

Research Laboratory for IDEA/IDEA Development Research Group

Members

18 Regular Staff Members:

Steven Kraines, Tetsuya Monna, Yoonyoung Chun*, Akifumi Takahashi*, Yu-Jen Lee*, Chiharu Fujii, Yuki Ichisugi*, Takehiro Suzuki, Asako Takada, Emi Tsutsui, Arini Nuran, Binti Zulkifli*, Maki Yokota, Shizu Uchiumi, Invidiado Loria Faian Ferolin*, Midori Yanagawa, Keisuke Sakata*, Yoshikazu Shinohara, Tetsuya Nakajima* (*: Members of the Research Group)

17 Concurrent Staff Members:

Kenichiro Tsukahara, Shinichiro Morimoto, Hiroki Hatayama, Tomonori Honda, Keijiro Masui, Toshiaki Hanaoka, Shinji Fujimoto, Kenta Takagi, Akihide Hosokawa, Mitsutaka Matsumoto, Tomohiko Nakajima, Hiroto Itagaki, Yusuke Hirayama, Noriyuki Uchida, Soh Takemoto, Kensuke Kobayashi (Guest), Katsuyuki Nakano (Guest)

24 Contract and Dispatched Staff Members

Research Laboratory Outline

Established in April 2017, IDEA Lab is not an organizational unit but rather a collaborative framework that promotes cross-organizational research activities centered on members of research projects. Its primary missions include the development, maintenance, and management of AIST-IDEA (Inventory Database for Environmental Analysis), collaboration with domestic and international partners, and the implementation of technology assessments and the establishment of related methodologies. To fulfill these missions, IDEA Lab operates through a structure consisting of a team responsible for the maintenance and management of AIST-IDEA and the IDEA Development Research Group, which focuses on the development of new inventory databases and technology assessment methods. AIST-IDEA is one of the largest inventory databases in Japan, comprising processes for more than 5,500 products and services that comprehensively cover domestic economic activities. By continuously providing this database to industry and research and development communities, IDEA Lab aims to contribute to the realization of a sustainable society through the reduction of environmental impacts using life cycle assessment (LCA).

Research Highlights

Development of the AIST-IDEA Inventory Database

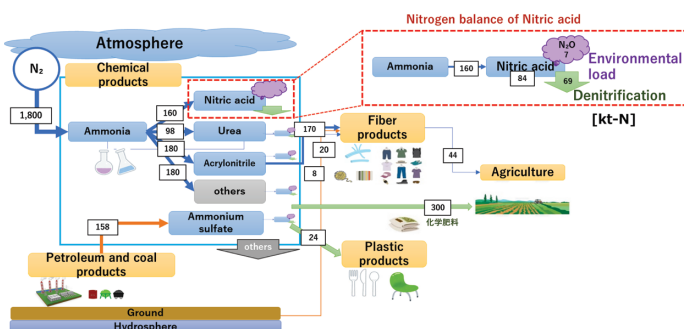
AIST-IDEA is being developed to guarantee comprehensiveness, reliability, completeness, and transparency. Particularly regarding comprehensiveness, AIST-IDEA covers almost all the economic activities of businesses in Japan. Representativeness is assured by using statistical averages for the data on manufacturing processes and services of Japan.

Development of Overseas Data for the AIST-IDEA

Environmental impact values for the same product can vary significantly between Japan and other countries, making country-specific databases essential. Based on AIST-IDEA, which comprehensively covers all products manufactured in Japan, we develop versions for other countries to enable more accurate international assessments.

Development of Nitrogen Inventory Database

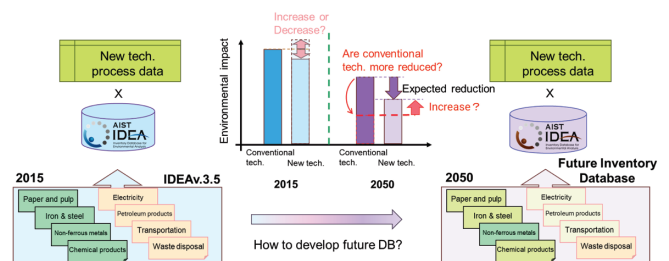
From the perspective of planetary boundaries, emissions of nitrogen compounds from agriculture and manufacturing industries have been identified as a serious threat to the global environment. In response, nitrogen circulation technologies that synthesize and effectively utilize ammonia from nitrogen compounds are being developed. Technology assessment in this field requires databases that account not only for nitrogen emissions but also for nitrogen inputs. To meet this need, AIST-IDEA is being enhanced to develop an inventory in which nitrogen inputs and outputs are consistently balanced. At present, we are building a framework that enables the estimation of nitrogen flows across the manufacturing sector, with a particular focus on chemical industries that utilize recovered and resource-circulated ammonia.



Nitrogen Flow in the manufacturing industry of Japan (2015)

Future Inventory Database

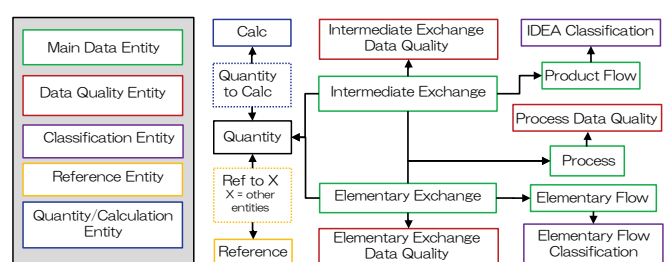
New technologies are being developed with the aim of achieving carbon neutrality in 2050. It is necessary to quantitatively evaluate how much greenhouse gas emissions can be reduced by using these technologies. We are creating a temporal and spatial expansion of AIST-IDEA to provide the inventory database needed for this calculation. We are building this database up to the year 2050 using various future scenarios.



Concept for future evaluation of new technologies

AIST-IDEA Data Model Development

In coordination with the transfer of AIST-IDEA to a large-scale data management system, we are developing a more robust data model for IDEA unit process datasets.



AIST-IDEA Data Model Development