore</p> <p>Papers for Low Carbon Economy: (216) Impact of Industrial Structure Adjustment and Energy Consumption Structure Adjustment on Urban Carbon dioxide emission and Embodied Carbon Emission: Taking Beijing as a Case (287) Climate change, the built environment and triple helix innovation</p>

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Paper Schedule – 20 July, 1.30 pm – 3.30 pm (continued)

Room 324	Room 325	Room 326	Room 327	Room 329	Room 330
Session Chairs: Loh Hsieh-Min / Ang Choon Keat			Session Chairs: Adrian Law / Alfred Wong		Session Chairs: Subhrajit Guhathakurta / Looi Teik Soon
BUILDING	BUILDING	INDUSTRY	ENVIRONMENT	POWER & ENERGY	URBAN PLANNING
(306) Effect of fin location on the latent heat storage: a numerical study			(253) Raman Spectroscopic Studies on Hydrate-based Carbon Dioxide Separation from Fuel Gas in the Presence of THF Paper for District Cooling & Heating: (143) Effects of Building Mix on Energy Performances of the District Heating and Cooling System		Papers for Smart and Sustainable Urban Design: (293) Smart & Safe Energy Society - Toward durable peace and evolution - (305) From Numerical Model to Computational Intelligence: The Digital Transformation of Urban Energy System

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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 20 July, 4.00 pm – 5.00 pm

Room 324	Room 325	Room 326	Room 327	Room 329	Room 330
Session Chairs: Ang Choon Keat / Loh Hsieh-Min	Session Chairs: Yat H Yau / Clive Ford	Session Chairs: Seow Tiang Keng / Lalit Saini	Session Chairs: Yan Jinyue / Alfred Wong	Session Chair: Victor Nian	Session Chair: Geoffrey Hammond
BUILDING	BUILDING	POWER & ENERGY	INDUSTRY	POWER & ENERGY	URBAN PLANNING
<p>Papers for Energy Efficiency:</p> <p>(238) Calibration of cooling loss-associated parameters using Bayesian inference</p> <p>(244) Inverse estimation of the urban heat island using district-scale building energy calibration</p> <p>(246) A coordinated VAV control with integration of heat transfer coefficients for improving energy efficiency and thermal comfort</p>	<p>Abstracts for Others:</p> <p>(146) Performance evaluation of air flow and thermal comfort in the room with wind-catcher using different CFD techniques under neutral atmospheric boundary layer</p> <p>Papers for Others:</p> <p>(43) A feasibility study of Building Information Modelling (BIM) for Green Mark New Non-Residential</p> <p>(61) A Meta Model Based Bayesian Approach for Building Energy Models Calibration</p> <p>(270) A Comprehensive Case Study of Climate Change Impacts on the Cooling Load in an Air-Conditioned</p>	<p>Papers & Abstract for Others:</p> <p>(310) Comparative Analysis of the Relationship between Oil Price and USD Exchange Rate Fluctuation before and after the Financial Crisis</p> <p>(233) Numerical modelling of methane hydrate dissociation within porous media by depressurization for energy recovery</p> <p>Papers for Energy Storage:</p> <p>(251) Experimental Analysis on Crucible Selection of Thermal Properties of Nitrate Salt</p> <p>(74) Non-Eutectic Phase Change Materials for Cold Thermal Energy Storage</p>	<p>Papers for Data Centres:</p> <p>(219) Free cooling technologies for data centers: energy saving mechanism and applications</p> <p>(248) Dynamic simulation of a multi-generation system for electric and cooling energy provision, employing a SOFC cogenerator and an adsorption chiller</p>	<p>Abstracts & Papers for Nuclear Energy:</p> <p>(21) Global developments in advanced reactor technologies and international cooperation</p> <p>(66) Factors Shaping the Outlook for Nuclear Energy</p> <p>(133) International Legal Framework for the Safe, Secure and Peaceful Uses of Nuclear Energy: Recent Developments</p> <p>(311) The Southeast Asian dynamics in nuclear energy</p>	<p>Papers for Smart and Sustainable Urban Design:</p> <p>(132) From Numerical Model to Computational Intelligence: The Digital Transformation of Urban Energy System</p> <p>(260) A Generalizable Method for Estimating Household Energy at a Neighborhood Scale in US Urban Regions</p> <p>(266) Energy efficient neighborhood design under residential zoning regulations in Shanghai</p> <p>(275) How Have Political Incentives for Local Officials Reduced the Environmental Pollution of Resource-depleted Cities?</p>

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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 21 July, 9.00 am – 10.30 am

Room 324	Room 325	Room 326	Room 327	Room 329
Session Chairs: Anders Avelin / Victor Nian	Session Chairs: Michael Leung / Tan Kang Hai	Session Chairs: Ren Hongbo / Muhammad Aziz	Session Chairs: Yan Jinyue / Alfred Wong	Session Chair: Liu Qibin / Yan Jinyue
POWER & ENERGY	BUILDING	POWER & ENERGY	ENVIRONMENT	POWER & ENERGY
<p>Papers for Renewable Energy:</p> <p>(154) CIGS photovoltaics for the urban tropics</p> <p>(169) Biodiesel production in a reactive distillation column catalyzed by heterogeneous potassium catalyst</p> <p>(174) Optimum Study on Primary Design of Geothermal Heat Pipe with CO2 Based Rankine Cycle</p> <p>(184) Cold gas micro propulsion development for satellite application</p> <p>(218) Decentralized algal energy system design at various urban densities and scales</p>	<p>Papers for Energy Efficiency:</p> <p>(247) The effect of urban density on energy consumption and solar gains: the study of Abu Dhabi's neighborhood</p> <p>(255) Energy saving potential of an air treatment system for improved building indoor air quality in Singapore</p> <p>(278) Mining gradual patterns in big building operational data for building energy efficiency enhancement</p> <p>(283) Optimal Carbon Reduction Strategies in the Building Sector with Emission Trading System (ETS)</p>	<p>Paper for Energy Storage:</p> <p>(99) Combined Nitrogen Production, Ammonia Synthesis, and Power Generation for Efficient Hydrogen Storage (Ammonia)</p> <p>Papers for Smart Grids:</p> <p>(26) Load and Renewable Energy Forecasting for a Microgrid using Persistence Technique</p> <p>(65) Smart Community Solution for Energy Management - A Review of Critical Parameters for Commercial or Residential Energy-Efficient Users to Participate in Demand-side Management of Singapore Electricity Market</p> <p>(116) Application of Hybrid Generator System in Smart Grid</p> <p>(178) Energy management for a smart campus</p>	<p>Keynote Speaker:</p> <p>Harry Seah, Chief Engineering and Technology Officer, PUB</p> <p>Papers for Others:</p> <p>(261) Formation Behaviors of CO2 Hydrate in Kaoline and Bentonite Clays with Partially Water Saturated</p> <p>(297) Use Eye Tracker to Design an Intelligent Patient Bed</p> <p>Papers for Climate Change Mitigation:</p> <p>(235) Systematic evaluation of semi clathrate-based pre-combustion CO2 capture in presence of tetra-n-butylammonium fluoride (TBAF): effect of TBAF concentration and kinetic additives</p>	<p>Papers for Renewable Energy:</p> <p>(141) Thermo-hydraulic modelling for Direct Steam generation</p> <p>(149) Siting assessment for Kinetic Energy Turbines: an emplacement study for sea and river applications</p> <p>(150) The rise of Renewable Energy implementation in South Africa</p> <p>(152) Solar Forecasting using ANN with Fuzzy Logic Pre-processing</p>

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PROGRAMME & PAPER SCHEDULE

Paper Schedule – 21 July, 11.00 am – 12.30 pm

Room 324	Room 325	Room 326	Room 327	Room 329
	Session Chairs: Tan Kang Hai / Michael Leung	Session Chairs: Muhammad Aziz / Ren Hongbo		Session Chair: Liu Qibin / Yan Jinyue
POWER & ENERGY	BUILDING	POWER & ENERGY	ENVIRONMENT	POWER & ENERGY
	<p>Papers for Energy Efficiency:</p> <p>(295) Simulation analysis on summer conditions of ancient architecture of gate tower based on CFD</p> <p>(296) Preparation and Performance of Composite Building Materials with Phase Change Material for Thermal Storage</p> <p>(298) Field Test Analysis of a Urban Sewage Source Heat Pump System Performance</p> <p>(299) Research on the clean energy heating systems in rural Beijing</p>	<p>Papers for Smart Grids:</p> <p>(209) Planning tool for polygeneration design in micro-grids</p> <p>(259) Scheduling Capacity Evaluation of Aggregated Thermostatically Controlled Loads Based on Fuzzy Set Method</p> <p>(267) Design and Evaluation of a CCHP based Micro-grid for an Urban Area</p> <p>(286) Optimal Operation Control of Pumped Hydro Storage in the South African Electricity Market</p> <p>(291) Performance Evaluation of Peer-to-Peer Energy Sharing Models</p>		<p>Papers for Renewable Energy:</p> <p>(265) Data-Driven Short-Term Forecasting of Solar Irradiance Profile</p> <p>(276) Potential of wind energy and design configuration of wind farm on Puger beach at Jember Indonesia</p> <p>(288) Advanced solar photocatalytic asphalt for removal of vehicular NOx</p> <p>(292) Injection power cycle applied in OTEC power plants</p>

TECHNICAL SITE VISITS, 21 JULY 2017

HDB Centre of Building Research

The Centre of Building Research (CBR) is HDB's master laboratory. Set up in 2009, it spearheads research and development (R&D) efforts in building and environmental sustainability, as well as nurtures new technologies for future generations of public housing. The CBR focuses its R&D initiatives in 5 areas – Energy, Urban Greenery, Living Environment, Waste & Water, and Building Technology. This is aligned with HDB's Roadmap to Better Living in HDB Towns to build 'Sustainable Towns'. Prototypes of new technologies are developed and test-bedded at the CBR before implementation in HDB estates. The CBR brings to fruition, HDB Building Research Institute's vision to be a leader in research, innovations and solutions in developing quality homes, and creating a pleasant, green living environment for its residents.

Duration/No. of Visitors for tour: 3 pm – 4.15 pm/40 pax only

Marina District Cooling

District cooling is a new urban utility which centralise the production of chilled water for air conditioning to developments within a district. DCS is, in fact, a "chilled water cloud".

Singapore District Cooling was incorporated as one of the utility services for the Singapore's new business district at Marina Bay. This is the world's largest underground DCS which provides air conditioning, 24/7, for 23 iconic buildings in the premium financial district, including Marina Bay Sands and Marina Bay Financial Centre.

The Marina Bay DCS achieves world-class reliability and maintain high supply quality as there was no chilled water supply interruption since the first day of supply in 2005. With economic of scale, the system significantly reduces unused equipment capacity, saving costs and space. The thermal storage system reduces the capacity requirement of the electricity grid by storing chilled water at night and discharge when needed e.g. electricity outages. The plant also seamlessly integrated with the development which every part of the system is away from public view, making this huge industrial facility in the city centre "invisible".

Duration/No. of Visitors for tour: 3 pm – 4 pm/30 pax only

Tuas South Waste-To-Energy Plant

Tuas South Incineration Plant is the fourth and largest refuse incineration plant in Singapore.

Built at a cost of S\$890 million and completed in June 2000, it was designed to incinerate 3,000 tonnes of refuse daily. The plant is sited on 10.5 ha of reclaimed land and enables all incinerable waste generated in Singapore to be disposed of by incineration. The Plant was built with state-of-the-art technology. The various processes are highly automated and controlled via a digital control system. Modern equipment incorporating advanced technology is used in the plant to ensure a high level of efficiency and reliability.



Incineration achieves about 90% reduction in volume of the refuse. Hence, all incinerable refuse are disposed of at the incineration plants while non incinerable refuse and ash from the incineration plants are disposed of at the Semakau Landfill. This helps to conserve the use of scarce land in Singapore. Tuas South Incineration Plant, together with the other incineration plants and the Semakau Landfill, will meet the refuse disposal needs of Singapore and help in achieving a clean living environment for all Singaporeans.

Duration/No. of Visitors for tour: 3 pm – 4 pm/30 pax only

Panasonic Vertical Farming

Panasonic Factory Solutions Asia Pacific (PFSAP) has been known as one of global leaders in the design, manufacturing, assembly & exporter of high-accuracy Auto-insertion & Surface Mount Technology machineries widely used in various product applications namely consumer electronics, automotive & industrial.

Most people may not easily associate the brand “Panasonic” with agriculture business, but that is precisely the business that they recently ventured into. Inspired to answer the ever-increasing need for food security and demand for high quality food supply, PFSAP fused Panasonic’s technology and factory automation expertise into agriculture, creating a new motion in 2013.

Panasonic’s vision is to offer advanced systems and solutions in urban farming industry to promote sustainable healthy lifestyle globally. They are the first and currently the only company in Singapore which has attained both Farm License and Salad Processing License within a single site. Their signature product is the “Veggie Life” salad series which are available in most of the major supermarkets in Singapore.

Duration/No. of Visitors for tour: 2.30 pm – 5 pm/40 pax only

Important note:

The above technical sites have limited seat availability so registration is based on first-come-first-serve.

Please report to the registration counter on level 3 at Suntec Convention Centre on 21 July by 1.30 pm. Delegates will board the land transfer at Lobby Pick-up Point at designated timing. Timing will be announced during the conference and lateness will not be entertained.





World Engineers Summit – Applied Energy Symposium & Forum: Low Carbon Cities & Urban Energy Joint Conference, WES-CUE 2017, 19–21 July 2017, Singapore

Potential of Wind Energy and Design Configuration of Wind Farm on Puger Beach at Jember Indonesia

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^aUniversity of Jember

Abstract

Puger beach located at coordinates geography of latitude-longitude 8°22'29,63" L at - 113°26'50,56" L on which in coastal areas in District of Jember that have potential to research the development of electrical wind power station. The elevation difference becomes important parameter to get the most optimal wind speed. The higher of the wind power plants establishment location, the higher wind speed will be resulted. Therefore, the research was conducted to determine the most optimal wind speed from high difference that measured. The data taken from speed anemometer basis, wind direction that equipped by data logger system and temperature. Data that obtained during a month will be analyzed using Weibull. Based on the analysis that has been done, it obtained the optimal elevation 43.2 meters. At a elevation of 43.2 meter was obtained electric power average 6573.96 Wh per day with wind direction to the northwest. This direction will be used as a reference for the construction of wind power plants with a permanent system without position control turbine. Because when found the wind potency, the wind direction tends to northwest position. Because of that conducted research to know velocity of the wind using weibull analysis. With using weibull analysis obtained of shape parameter (k) and scale parameter (c). After finding out that the research place has the potential to the development of power wind station and then will be built wind farm on the Puger beach. From wind farm which analyzed using wind turbine 2000 W obtained with configuration 5Dx9D wake loss the smallest namely 13.81%. The big potential of power wind namely 16.22 kW/m², the potential of electrical power equal to 59.57 kW and electrical energy produced on wind farm of 619.76 kWh.

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Peer-review under responsibility of the scientific committee of the World Engineers Summit – Applied Energy Symposium & Forum: Low Carbon Cities & Urban Energy Joint Conference.

Keywords: Type your keywords here, separated by semicolons ;

1. Introduction

The need for national electrical energy is not comparable with the existing energy availability and supply of electricity in Indonesia. Efforts combine power plants with environmentally friendly alternative energy sources become an urgent matter. It is also in line with the commitment of Indonesia as stipulate in the National Action Plan on Climate Change as an effort to achieve emission reduction targets for greenhouse gas (GHG) emissions by 26% by 2020. [1]

Wind is a renewable energy that can be utilize as electrical energy with Wind Energy Conversion Systems (SKEA). Altitude will also affect the speed of the wind generated. Construction of wind power requires wind speed data at a height corresponding to the location of the wind turbine. The higher the turbine layout that will be more likely to be accepted by the turbine speed can be use to drive a generator. The distances between the turbines also need to be taken into account so that the wind is not too large wind turbulence that occurs. The farther the distance altitude wind turbine, the smaller the value of wind turbulence will occur. [2]

Pancer Beach Puger Jember regency has the potential of wind power plants, according to a study Bhakti Dharmawan with an average wind speed of 5,399 m / s. From this research, there is a lack of the difference in height of the wind speed. [3]

The importance of the wind as a pointer frequency of wind which always leads to the mainland became a major staple in the establishment of wind power. Wind power can be used to change the direction of the wind fins wind turbines. Sometimes if the wind direction is already known, the wind turbine can be made in one direction only. Design one way to make a wind turbine wind turbine development easier without thinking of additional wind fins for propulsion. The dominant wind direction is usually depicted in the form of wind rose. With the wind rose will make it easier to analyze any potential locations for wind power plants. In addition, with the help of wind rose will facilitate the analysis of the development of wind power.

2. Weibull distribution

Weibull distribution is a special case of Pierson class III distribution. In Weibull distribution, the variations in wind velocity are characterized by the two functions. First, the probability density functions. Second, the cumulative distribution functions. The probability density function $f(V)$ indicates the fraction of time (or probability) for which the wind is at a given velocity V , it is given by:

$$f(V) = \frac{k}{c} \left(\frac{V}{c}\right)^{k-1} e^{-(V/c)^k} \quad (1)$$

Here, k is the weibull shape factor and c is scale factor. The cumulative distribution function of the velocity gives us the fraction of time (or probability) that the wind velocity is equal or lower than V . Thus the cumulative distribution $F(V)$ in integral of the probability density function. Thus,

$$F(V) = \int_0^V f(V)dV = 1 - e^{-(V/c)^k} \quad (2)$$

The cumulative distribution function can be used for estimating the time for which wind is within a certain velocity interval, probability of wind velocity being between V_1 and V_2 is given by the difference of cumulative probabilities corresponding to V_2 and V_1 thus,

$$P(V_1 < V < V_2) = e^{-(V_1/c)^k} - e^{-(V_2/c)^k} \quad (3)$$

For a unit area the rotor, power available (P_v) in the wind stream of velocity V is,

$$P_v = \frac{1}{2} \rho v^3 \quad (4)$$

The fraction of time for which this velocity V prevails in the regime is given by $f(V)$. The energy per unit time contributed by V is $P_V f(V)$, thus the total energy contributed by all possible velocities in the wind regime, available for unit rotor area and time may be expressed as

$$E_V = P_V f(V) \quad (5)$$

4. Potential wind energy analysis

The process calibration tools used to obtain wind speed and temperature readings in accordance with conventional tools. The tools used for the calibration process is digital anemometer GM816. The similarities in the wind speed and temperature readings are taken into account so that the data obtained in accordance with these tools [4].

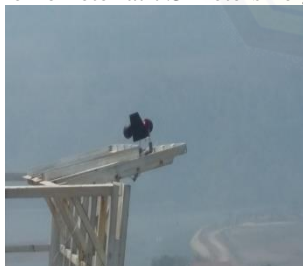
Placement tool based anemometer wind speed and direction do in pole lighthouse belonging to the Ministry of Maritime Navigation District Class I Surabaya, East Java, Indonesia. Installation with a height of 7.3 meter point A, 20.6 meters at point B and 43.2 meters at point C. A different height aims to obtain wind data is the difference significant site such research.

5. Result and discussion

Figure 1 is the placement of measuring tools at three different heights. From Figure 2 can be explained that the movement speed of the wind that often appear at a height of 7.3 meters is 2.5 m/s with a probability value of 0.25. To a height of 20.6 meters has the highest probability density value of 0.25 at a speed of 5.5 m/s. At a height of 43.2 meters has the highest probability density value of 0.18 at a speed of 6.5 to 7.5 m/s. Of the three data we can see that the probability density at 7.3 and a height of 20.6 meters.

However for the 43.2 meter has a top speed with the density of probability is not too big of at altitudes below. Speed has a cumulative probability value used to estimate the time required for wind speed interval. Figure 3 is a cumulative probability of the wind speed graph. The cumulative probability is the smallest value is found at a height of 43.2 meters that do not reach 1 at a speed of 10.5 m/s. The potential of wind power generated in Figure 4 is known that most large wind power at a height of 43.2 meters of 277.03 W/m². With the greatest wind speeds with a reduction in wind speed is not too fast to make optimal wind energy potential. The calculation result of the potential for electrical energy produced was shown in Figure 5 with electrical power each altitude for wind turbine power of 1000 W and 2000 W. The optimum power at a height of 43.2 meters with electrical power of 865.81 Watt at 1000 W turbine and turbine 1017.17 Watt at 2000 W. The lowest power is at 176.11 Watt turbine 206.55 at 1000 W and 2000 Watt turbine.

Picture of the wind direction in accordance with the wind rose each different heights according to the wind speed values and conditions. Location where the existing environmental research. It's because the location of the data collection is still blocked by the buildings around installed research. In addition the distance between buildings on the anemometer at 7.3 meters height too close to high wind turbulence.



a. Height of 43.2 m at point C



b. Height of 20.6 m at point B



c. Height of 7.3 m at point A

Fig.1. The height of placement anemometer

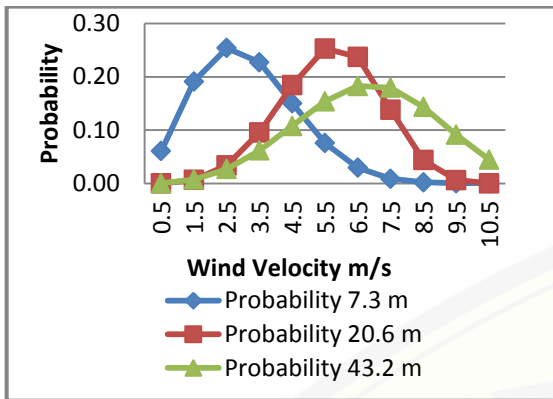


Fig 2. Probability Density Weibull

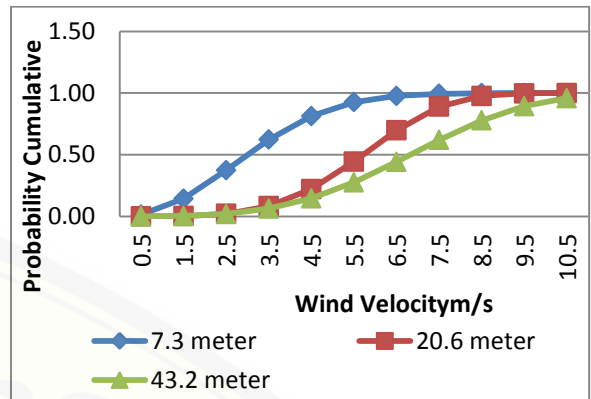


Fig 3. Probability Cumulative

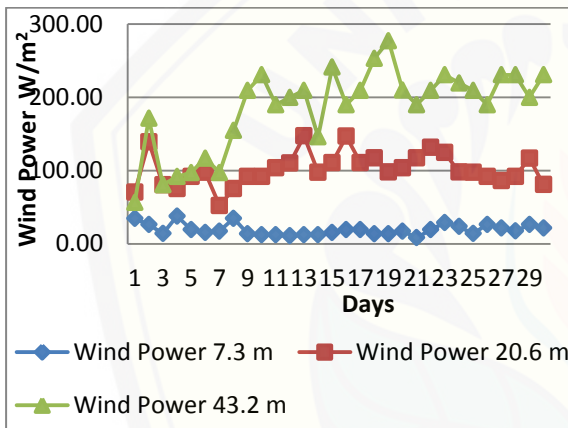


Fig 4. Wind Power

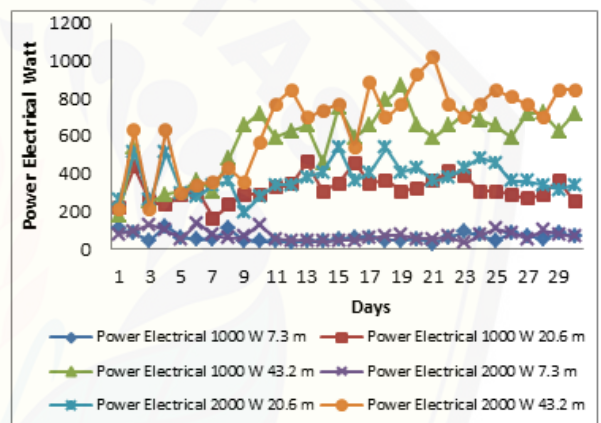


Fig 5. Power Electrical Potential

6. Wind Farm Analysis

The data will be conducted for 30 days at three different points to different measurements of 20 minutes for each point. The length of time of 30 days was carried out as samples of wind speed data in order to know the average speed of the wind is. It serves for the selection of the turbine which will be installed in this study. While three different points are meant to be able to know the distribution of average wind existing research sites. The analysis was conducted based on the area that will be a farm by notice the wake loss based on the rotor [5]. While the direction of the wind is used to set the dominant direction of the turbine.

The analysis is done in order to determine the location of turbines on a wind farm that count with manual calculations for various types of turbines based on where the base of the turbine based on rotor long . The ideal distance from the turbine to the other turbine that is 5-9 times the times the rotor diameter in the dominant wind direction to a horizontal position (5D-9D) and 3-5 times the diameter of the rotor in a vertical position (3D-5D).

The calculations results for the configuration of wind farm look like Table 1. Table 2 shows the relationship between the configurations of the wind farm to wake loss in wind turbine capacity of 2000 W with a rotor diameter of 3.8 meter. From table 2 it can the value of wake loss at each wind turbine capacity to the configuration at a wind farm. Wind turbines with a capacity of 2000 W grades wake greatest loss occurred in 3Dx5D configuration that is

36.30% and the smallest loss occurs in the wake 5Dx9D configuration is 13.81%. Table 3 is the calculations results of Wind Power Potential, Electrical Power Potential, and Electrical Energy with capacity turbine of 2000 W based on Wake Loss of 13.81%.

The number of existing turbines at the wind farm will create greater energy produced anyway. But with more and more number of existing turbines at a wind farm will make high wake loss. So the present study found that with the configuration of the turbine 5Dx9D with a capacity of 2000 W generate the greatest wind power potential is 16.22 kW/m², the largest electrical power potential is 59.57 kW and electrical energy can be generated 619.76 kWh per day. Figure 6 is the map in calculation result of wind farm at Puger Beach with 5D x 9D configurations.

Table 1. Configuration Wind Farm of Horizontal and Vertical Number with Turbine 2000 W

No	Configuration	Horizontal	Vertical
1	3D-5D	102	6
2	3D-6D	102	5
3	3D-7D	102	4
4	3D-8D	102	3
5	3D-9D	102	3
6	4D-5D	76	6
7	4D-6D	76	5
8	4D-7D	76	4
9	4D-8D	76	3
10	4D-9D	76	3
11	5D-5D	61	6
12	5D-6D	61	5
13	5D-7D	61	4
14	5D-8D	61	3
15	5D-9D	61	3

Table 2. Configuration Wind Farm With Turbine 2000 W based on Wake Loss

No	Configuration	Total	d(V)	Wake Loss
1	3Dx5D	612	1.92	36.30%
2	3Dx6D	510	1.63	30.78%
3	3Dx7D	408	1.40	26.44%
4	3Dx8D	306	1.21	22.96%
5	3Dx9D	306	1.06	20.12%
6	4Dx5D	456	1.58	29.81%
7	4Dx6D	380	1.34	25.28%
8	4Dx7D	304	1.15	21.71%
9	4Dx8D	228	1.00	18.85%
10	4Dx9D	228	0.87	16.52%
11	5Dx5D	366	1.32	24.93%
12	5Dx6D	305	1.12	21.14%
13	5Dx7D	244	0.96	18.16%
14	5Dx8D	183	0.83	15.76%
15	5Dx9D	183	0.73	13.81%

Table 1. Configuration Wind Farm with Turbine 500 W

Turbine 500 W	Wind Energy Potential (kW/m ²)	Electrical Energy Potential (kW)	Electrical Energy (kWh)
Row 1	5.530991	20.3135	206.5883
Row 2	3.540156	13.00182	132.2285
Row 3	2.265906	8.321924	84.63397
	11.33705	41.63725	423.4508



Fig.6. Map of Puger Beach with 5Dx9D Configuration

7. Conclusion

Based on the research that has been conducted to determine the potential of wind energy and electrical energy at the Puger Beach on Jember obtained some conclusions as the data were processed using weibull analysis is the wind speed at 09:00 to 19:00 pm. For 20:00 to 8:00 pm, the wind speed is less productive and do not allow processed because there is only wind speeds below 1 m/s. The potential for wind power at a height of 7.3 meters between 8.19 to 37.68 W, to a height of 20.6 meters between 52.15 to 147.13 W, whereas at a height of 43.2 meters between 56.35 to 277.03 W. The value of the density of the wind on the Puger beach at all about the same altitude that is equal to 1.18 kg / m³ with an average temperature of 297 K in Kelvin. Based on this research can be drawn some conclusions is the average wind speed at the first location is 5.11 m/s, the second location 5.34 m/s and at a third location 5.4 m/s. Thus for all these locations will serve as the basis for wind farms with an average wind speed for the area studied by 5.29 m/s, 2.12 lowest wind speed m/s and the highest wind speed 6.75 m/s.

The wind farm which analyzed using wind turbine 2000 W obtained with configuration 5Dx9D wake loss the smallest namely 13.81%. The big potential of power wind namely 16.22 kW/m², the potential of electrical power equal to 59.57 kW and electrical energy produced on wind farm of 619.76 kWh.

The number of wind turbines in a wind farm Puger coast with 133.380 m² area is 183 wind turbines with a rotor diameter of 3.8 meters. Coastal wind farm Puger Jember is situate in the geographic coordinates of latitude and longitude 8°38'48,44 "Lang - 113°47'56,73" Lon; 8°38'09,98" Lang - 113°46'60,58" Lon; 8°38'38,7" Lang - 113°47'55,28" Lon; and 8°38'01,77" Lang - 113°46'56,55" Long.

Acknowledgements

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