

Juin Yau Lim

Passionate sustainable practitioner that seek solutions with modern approaches



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EXPERIENCE

Greenverse Co., MY — Research Engineer (Hybrid)

June 2023 - PRESENT

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

Korea University, KR — Research Professor

March 2023 - March 2024

Conduct research related to decarbonization technologies focusing on biochar, and provide guidance to postgraduate & undergraduates.

Korea University, KR — Research Fellow

March 2023 - March 2024

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

31 publications at top tier research journal article

7 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. Commissioning 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 & maintenance

BeChem Technologies, MY June. - Sept 2016

- Coordinate and commissioning an **underground water treatment plant** (1,000 m³/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 management

- 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

- Datasets are **extracted** from the **published sustainability report** of top 200 corporations in Korea from 2018 to 2023.
- An evaluation of the **performance and further trends** on the corporate's strategies are performed.

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, S.T., **Lim, J.Y.**, Park S., Ok, Y.S., 202x. Achieving the sustainable waste management of medical plastic packaging using a life cycle assessment approach. (*Under Review*)
6. Lin, Z.Y., **Lim, J.Y.**, Oh, J.M., 202x, Innovative interpretable AI-guided water quality evaluation with risk adversarial analysis in river streams considering spatial-temporal effects. (*Under Review*)
7. Lin, Z.Y., Lee, K.H., **Lim, J.Y.**, Kim J.H., Eun, B., Lee, S.J., Park, J.Y., Oh, J.M., 202x, Spatial and Temporal Effect of Industrial Effluent on the Dissolved Organic Matter Quality across Riverine. (*Under Review*)

Accepted & Published

1. Yuan, X.Z., Manu, S., **Lim, J.Y.**, Javier, P.R., Wang, X.N., Ok, Y.S., 202x. Active Learning based Guided Synthesis of Engineered Biochar for CO₂ Capture. *ACS ES&T*
2. 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*
3. Lyu, H.H.⁺, **Lim, J.Y.**⁺, Zhang, Q.⁺, Senadheera, S., Zhang, C.C., Huang, Q.L., Ok, Y.S. 2024, 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.
4. **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.
5. 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.
6. 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.

7. 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-based functional biomaterial: A review on recent advances, challenges, and future directions. *Renewable and Sustainable Energy Reviews*. 181, 113342.
8. 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.
9. 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.
10. 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.
11. **Lim, J.Y.**, Teng, S.Y., How, B.S., Nam, K., Heo, S., Máša, V., Stehlik, 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.
12. **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.
13. 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-nitrification modeling with airlift granular for nitrogen removal in a full-scale wastewater treatment plant. *Chemosphere*. 305, 135411.
14. 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.
15. 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.
16. 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.
17. 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.
18. **Lim, J.Y.**, Loy, A.C.M., Alhamzi, 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.

19. 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.
20. 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.
21. **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.
22. Safder, U. *, **Lim, J.Y.** *, How, B.S., Ifaei, P., Heo, S., Yoo, C., 2022. 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.
23. 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.
24. 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.
25. 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.
26. 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.
27. 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.
28. 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.
29. **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.
30. **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.
31. **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).