

Internacional Seminar Report

"ARTIFICIAL INTELLINGENCE AND CLIMATE CHANGE"





Executive Summary	Э
Opening, Presentation, and First Panel	4
Opening Session:	4
Presentation: "The Dimension of Sustainability in the Brazilian Artificial Intelligence Plan"	4
Panel 1: "Promoting Al Solutions for Mission 1.5"	5
Display of Al Solutions for Combating Climate Change (Part 1)	8
Second Panel: "Artificial Intelligence and Public Digital Infrastructure in Addressing Climate Change"	10
Third Panel: "Reducing the Artificial Intelligence Footprint - Climate Commitments for 2030"	12
Display of Al Solutions for Combating Climate Change (Part 2)	15
Fourth Panel: "Aligning Data Flow with Mission 1.5 and the Role of Developing Countries in the Sustainable Al Value Chain"	17

Closing Session

Executive Summary

This report presents the main contributions of the International Seminar "Artificial Intelligence and Climate Change," held in Brasília on January 28, 2025, focusing on the role of Artificial Intelligence (AI) in the transition to a sustainable economy and in mitigating climate impacts. This is an English translation provided by ITS Rio — the original report was written in Portuguese and is available <u>here</u>.

The event took place at the Itamaraty Palace and was organized by the Ministry of Foreign Affairs, the Ministry of Science, Technology, and Innovation, and the Alexandre de Gusmão Foundation, with support from the Institute for Technology and Society of Rio (ITS Rio), *the Instituto Clima e Sociedade* (iCS), and *Comitê Gestor da Internet no Brasil* (CGI.br).

Among the contributions of the event, particular attention was given to the energy consumption of AI models, inequality in access to technology, and the need for public digital infrastructure to support value chains. Additionally, solutions utilizing AI for climate forecasting, environmental monitoring, and optimization of natural resource use were presented.

The event emphasized the importance of global AI governance that is concerned with (a) the opportunities presented by the technology in combating climate change and (b) the environmental impact of the development and operation of the technology itself, while also highlighting the role of COP30 in supporting the use of AI for monitoring and mitigating the risks posed by climate change.

Opening, Presentation, and First Panel

Opening Session:

Attendees:

- Secretary Jorge Oliveira, Vice President of the *Tribunal de Contas da União*
- James Grabert, Director of the Mitigation Division, United Nations Framework Convention on Climate Change (UNFCCC)
- Renata Mielli, Coordinator of the Comitê Gestor da Internet no Brasil
- Secretary Marina Silva, Secretary of Environment and Climate Change
- Secretary Luciana Santos, Secretary of Science, Technology and Innovation
- Ambassador Mauro Vieira, Secretary of Foreign Affairs

Presentation: "The Dimension of Sustainability in the Brazilian Artificial Intelligence Plan"

Attendees:

- Eliana Cardoso Emediato Azambuja, Director of Digital Science, Technology, and Innovation, Ministry of Science, Technology, and Innovation
- Caetano Penna, Director, Center for Strategic Management and Studies (CGEE)

Panel 1: "Promoting Al Solutions for Mission 1.5"

Attendees:

- Moderator: Sr. Julian Najles, Senior Digital Development Specialist, World Bank
- Maria João Sousa, Executive Director, Climate Change AI
- Tomas Lamanauskas, Deputy Secretary-General, International Telecommunication Union (ITU)
- Erick Giovani Sperandio Nascimento, Associate Professor of Artificial Intelligence (AI) For Clean Air Systems and Lead Researcher of AI and Sustainability, University of Surrey, United Kingdom

Key observations:

- Energy Consumption and Environmental Impact of Data Centers: The exponential growth of AI models requires significant amounts of energy and large volumes of water for cooling, resulting in environmental impacts and high operational costs. Nonetheless, Brazil, with its clean energy matrix, has the potential to be a leader in the green transformation of AI technology in the coming years. The *Comitê Gestor da Internet* (CGI), in partnership with FAPESP and MCTI, for example, has invested resources in the creation of ten Applied AI Research Centers that have been working to develop tools focused on national issues, advancing topics such as environmental awareness and sustainability.
- Inequality in Access to Technology and Distribution of Benefits: The development and application of AI are concentrated in a few countries particularly the USA and China, with some residual distribution in the European Union leaving developing nations at a disadvantage, both in access and in the ability to implement these technologies. Although Brazil could benefit from its transformative impact, the inequality in access to AI infrastructure must be taken into account. Part of the problem lies in the inequality in the international flow of data. Some initiatives can help address these challenges, such as the role of the *Tribunal de Contas da União* in promoting the <u>ClimateScanner</u>, a climate audit that has already gained the participation of 100 countries and promotes data sharing in the sector.

Lack of Adequate Infrastructure and Specific Regulation: The effective and secure use of AI depends on technologically advanced infrastructure and a set of clear and well-defined regulations that ensure security, transparency, and accountability in its development and use. While some countries are already thinking about how to promote the implementation of this infrastructure and develop regulatory frameworks that foster technological innovation and mitigate associated risks, countries like Brazil still need to mature their long-term strategies. Additionally, throughout the event, particularly during Director Eliana Cardoso's speech, the case of DeepSeek was highlighted as a sign of the potential reduction in hardware costs and AI model training, reinforcing the importance of initiatives such as the Plano Brasileiro de IA (PBIA).

Concrete cases shared:

- TerraClass Project: Created in partnership between INPE and Embrapa, the system monitors deforested areas in the Amazon, providing information on land use and strategies for environmental recovery.
- <u>GeoRisk</u>: The Landslide Risk Prediction System was developed by the Centro Nacional de Monitoramento e Alertas de Desastres Naturais (CEMADEN). The system analyzes environmental and geological factors to predict landslide risks up to 72 hours in advance, enabling preventive evacuation.
- The Use of AI in Precision Agriculture in Ethiopia: Precision agriculture plays a crucial role in improving climate resilience for farmers, particularly in the Global South. The World Bank supported a project in Ethiopia, the largest olive oil producer in Africa, which uses AI to optimize fertilizer use, increasing agricultural productivity and reducing environmental impacts. The project collected 20.000 data points and built a machine learning algorithm that can increase productivity by up to 65% and profitability per hectare by up to 70%.
- <u>Climate Trace</u>: It consists of a digital platform organized by a coalition of universities, scientists, and AI experts to analyze patterns in satellite images and identify sources of greenhouse gas emissions.
- <u>Green Digital Action</u>: Launched during COP28 in 2023, Green Digital Action is an initiative led by the International Telecommunication Union (ITU) that aims to promote international partnerships and collaborations around the implementation of new technologies in climate action, thus fostering a green agenda in the digital era.

- "The transition to a low-carbon economy must be a just transition, ensuring that developing countries can also benefit from new technologies." – Luciana Santos
- "AI is deeply energy-intensive. Innovation in energy usage by AI is crucial." – James Grabert
- "Brazil has the potential to become a global leader in sustainable AI. We primarily have an energy matrix based on renewable sources. 90% of our interconnected system is sustainable." – Caetano Penna

Display of Al Solutions for Combating Climate Change (Part 1)

Participants:

- Moderator: Secretary Eugênio Vargas Garcia, Director of the Department of Science, Technology, Innovation, and Intellectual Property, Ministry of Foreign Affairs.
- Daniel Penz, Instituto CERTI Amazônia
- Yana Dumaresq Sobral, Meta
- Gabriel Savio, Sipremo

Key observations:

- Environmental and Biodiversity Monitoring: Instituto Certi presented the "Vem De Onde" system, which tracks the origin of forest products to ensure sustainability and transparency in the ESG market. It includes the implementation of sensors to monitor beehives in the Amazon and mitigate the impacts of smoke on pollination, as well as the use of AI to process satellite images and identify plant species of economic and conservation interest.
- Reforestation Monitoring: Meta highlighted the development of a <u>AI model</u> in partnership with the World Resources Institute (WRI) to measure tree canopy height and track global reforestation progress. A mapping of forests and forest covers is conducted using AI and satellite data, which are later made freely available to researchers and policymakers.
- Natural Disaster Forecasting and Climate Management: Sipremo presented an AI that anticipates extreme weather events, such as floods and landslides, allowing for proactive response and mitigation of economic and social impacts. This technology has applications in sectors such as Civil Defense, forestry, and finance, enabling, for example, insurers and governments to optimize their contingency plans.

- "AI defining where it is, optimizing resources, routes, how they move within the forest, how many kilometers they have, and the area they physically protect." – Daniel Penz
- "Brazil is a major reference in the use of satellite imagery for monitoring deforestation, but in the case of reforestation, there were not enough tools to assess vegetation recovery with the same precision." – Yana Dumaresq Sobral
- "94% of Brazilian municipalities have already been affected by these events [natural disasters], 70% of companies are already directly impacted by climate change, and so, if you've never experienced this, the bad news is that you will." – Gabriel Savio

Second Panel: "Artificial Intelligence and Public Digital Infrastructure in Addressing Climate Change"

Participants:

- Moderator: Michela Rossane Cavilha Scupino, Director of Technology Operations, Lactec
- Francisco Gaetani, Extraordinary Secretary for State Transformation, Ministry of Management and Innovation in Public Services
- Christer Andersen, Senior Adviser, Norwegian Agency for Development Cooperation (Norad)
- Paulo Nobre, Researcher, *Instituto Nacional de Pesquisas Espaci*ais (INPE)

Key observations:

 Public digital infrastructure as the foundation for AI and the need for greater governance: The modernization of the National Data Infrastructure was highlighted as a crucial step to enhance and integrate AI into environmental and energy policies. <u>Cadastro Ambiental Rural (CAR</u>) was cited as a successful example of public digital infrastructure that enables environmental monitoring and governance in a transparent manner. Experts also warned about the need for robust regulation and governance to ensure that AI is used ethically and efficiently in environmental policies. It was emphasized that the use of AI should be thought of in the long term, with flexible policies that can adapt to technological changes. Global cooperation and data sharing: Public digital infrastructure should promote the integration of environmental data between different institutions and countries, fostering global solutions. Collaborative models, such as the sharing of satellite data and environmental sensors presented by the speakers in previous sessions, were cited as promising examples for predicting extreme climate events and guiding public policies. Here, the Global Biodiversity Information Facility (GBIF) was mentioned as an example, an open data infrastructure funded by various governments to facilitate access to biodiversity data, which can be used to train AI models focused on climate issues.

Concrete cases shared:

 Sistema Inteligente de Previsão de Extremos Climáticos (SIPEC): Developed by the Instituto Nacional de Pesquisas Espaciais (INPE), the system analyzes large volumes of meteorological data and predicts extreme weather events up to 12 months in advance, enabling more effective preparation to mitigate their negative impacts.

- "The national data infrastructure boosts and enhances magnificent Artificial Intelligence. And it can be a great passport to a greener, more sustainable future." – Francisco Gaetani
- "When we talk about infrastructure in this context [of AI], this is also where the public sector comes in, in collaboration with the market, taking on this role of coordination [...] for the development of a policy for the future." – Christer Andersen
- "Have you heard that some people are trying to reach Mars? We want to go much further. We are working with institutions in Brazil and around the world to warn, a year in advance, that a certain region is at risk of extreme drought or flooding" – Paulo Nobre

Third Panel: "Reducing the Artificial Intelligence Footprint - Climate Commitments for 2030"

Participants:

- Moderator: Gustavo Macedo, Professor of Business, Insper Instituto de Ensino e Pesquisa
- Thomas Spencer, Energy Sector Analyst, Agência Internacional de Energia
- Christiana Weisshuhn, Vice President of Marketing and Sustainability, Scala Data Centers
- Antonia Gawel, Global Director of Sustainability, Google
- Márcio Gonçalves, Global Director of Sustainability, Microsoft Brasil
- Zhaoyang Wang, General Manager of Alibaba Cloud Global Data Center, Alibaba Group

Key observations:

 Energy Efficiency and Use of Clean Energy: Major technology companies are investing in the transition to carbon-neutral data centers and optimizing the energy efficiency of servers and AI infrastructures, in addition to committing to achieving net-zero emissions by 2030. The strategy of <u>clean energy 24/7</u>, adopted by companies like Google, aims to ensure that all electricity consumed comes from renewable sources at all times. Furthermore, the optimization of cooling systems in data centers has significantly reduced the waste of water and energy resources. In this regard, consider the <u>commitment</u> made by Microsoft to become "water positive" by 2030.

- Opportunities for Brazil: While the development of technology is concentrated in countries like China and the US, the climate impact generated is global and should be addressed by the international community as a whole. Brazil, in turn, has an advantage in the pursuit of sustainable AI due to its predominantly renewable energy matrix and can become a global reference in the implementation of green data centers. As highlighted by the representative of Scala Data Centers, the forecast is that the AI market will reach 90 gigawatts of capacity in the coming years. The Brazilian market, in turn, has an installed capacity between 400 and 500 megawatts. This only reinforces the need for investments in the energy sector so that the country can meet this demand in the coming years.
- Partnerships between Industry and Academia: To advance in addressing climate change through the implementation of AI models, partnerships between large technology companies and university research centers are becoming increasingly necessary. One example is the <u>Alibaba-NTU Corporate Lab</u>, formally known as Alibaba-NTU Global e-Sustainability CorpLab (AN-GEL), a partnership between Nanyang Technological University (NTU) of Singapore and Alibaba Group, established in September 2024. ANGEL focuses on two main areas of research: Green Technologies and Sustainable Lifestyles. In the Green Technologies area, the lab works on the development of energy-efficient AI algorithms and eco-friendly cloud computing solutions. In the Sustainable Lifestyles area, it aims to create digital systems that encourage ecologically conscious choices among consumers and small and medium-sized enterprises (SMEs).

- "[To achieve greater energy efficiency] we need planning regarding the use of appropriate models for specific situations. Sometimes you need a very large model to answer a complex question. In other cases, a smaller model is more appropriate to answer a simpler question." - Thomas Spencer
- "We are very focused on the topic of AI and electricity specifically. But it is important to recognize that this is part of a larger system. [...] AI is a portion of electricity consumption. What we have seen for a long time is that to decarbonize the entire economy, we need to electrify it" Antonia Gawell

 "The opportunity we have is precisely to develop sustainable solutions more quickly. So, the data centers we are building, including here in Brazil, consume much less energy and water" – Márcio Gonçalves

Display of Al Solutions for Combating Climate Change (Part 2)

Participants:

- Moderator: Secretary Pedro Ivo Ferraz da Silva, Coordinator of Scientific and Technological Affairs, Climate Department, Ministry of Foreign Affairs
- Gabriel Perez, MeteoIA
- Carlos Souza Jr., Imazon
- Lennon Medeiros, Visão Coop

Key observations:

- Climate Modeling and Extreme Event Forecasting: MeteoIA, a Brazilian climate startup, develops AI models capable of predicting climate impacts on various time scales, from short-term forecasts (hours) to seasonal forecasts of 12 months. The tool allows for early warnings to be generated for strategic sectors such as Civil Defense, energy, and insurance, enabling the adoption of preventive measures before extreme events occur.
- Deforestation and Climate Risk Monitoring in the Amazon: Instituto do Homem e Meio Ambiente da Amazônia (Imazon) presented a monitoring system based on AI that analyzes changes in vegetation cover and predicts deforestation risks. It is, therefore, an algorithm developed in partnership with the Centro de Projetos e Inovação IMPA to assist in detecting deforestation hotspots. The tool combines geospatial data, satellite imagery, and machine learning to predict areas vulnerable to environmental degradation. Additionally, the model can identify risks of drought and flooding in the Amazon, assisting in the planning of climate adaptation actions.
- AI for Urban Resilience and Flood Response: <u>Visão Coop</u> developed an AI system focused on communities that are vulnerable

to flooding, enabling accurate mapping of risk areas and the issuance of preventive alerts. The project aims to integrate environmental, social, and urban data to provide a holistic view of the climate challenges faced by peripheral regions.

- "AI can determine the probability of an event happening and how the probability distribution changes each month" – Gabriel Perez
- "We are replacing many of the tasks we used to perform in operational monitoring with AI algorithms, saving time to address the big problems ahead of us" – Carlos Souza Jr.
- "We need to be able to multiply efforts, mobilize new actors, and, above all, understand what is replicable and what is not" – Lennon Medeiros

Fourth Panel: "Aligning Data Flow with Mission 1.5 and the Role of Developing Countries in the Sustainable Al Value Chain"

Participants:

- Moderator: Daniel Vargas, Professor, Fundação Getúlio Vargas
- Dora Kaufman, Professor of the Intelligence Technologies and Digital Design Program, PUC-SP
- Shamika Sirimanne, Director, Division on Technology and Logistics, UNCTAD (online)
- Dr. Álvaro L. G. A. Coutinho, Professor at COPPE/Universidade Federal do Rio de Janeiro, Director of the Advanced High-Performance Computing Center and the Center of Excellence in AI for Renewable Energies

Key observations:

 Data Governance and Technological Inequality: The imbalance in global digital infrastructure favors major technological powers such as China and the US, limiting the ability of developing countries to implement their own AI solutions not only due to a lack of adequate infrastructure but also due to deficiencies in data governance. As highlighted by Professor Dora Kaufman, the world today has 11,800 data centers, with 5,388 located in the US compared to 499 in China. Brazil, in turn, has 119 data centers, 49 of which are large-scale, all concentrated in São Paulo, Brasília, and Ceará due to the distribution of cables across the national territory – nonetheless, in the case of AI, it is possible to improve the distribution of these centers across the country, promoting more equality and technological inclusion. Furthermore, the extraction of data from Global South countries without proportional return of benefits perpetuates an unequal dynamic, where few control the processing and innovation in the AI field.

 Digital Infrastructure and Technological Independence: To avoid excessive dependence on foreign data centers, developing countries must invest in their own digital infrastructure and define regulatory milestones that ensure sovereignty over their data. However, it was highlighted that this does not necessarily mean the government needs to "own" the infrastructure, but rather that there should be clear rules on how this infrastructure should be developed and what purposes it serves. Regulation must therefore establish guidelines on what constitutes sustainable infrastructure and a balance between economic growth and environmental impacts.

- "The government does not have to own the infrastructure, but it must create clear rules. In the case of Artificial Intelligence, these rules should be sustainable and in the country's best interest." – Dora Kaufman
- "Are we entering an era where a set of powers prioritizes the race for technological dominance as the number one goal, [...] while developing countries protect forests? Or will we be able to embrace an attitude of building and innovation that is also an element of climate governance and sustainable balance?" – Daniel Vargas
- "Data is not just an economic resource to be exploited for private profit. Data is also a strategic resource for addressing global challenges such as climate change and pandemics" – Shamika Sirimanne
- "Unlike common data centers you see out there, these machines [used for AI] generate more heat and consume more energy, so they are typically cooled with water. [...] The growth in energy consumption of data centers [...] is brutal" – Dr. Alvaro L. G. A. Coutinho

Closing Session

Participants:

- Ambassador Laudemar Gonçalves de Aguiar Neto, Secretary for Commercial Promotion, Science, Technology, Innovation, and Culture, Ministry of Foreign Affairs
- Ambassador André Aranha Corrêa do Lago, Secretary for Climate, Energy, and Environment and Designated President of COP30, Ministry of Foreign Affairs

Key observations:

- The closing of the event reinforced the need for global collaboration so that AI can effectively contribute to combating climate change. AI governance must be inclusive, ensuring that its benefits are accessible to all nations, not just the major technological powers. Brazil was cited as a strategic country to lead a sustainable agenda, leveraging its renewable energy matrix and its capacity for digital innovation focused on environmental challenges.
- In this regard, COP30 was highlighted as a crucial moment to transform commitments into concrete action. The strengthening of public policies, investment in sustainable digital infrastructure, and encouragement of scientific research were identified as essential steps. The integration between the public sector, businesses, and civil society is crucial to ensure that AI solutions have a real impact. The event thus consolidated the importance of AI in the global climate agenda and reinforced the urgency of implementing effective measures to address the environmental crisis.

- "We reiterate that these discussions [on AI] need to be centered within the United Nations system, in order to ensure that everyone has a voice in this process" – Laudemar Gonçalves de Aguiar Neto
- "We want COP30 to show that combating climate change is something possible [...] and that Artificial Intelligence will be an extraordinary tool for this." – André Aranha Corrêa do Lago



Acess our social media



