# Juin Yau Lim

Passionate sustainable practitioner that seek solutions with modern approaches

jy-lim.com
**(331) 298-0149**
**juinyau95@gmail.com**

## EXPERIENCE

### **Argonne National Laboratory,** USA — *Postdoctoral Appointee*

March 2023 - PRESENT

Conducting research and providing solutions to stakeholders which align towards the interest of the Dept. of Energy (US).

### **Greenverse Co.,** MY — *Research Engineer (Hybrid)*

June 2023 - June 2024

Led research initiavete on sustainable hazardous waste (HW) management, and assisted in commencement of large-scale integrated HW plants.

### **Korea University,** KR — *Research Professor & Fellow*

March 2023 - March 2024

Conduct research related to decarbonization technologies focusing on biochar, and analyzing the ESG performance of top 200 corporations in South Korea.

## EDUCATION

### **Kyung Hee University (Global),** KR — *PhD*

Feb. 2019 - Feb. 2023

**Major:** Applied Environmental Science & Engineering [CGPA: 4.0/4.3]

**Thesis***: Comprehensive guidance on the improvement of nationwide renewable energy penetration considering overall sustainability alongside with system reliability: Power-to-X, Microalgae Biorefinery, and Hydrogen*

### **University of Nottingham,** MY — *M.Eng.*

Sept. 2014 - June 2018

**Major:** Chemical & Environmental Engineering [CGPA: 3.7/4.0]

**Thesis***: Fertilizer Formulation in Oil Palm Plantation with Life Cycle Assessment and P-graph Optimization.*

## PROJECTS

### **BKT Co.,** KR

Sept. 2020 - Oct. 2022

Digitalization of modern nitrogen recovery wastewater treatment plant based on two-stage partial nitrification - Anammox process.

### **Samsung Display,** KR

May 2021 - Dec. 2021

Assess the performance & analyze reaction kinetics and pathway of combustion chamber under vary operating conditions..

### **Samsung Electronics,** KR

May 2020 - Dec. 2020

Proposing optimal operating conditions for burning chamber and scrubber in compliance of air discharge limits for the semiconductor industry.

## SKILLS

Advanced data analysis

Python, Matlab, & GAMS

AI, optimization, modeling

Life-cycle analysis

Techno-economic analysis

## PORTFOLIO

**35 publications** at top tier research journal article

**4 research articles** in submissions/reviews.

**10 main participation** in conferences.

## AWARDS

**Postdoctoral Fellowship**

Korea University, 2023-2024

**Brain Korea 21+**

South Korea, 2019-2023

**Presidential Scholarship**

South Korea, 2019-2021

## LANGUAGES

**Native & fluent**:

English, Chinese, Malay, Cantonese, Hokkien, & Hakka

**Intermediate**: Korean

## MAIN INTEREST

**Renewable Energy**

**Sustainability Enhancement**

**Artificial Intelligence**

**Resources Management**

**Process System Engineering**

## Notable Experiences by Categories

***Projects led and mainly contributed only.***

### [A] Renewable Energy

1. **Nationwide renewable energy deployment**
   - A nationwide hybrid renewable energy system (HRES) coupling Power-to-X is deployed in 15 provinces across South Korea.
   - Transitioning excessive electricity and biogas from localized HRES and wastewater treatment plants towards green hydrogen generation and efficient decarbonization.
2. **Large-scale microalgae based biorefinery**
   - Ideal process configuration of the microalgae biorefinery coupling with combined heat & power is determined via a superstructure optimization model with GAMS.
   - A large-scale profitable microalgae biorefinery is designed considering daily dynamic variation alongside life-cycle assessment, covering the features of: microalgae species selection, harvest scheduling, & electricity utilization.
3. **AI- guided hydrogen generation & utilization**
   - Best operating condition for hydrogen production with dry catalytic reforming of light hydrocarbons is identified with reaction mechanism generator (RMG).
   - Innovative research focusing on proton exchange membrane fuel cells is conducted: remaining useful life prediction and deep generative design.

### [B] Wastewater treatment

1. **Digitalization of wastewater treatment plant**

   **BKT Co., KR** *Sept. 2020 - Oct 2022*
   - A current operating two-stage PN SBR-Anammox treatment plant is digitalized to provide precise control and monitoring.
   - Model developed is currently deployed and integrated with the WWTP operation.
2. **Commisioning biological treatment plant**

   **Nottingham GreenTech, MY** *June. - Sept. 2017*
   - An integrated anaerobic aerobic bioreactor plant focussed on treating palm oil mill effluent is commissioned.
   - Technical drawings (PFD, PID, and Isometric) are updated to the plant site.
3. **Physical-chemical WWTP setup & mainentance**

   **BeChem Technologies, MY** *June. - Sept 2016*
   - Coordinate and commissioning an underground water treatment plant (1,000 $m^3$/day) with ultrafiltration membrane.
   - Performed on-site checking and maintenance for multiple plant site: *TRIM, Jotun, Southern Steel, and Kozato Kizai*

### [C] Air Pollution Control

1. **AI guided upgrade for coal-fired power plant**
   - A real-time monitoring database for the discharge air pollution for 30 mins intervals are collected for one year period.
   - Upgrade of the existing air pollution control system with best-available-technology.
2. **Reducing air pollutant discharge from industry**

   **Samsung Display, KR** *May - Dec 2021*

   **Samsung Electronics, KR** *May - Dec 2020*
   - Identified the reaction pathways and kinetics inside of the combustion chamber at various operating conditions with ML-based RMG.
   - Proposed solutions that are in compliance with the discharge limit by the local authority with ideal operating conditions.

### [D] Waste management

1. **Hazardous waste management**

   **Greenverse Co., MY** *June. 2023 - till date*
   - Participate in commencement of large-scale integrated hazardous waste plant in East Coast of Peninsular Malaysia with Environmental Impact Assessment reporting to local authority (i.e., Dept. of Environment).
   - Lead research initiatives and collaborate closely with the CEO on sustainable hazardous waste management representing companies.
2. **Plastic waste managment**
   - Thorough cradle-to-grave life cycle assessment of the plastic waste for China, US, Germany, Japan, Korea, and Malaysia are assessed accordingly.
   - A cross-nation plastic waste management strategy is evaluated and proposed considering the economic-environment-energy criterias.

### [E] Evaluation of ESG performance

1. **Top 200 Korean corporates evaluation**

   **Korea University, KR** *Mar. 2023 - Mar. 2024*
   - An evaluation of the performance and further trends on the corporate's ESG strategies are performed focusing on South Korea.

## Portfolios: Publications & Conference

### [A] Publications

* **Underlined & bolded** indicates authorship position;

[+] indicates authors contributed equally

### *Submitted & In Review*

1. **Lim, J.Y.**[+], Loy, A.C.M.[+], How, B.S., Sonne, C., Chang, S.X., Ok, Y.S., 202x., Enhancing Future in the Agricultural Industry through Sustainable Digitalization. *(In submission).*
2. Wang, M.M.K.[+], **Lim, J.Y.**[+], Chan, Y.J., Lam, H.L., 202x. Navigating the path to sustainable hazardous waste management for a resilient future projecting Malaysia with smart and innovative solutions. *(In submission)*
3. Cho, Y.[+], **Lim, J.Y.**[+], Igalabithana, A.D., Hwang, G.W., Masek, O., Ok, Y.S., 202x. AI-guided investigation of biochar's efficacy in Pb immobilization for remediation of post-mining contaminated agricultural land. *(Under Review)*
4. Senadheera, S.S. [+], Withana, P.A. [+], **Lim, J.Y.** [+], Scott, C.X., Wang, F., You, S.M, Rhee, J.H., Ok, Y.S., 202x. Carbon Negative Biochar Systems Contribute to Sustainable Urban Green Infrastructure: A Bibliometric Analysis. *(Under Review)*
5. Cho, Y., Withana, P.A, Rhee, J.H., Lim, ST, **Lim, J.Y.**, Park S., Ok, Ys., 202x. Achieving the sustainable waste management of medical plastic packaging using a life cycle assessment approach. *(Under Review)*
6. Lin, Z.Y., Lee, K.H., **Lim, J.Y.**, Kim J.H., Eun, B., Lee, S.J., Park, J.Y., Oh, JM, 202x, Spatial and Temporal Effect of Industrial Effluent on the Dissolved Organic Matter Quality across Riverine. *(Under Review)*

### *Accepted & Published*

1. Cho, Y.+, Lim, J.Y.+, Igalabithana, A.D., Hwang, G.W., Masek, O., Ok, Y.S., (2024). AI-guided investigation of biochar's efficacy in Pb immobilization for remediation of post-mining contaminated agricultural land. Applied Biologgical Chemistry (Accepted)
2. Senadheera, S.S. +, Withana, P.A. +, Lim, J.Y. +, Scott, C.X., Wang, F., You, S.M, Rhee, J.H., Ok, Y.S., (2024). Carbon Negative Biochar Systems Contribute to Sustainable Urban Green Infrastructure: A Bibliometric Analysis. Green Chemistry (Accepted)
3. Lin, Z.Y., Lee, K.H., Lim, J.Y., Kim J.H., Eun, B., Lee, S.J., Park, J.Y., Oh, JM., (2024), Spatial and Temporal Effect of Industrial Effluent on the Dissolved Organic Matter Quality across Riverine. Journal of Environmental Chemical Engineering
4. Ngan, S.P., Ngan, S.L., How, B.S., Tan, A.ST., Lim, J.Y., Lam H.L., (2024), Using Life Cycle Assessment to Achieve Circular Economy. Encyclopedia of Sustainable Technologies, 2nd Edition, vol. 1, pp. 217-234. Oxford: Elsevier
5. Lin, Z.Y., Lim, J.Y., Oh, JM, (2024), Innovative interpretable AI-guided water quality evaluation with risk adversarial analysis in river streams considering spatial-temporal effects. Environmental Pollution.
6. Yuan, X.Z., Manu, S., Lim, J.Y., Javier, P.R., Wang, X.N., Ok, Y.S, (2024). Active Learning based Guided Synthesis of Engineered Biochar for CO2 Capture. ACS ES&T
7. Yuan, X.Z, Li, J., Lim, J.Y., Ashkan, Z., Daniel, A., Wang, Y., Wang, X.N., Ok, Y.S., (2023). Machine learning for heavy metal removal from water: recent advances and challenges. ACS ES&T Water
8. Lyu, H.H.+, Lim, J.Y.+, Zhang, Q.+, Senadheera, S., Zhang, C.C., Huang, Q.L., Ok, Y.S. (2023), Conversion of organic solid waste into energy and functional materials using biochar catalyst: bibliometric analysis, research progress, and directions. Applied Catalysis B: Environmental. 340, 123223.
9. Lim, J.Y., Teng, S.Y., Loy, A.C.M, How, B.S., Heo, S., Jansen, J., Show, P.L., Yoo, C.K., (2023). Interpretable artificial intelligence guided configuration of sustainable coal-fire flue gas treatment under best available technology set. Environmental Pollution. 122335.
10. Lo, S.L.Y, How, B.S., Teng, S.Y., Lim, J.Y., Loy, A.C.M, Lam, H.L., Sunarso, J., (2023). A novel hybrid method for constructing resilient microalgae supply chain: Integration of n-1 contingency analysis with stochastic modelling. Journal of Cleaner Production. 417, 137939.
11. Loy, A.C.M+, Lim, J.Y+, How, B.S., Yiin, C.L., Lock, S.M.S, Lim, L.G., Alhamzi, H., Yoo, C., (2023). Rethinking of the future sustainable paradigm roadmap for plastic waste management: A multi-nation scale outlook compendium. Science of The Total Environment. 881, 163458.
12. Foong, S.Y., Chan, Y.H., Yiin, C.L., Lock, S.S.M., Loy, A.C.M., Lim, J.Y., Yek, P.N.Y., Wan, Mahari W.A., Liew, R.K., Peng, W., Tabatabaei, M., Aghbashlo, M., Lam, S.S. (2023). Sustainable CO2 capture via adsorption by chitosan-baased functional biomaterial: A review on recent advances, challenges, and future directions. Renewable and Sustainable Energy Reviews. 181, 113342.
13. Heo, S.+, Lim, J.Y.+, Nguyen, H., Vilela, P., Safder, U., Woo, T., Kim, S., Oh, T., Yoo, C., (2023). End-to-end autonomous and resilient operability strategy of full-scale PN-SBR system: From influent augmentation to AI-aided optimal control and scheduling. Journal of Water Process Engineering. 53, 103694.
14. Loy, A.C.M, Kong, K.G.H, Lim, J.Y, How, B.S., (2023). Frontier of Digitalization in Biomass-to-X Supply Chain: Opportunity or Threats?. Journal of Bioresources and Bioproducts. 8, 101-107.
15. Sahl, A. Bin, Loy, A.C.M., Lim, J.Y., Orosz, Á., Friedler, F., How, B.S., (2023). Exploring N-best solution space for heat integrated hydrogen regeneration network using sequential graph-theoretic approach. International Journal Hydrogen Energy. 48, 4943–4959.
16. Lim, J.Y., Teng, S.Y., How, B.S., Nam, K., Heo, S., Máša, V., Stehlík, P., Yoo, C.K., (2022). From microalgae to bioenergy: Identifying optimally integrated biorefinery pathways and harvest scheduling under uncertainties in predicted climate. Renewable and Sustainable Energy Reviews. 168, 112865.
17. Lim, J.Y. and How BS, (2022). A Comprehensive Guidance on Transitioning Toward Sustainable Hydrogen Network from Localized Renewable Energy System: Case study of South Korea. Optimization for Energy Systems and Supply Chains, CRC Press, 73-92.

18. Vilela, P., Safder, U., Heo, S., Nguyen, H.-T., Lim, J.Y., Nam, K., Oh, T.-S., Yoo, C., (2022). Dynamic calibration of process-wide partial-nitritation modeling with airlift granular for nitrogen removal in a full-scale wastewater treatment plant. Chemosphere. 305, 135411.
19. Kong, K.G.H., Lim, J.Y., Leong, W.D., Ng, W.P.Q., Teng, S.Y., Sunarso, J., How, B.S., (2022). Fuzzy optimization for peer-to-peer (P2P) multi-period renewable energy trading planning. Journal of Cleaner Production. 368, 133122.
20. Heo, S., Lim, J.Y., Chang, R., Shim, Y., Ifaei, P., Yoo, C., (2022). Non-Gaussian multivariate statistical monitoring of spatio-temporal wind speed frequencies to improve wind power quality in South Korea. Journal of Environmental Management. 318, 115516.
21. Yap, T.L., Loy, A.C.M., Chin, B.L.F., Lim, J.Y., Alhamzi, H., Chai, Y.H., Yiin, C.L., Cheah, K.W., Wee, M.X.J., Lam, M.K., (2022). Synergistic effects of catalytic co-pyrolysis Chlorella vulgaris and polyethylene mixtures using artificial neuron network: Thermodynamic and empirical kinetic analyses. Journal of Environmental Chemical Engineering. 10, 107391.
22. Woo, T., Nam, K., Heo, S., Lim, J.Y., Kim, S., Yoo, C., (2022). Predictive maintenance system for membrane replacement time detection using AI-based functional profile monitoring: Application to a full-scale MBR plant. Journal of Membrane Science. 649, 120400.
23. Lim, J.Y., Loy, A.C.M., Alhazmi, H., Fui, B.C.L., Cheah, K.W., Taylor, M.J., Kyriakou, G., Yoo, C.K., (2022). Machine learning–assisted CO2 utilization in the catalytic dry reforming of hydrocarbons: Reaction pathways and multicriteria optimization analyses. International Journal of Energy Research. 46, 6277–6291.
24. Peter, A.P., Tan, X., Lim, J.Y., Chew, K.W., Koyande, A.K., Show, P.L., (2022). Environmental analysis of Chlorella vulgaris cultivation in large scale closed system under waste nutrient source. Chemical Engineering Journal. 433, 134254.
25. Kong, K.G.H., How, B.S., Lim, J.Y., Leong, W.D., Teng, S.Y., Ng, W.P.Q., Moser, I., Sunarso, J., (2022). Shaving electric bills with renewables? A multi-period pinch-based methodology for energy planning. Energy 239, 122320.
26. Lim, J.Y., Orosz, A., How, B.S., Friedler, F., Yoo, C., (2022). Reliability incorporated optimal process pathway selection for sustainable microalgae-based biorefinery system: P-graph approach, in: Yamashita, Y., Kano, Computer Aided Chemical Engineering (Eds.), 14 International Symposium on Process Systems Engineering. Elsevier, pp. 217–222.
27. Safder, U. +, Lim, J.Y. +, How, B.S., Ifaei, P., Heo, S., Yoo, C., 92022). Optimal configuration and economic analysis of PRO-retrofitted industrial networks for sustainable energy production and material recovery considering uncertainties: Bioethanol and sugar mill case study. Renewable Energy 182, 797–816.
28. How, B.S., Orosz, A., Teng, S.Y., Lim, J.Y., Friedler, F., (2021). Heat Integrated Water Regeneration Network Synthesis via Graph-Theoretic Sequential Method. Chemical Engineering Transactions. 88, 49–54.
29. Affery, A.P., Tan, J.X., Ong, I.Y.B., Lim, J.Y., Yoo, C., How, B.S., Ling, G.H.T., Foo, D.C.Y., (2021). Optimal planning of inter-plant hydrogen integration (IPHI) in eco-industrial park with P-graph and game theory analyses. Process Safety and Environmental Protection. 155, 197–218.
30. Loy, A.C.M., Lim, J.Y.+, How, B.S., Yoo, C.K., (2021). Blockchain as a frontier in biotechnology and bioenergy applications. Trends in Biotechnology. 40 (3), 225-258.
31. Lo, S.L.Y., Kong, K.G.H., How, B.S., Lim, J.Y., Show, P.L., Sunarso, J., (2021). Techno-economic evaluation of microalgae-based supply chain: Review on recent approaches, in: IOP Conference Series: Materials Science and Engineering. IOP Publishing, p. 12026.
32. Rhee, G.+, Lim, J.Y.+, Hwangbo, S., Yoo, C., (2021). Evaluation of an integrated microalgae-based biorefinery process and energy-recovery system from livestock manure using a superstructure model. Journal of Cleaner Production. 293, 125325.
33. Heo, S., Nam, K., Tariq, S., Lim, J.Y., Park, J., Yoo, C., (2021). A hybrid machine learning–based multi-objective supervisory control strategy of a full-scale wastewater treatment for cost-effective and sustainable operation under varying influent conditions. Journal of Cleaner Production. 291.
34. Lim, J.Y., How, B.S., Teng, S.Y., Leong, W.D., Tang, J.P., Lam, H.L., Yoo, C.K., (2021). Multi-objective lifecycle optimization for oil palm fertilizer formulation: A hybrid P-graph and TOPSIS approach. Resources, Conservation and Recycling. 166, 105357.
35. Lim, J.Y., Safder, U., How, B.S., Ifaei, P., Yoo, C.K., (2021). Nationwide sustainable renewable energy and Power-to-X deployment planning in South Korea assisted with forecasting model. Applied Energy. 283, 116302.
36. Lim, J.Y., How, B.S., Rhee, G., Hwangbo, S., Yoo, C.K., (2020). Transitioning of localized renewable energy system towards sustainable hydrogen development planning: P-graph approach. Applied Energy. 263, 114635.

**[B] International Conferences**

1. **Juin Yau Lim**, Wai Yin Wong, SangYoun Kim, ChangKyoo Yoo*, Generative AI-assisted functional design of PEMFC flow field channel for the flooding issue, pp.72, *3rd International Symposium on Carbon & Functional Materials For Energy & Environment*, Poster Presentation, DaNang, Vietnam (Feb 2024).
2. **Juin Yau Lim**, Unleashing potential of renewable energy from different aspects and highlighting current industrial practice of waste management. Oral Presentation (co-chair session & plenary speaker), *6th International ESG Conferences x JCK Forum*. Seoul, South Korea (Nov 2023)
3. **Juin Yau Lim**, Akos Orosz, Bing Shen How, Ferenc Friedler, ChangKyoo Yoo*. Reliability incorporated optimal process pathway selection for sustainable microalgae-based biorefinery system: P-graph approach. *14th International Symposium on Process System Engineering -PSE 2021+*, Kyoto, Japan (June 2022).
4. **Juin Yau Lim**, Roberto J. Chang Silva, ChangKyoo Yoo*. An effective guidance of deploying solar and wind energy with multiperiod optimization model considering the geospatial characteristics: A case study of South Korea. *6th Postgraduate Colloquium for Environmental Research 2022 (POCER 2022)*, Physical poster presentation, Langkawi, Malaysia (June 2022).
5. **Juin Yau Lim**, ChangKyoo Yoo*, SungKu Heo, TaeSeok Oh, Global sensitivity analysis and multi-objective model calibration study of in-cycle full-scale

data-based PN-SBR ASM model. *Korean Society of Environmental Engineering 2021 National Conference*, pp.701-701, poster presentation, Jeju Island, Korea (Nov. 2021).

6. **Juin Yau Lim**, Jeongin Kim, SungKu Heo, KiJeon Nam, ChangKyoo Yoo*, Data-Driven Process Integration on Identifying Best Available Technology for Sustainable Air Pollution Controls Aided by P-graph Superstructure Optimization. *PRES21, 24th Conference on Process Integration, Modelling, and Optimisation for Energy Saving and Pollution Reduction.* Oral presentation, Brno, Czech Republic (Oct 2021).
7. **Juin Yau Lim**+, Soonho Hwangbo+, KiJeon Nam and ChangKyoo Yoo*, Guidance and sustainable platform to design combined microalgae biorefinery-biogas-hydrogen networks towards nationwide green energy deployment, *12th International Conference on Applied Energy (ICAE2020), pp. 116, Oral presentation*, Bangkok / Virtual, (Dec. 2020)
8. **Juin Yau Lim**, ChangKyoo Yoo*, Research on improving reliability of hybrid renewable energy design. *Korean Society of Chemical Engineers 2020 Conference*, Poster, (Online), p.386 (Oct. 2020)
9. **Juin Yau Lim**, KiJeon Nam, ChangKyoo Yoo*, Circular economy assessment towards optimal process configuration of microalgae-based bio-refinery system with consideration of risk analysis and redundancy allocation: P-graph approach. *PRES20, 23rd Conference on Process Integration, Modelling, and Optimisation for Energy Saving and Pollution Reduction. pp 21, Oral presentation*, Xi'an, China (Aug 2020).
10. **Juin Yau Lim**, KiJeon Nam, ChangKyoo Yoo*Research on optimization of intermediate storage hub design of optimal biogas supply chain (greenhouse gas and economic evaluation), *Korean Society of Chemical Engineers 2019 Spring Conference*, Poster, Jeju Island, Korea, p.170 (Apr. 2019).

## Summary of the research achievement