**Kyuil KWAK**

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# EDUCATION

Mar 2022 **KOREA University**

- present *Ph.D. Student in Energy & Environment Economics and Policy* (Advisor: Prof. JongRoul Woo)

* *Keywords:* Power system modelling, Economic Assessment of energy and environment,

Electricity market, Innovation policy

Mar 2018 **KOREA University**

-Aug 2020 *Master of Atmospheric Chemistry* (Advisor: Prof. Meehye Lee)

* Thesis Paper: Source Appointment of PM2.5 Emission Ratio at Socheongcho Ocean Research Station from

2014 to 2019 ([Master’s Thesis ; Google Drive Link](https://drive.google.com/file/d/1asRV2zgyBThralPQpTkUwHO4nKBDJuoD/view?usp=sharing))

* *Keywords:* Atmospheric Chemistry, PM2.5, BC, Greenhouse Gas, Source Appointment,

Air Quality, North-East Asia Background Observation, Long-term Effect

Mar 2010 **HONGIK University**

-Aug 2017 *Bachelor of Mechanical Engineering*

* Grad. Proj.: The Evaluation of Crashworthiness of Vehicle Parts using Computational Analysis
* *Keywords:* Vehicle, Impact Efficiency Analysis, Front Collision Simulation,

Impact Energy Absorption, Crash-Box (Bumper),Design Optimization

# SKILLS

* Programming Skills: **Python, R, GAMS, STATA, Q-GIS, PMF, MATLAB, ANSYS-Autodyn, CAD-2D, CATIA**
* Language: Korean, English

# WORK EXPERIENCE

Dec 2023 **Korea University**

- Feb 2024 *Undergraduate Mentor*

* + Participate in Mentor-Mentee Program

Mar 2022 **Korea University**

- present *Research Assistant, Teaching Assistant*

* + T.A: Undergraduate calculus, energy system modeling training

Oct 2020 **The Seoul Institute**

- Feb 2022 *Researcher (Safety and Environment Research Team)*

* + Carry out research on various environmental policies to support Seoul City Hall: PM2.5 Emission Inventory Modeling, Air Quality Modeling

Mar 2018 **Korea University**

-Aug 2020 *Research Assistant, Teaching Assistant*

* + R.A: Lead a research project in Ocean Research Station as a Project Manager
  + T.A: Instruct undergraduate laboratory sessions of Earth Science

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Sep 2017 **National Institute of Forest Science, Korea**

-Dec 2017 *Researcher (Wood Engineering Division)*

* + Participate on advanced wood resources treatment, development physical · chemical processing technology to utilize wood efficiency.

Jul 2016 **Korea Automotive Technology Institute**

-Dec 2016 *Research Assistant (High-Pressure Fuel Pump Development Team)*

* + Assist in the diesel engine’s fuel pump research and experiment for certifications.

Mar 2016 **Hongik University**

-Aug 2017 *Research Assistant*

* + Conduct computational simulation (ANSYS-Autodyn) on improving impact energy absorption of thin-walled structures in vehicle’s bumper.

Aug 2013 **KOREA ARMY**

-June 2015 *Landmine Reconnaissance*

# RESEARCH PROJECTS

Oct 2024 **Korea and China’s Net-zero Energy Technologies under deep decarbonization**

-Dec 2024 *Korea University & Peking University*

* ~~Evaluation of the feasibility of integrating various ESS technologies to enhance power supply stability and maximize renewable energy utilization in Jeju Island~~
* ~~Development of an optimal storage mix to achieve target curtailment rates by minimizing total costs, including ESS installation and operational costs, dispatch generator fuel costs, and HVDC trading costs~~

Jun 2024 **A study on analysis of optimization mix for ESS in Jeju-Island**

-Oct 2024 *Korea Energy Economics Institute (KEEI)*

* Evaluation of the feasibility of integrating various ESS technologies to enhance power supply stability and maximize renewable energy utilization in Jeju Island
* Development of an optimal storage mix to achieve target curtailment rates by minimizing total costs, including ESS installation and operational costs, dispatch generator fuel costs, and HVDC trading costs
* Simulation of the power market to derive optimal operation patterns, including generation facility and HVDC operation schedules, as well as ESS charge and discharge patterns

May 2024 **A study on predicting hourly and seasonal surplus electricity based on heat-to-electricity conversion**

-Oct 2024 *Korea Energy Economics Institute (KEEI)*

* Derivation of heating and cooling demand used for power-to-heat conversion
* Analysis of the economic and environmental impacts on the power system due to power-to-heat conversion and exploration of methods to supply heat energy using surplus electricity

Jun 2022 **Development of an Integrated Industry Model for Transition to Carbon Neutrality**

-Dec 2029 *Ministry of Environment, Korea*

* Comparison and conceptual design of the global industrial Sector (steel, cement, petrochemicals) Bottom-up model
* A bottom-up model is constructed for the industry sector based on a common equipment technology database, while a process-based technology database is used to build a bottom-up model for certain high-emission industries, resulting in a comprehensive estimation of industrial emissions
* Focus on carbon-intensive industries, and a technology database suitable for comprehensive assessment models is developed, incorporating information from major carbon-emitting countries such as the U.S., Europe, China, India, and Japan, along with Korean data

Jun 2022 **Market Segmentation Analysis and Suggestion of Program Design/Operational Method for Implementing**

-Mar 2023 **Behavior Change Program**

*Korea Energy Economics Institute (KEEI)*

* Define and conduct surveys to establish market segmentation measures and assess energy consumption savings of Korea District Heating Corporation
* Deriving the priority of introducing behavior change program and designing cost-effective program operation plan (Using discrete choice model)

May 2021 **A Development of Seoul-CAPSS and Emission Inventory Map**

-Dec 2022 *Seoul City-Hall*

* A development of Seoul-CAPSS (Clean Air Policy Support System) by calculate emission of eight air pollutants (CO, NOx, SOx, TSP, PM10, PM2.5, VOCs, NH3)
* Speciate the source-based profiles, emission source that provide the chemical composition of air pollutants (VOCs, PM2.5)

Nov 2020 **A Project to Improve the Precision of Emission Inventory with Air Pollutants Database**

-Dec 2021 *Seoul City-Hall*

* A survey on small-scale business and commercial facilities in Seoul, Korea.
* Establishment of strategies for responding to customized emission facilities in Seoul and future management policy.

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Jun 2020 **A Study of Emission Inventory Evaluation using Air Quality Modeling**

-Jul 2021 *Seoul City-Hall*

* Analysis of air pollutants by emission source and evaluation of emissions by gas profile, PM profile.
* Establishing environmental policies for air quality management and climate change.

Mar 2018 **Construction of Ocean Research Stations and their Application Studies**

-Dec 2020 *The Ministry of Oceans and Fisheries, Korea*

* Lead project (Project Manager); In charge of all atmospheric instruments, Ocean onsite fieldwork quarterly, Produce and manipulate atmospheric datasets.
* Participate in publishing research outcomes; research articles and conference presentations
* Monitor air pollutants; PM2.5, BC, CO, CO2, CH4 from North-East Asia (China, Siberia, Mongolia) continental background in the Socheongcho Ocean Research Station (S-ORS)
* Analyze the long-term observation data; Emission Ratio, Source Regions, Combustion Types
* The Ministry of Oceans and Fisheries (Korea) has built a multi-purpose Ocean Research Station in Socheongcho, Yellow Sea at the edge of the territorial sea, to monitor the oceans and atmosphere conditions in real time. (Site description of S-ORS; [Youtube Clip](http://www.youtube.com/watch?v=3PwXwMPcPdI))

Jun 2019 **A Study on the Cause and Restoration of Forest Damage near Young-Poong Metal Smelter in Seokpo**

-Dec 2019 *Korea Forest Service*

* Measure air pollutants variables: **SO2, NOx, VOCs (BTEX)**, HCl, HNO3, H2SO4, NH3 in Seokpo, Korea
* Investigate industry emission from metal smelter facilities and evaluate the damage on local areas.

Mar 2018 **Construction and Improvement of Air Quality Modeling System based on the Measurement**

-Dec 2019 *National Institute of Environmental Research, Korea*

* Measure air pollutants variables: **H2O2, OC, EC, O3**, NOx, SO2, PM2.5, HONO, HNO3 in Seoul, Korea
* Analyze the characteristic of pollutant in Metropolitan and chemical reaction mechanism of O3

Mar 2016 **Improvement of Impact Energy Absorption in Vehicle-Part**

-Feb 2017 *Korea Testing Laboratory*

* Conduct computational analysis on Impact Simulation using ANSYS, CATIA, 2D Auto CAD
* Improve impact energy absorption of thin-walled structures using computational analysis and design

# PUBLICATIONS

* **Kyuil Kwak,** JongRoul Woo\*(2024) PyPSA-KR: An open-source energy system modelling of Korean electricity network
* **Kyuil Kwak,** Joongha Ahn, JongRoul Woo\*(2024) Analyzing community acceptance of hydrogen refueling station in South Korea : Discrete choice experiment approach. <https://doi.org/10.46251/INNOS.2024.8.19.3.157>
* Siwon Choi, **Kyuil Kwak**, Soyoung Yang, Sesil Lim, JongRoul Woo\* (2022) Effects of policy instruments on electric scooter adoption in Jakarta, Indonesia: A discrete choice experiment approach. <https://doi.org/10.1016/j.eap.2022.08.015>

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# AWARDS AND GRANTS

2023 **Student of the year (2022)**

*Graduate School of Energy and Environment, Korea University*

2022 **Scholarship for Teaching/Research Assistant**

*Graduate School of Energy and Environment, Korea University*

2018, 2019 **Scholarship for Teaching/Research Assistant**

*Dept. of Earth and Environmental Science, Korea University*

Aug 2016 **6th Student Creative Design Competition**

*Listed as Finalist, Mechanical Design Contest*

* Design Title: 「The Design of Crash-Box in Bumper to Improve Front Collision Performance」
* Host: Korean Society of Mechanical Engineers

# CONFERENCE AND WORKSHOP EXPERIENCE

Oct 2024 **17th IAMC Annual Meeting 2024**

*Poster presentation*

「PyPSA-KR: An open-source energy system modelling of Korean electricity network」

<https://drive.google.com/file/d/1hP_vVuQ06web3T6Co5kelAPovjmFR1Fc/view?usp=sharing>

Oct 2023 **2023 Korean Energy Conference**

*Oral presentation*

「Optimal ESS capacity expansion planning and benefit research considering time-of-use tariffs」

Oct 2022 **2022 INFORMS Annual Meeting (Indianapolis, U.S)**

*Poster presentation*

「Public Acceptance of Hydrogen Refueling Station in South-Korea: A Discrete Choice Experiment Approach」

Oct 2019 **2019 Korean Society of Oceanography**

*Poster presentation*

「 The Observation of PM2.5, BC, CO at S-ORS in Yellow-Sea from 2014 to 2019」

Aug 2018 **2018 Korean Society of Oceanography**

*Poster presentation*

「Distributions and Source Apportionment of PM2.5, BC, and CO at Socheongcho Ocean Research Station in the Yellow Sea」

Aug 2018 **2018 Korean Society for Atmospheric Environment Conference**

*Poster presentation*

「 Preliminary results of distribution characteristics of Photochemical Indicative Species in Seoul summer, 2018」

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