

► **Project Gaia**
**Enabling climate risk analysis
using generative AI**

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Executive summary

Project Gaia – a collaboration between the BIS Innovation Hub Eurosystem Centre, the Bank of Spain,¹ the Deutsche Bundesbank and the European Central Bank – leverages generative artificial intelligence (AI) to facilitate the analysis of climate-related risks in the financial system.

Central banks, supervisory authorities and financial institutions need higher quality and more accessible data to model the financial risks posed by climate change. Today, due to the lack of global reporting standards, accessing relevant climate-related indicators takes significant effort. In financial institutions' corporate reports, climate-related data are buried among other financial and non-financial information and, in many cases, information pertaining to one company is split across multiple reports, and relevant information is contained in texts, tables, footnotes and figures. These challenges constrain the usability of climate-related information.

Project Gaia aims to help analysts search corporate climate-related disclosures and extract data quickly and efficiently using AI, particularly large language models (LLMs). Gaia Phase I has surveyed climate risk experts from central banks and supervisory authorities, designed a solution that addresses the requirements articulated by these experts and delivered a proof of concept (PoC) demonstrating the technical feasibility of the concept.

By automating information extraction, Gaia opens up the possibility of analysing climate-related indicators at a scale that was not previously feasible. Furthermore, Gaia offers harmonised metrics despite the heterogeneity of naming conventions and definitions across different jurisdictions. The combination of semantic search together with iterative and systematic LLM prompting enables Gaia to overcome differences in disclosure frameworks. This offers much needed transparency and comparability of climate-related information.

Project Gaia breaks new ground by integrating LLMs into an application and leveraging it for data extraction. This poses several technical challenges, including LLMs' long response times, randomness (non-repeatability) in their responses and hallucinations. This report explains a set of concrete design choices that allow the Gaia PoC to overcome these challenges.

Gaia demonstrates the power of creating AI-enabled intelligent tools to automate existing workflows. For example, macro analysis results presented in this report cover 20 key performance indicators (KPIs) for 187 financial institutions over five years and adding more institutions or KPIs is quick and easy. Due to its flexible design, the platform is relevant in a much broader context than climate-related data analysis. This paves the way for AI-enabled applications for central banks and the financial sector to address, for example, regulatory and supervisory use cases. Generative AI promises to change the way we work in the future and Project Gaia is one of the first comprehensive studies investigating how this can be done in practice.

¹ Building on previous work published by Moreno and Caminero (2020, 2022, 2023).

List of abbreviations and acronyms

AI	Artificial intelligence
BIS	Bank for International Settlements
DC	Design choice
ESG	Environmental, social and governance
JSON	Java script object notation
KPI	Key performance indicator
LLM	Large language model
NGFS	Network for Greening the Financial System
NLP	Natural language processing
PoC	Proof of concept
SQL	Structured query language
TCFD	Task Force on Climate-related Financial Disclosures

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