DataCenterBoom!

Mitigating the socio-environmental impacts of data centers

Experiences in Latin America

By Rodrigo Vallejos[1], January 2026.

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I. Introduction: the environmental impact of data centers

Over the last decade, the construction and operation of data centers have generated growing concern about their environmental impacts. This phenomenon has intensified due to the rapid growth of the industry and the increasing demand for digital services, driven by cloud computing and the rise of artificial intelligence. Communities and academics have strongly denounced the negative impact these technological complexes have on the environment.

The environmental impact of data centers is multifaceted and includes, among other things, the intensive energy use for their operation, massive water consumption in their cooling systems, greenhouse gas (GHG) emissions from the use of high-carbon energy sources, and the generation of electronic waste.

Faced with these complaints and the visibility of the impacts, the companies responsible for data centers have been prompted to set sustainability goals and invest in voluntary and mandatory environmental mitigation measures, in cases where regulations or courts have required it[2].

This report analyzes a sample of the various environmental mitigation measures—both mandatory and voluntary—that the data center industry is implementing. We take the Chilean case as a starting point, but we also add notable cases at the Latin American level. We aim to achieve two goals: first, to offer communities facing the construction of a data center a typology that can help them better understand the mitigation measures that are offered and required; and second, to provide concrete examples that can be replicated, improved, contextualized, or simply serve as inspiration for communities in other locations facing similar problems.

Although this is an initial effort, this analysis aims to improve the bargaining power of communities and local governments through access to information and to reflect more deeply on whether the mitigations currently in place are truly adequate to the scale of the socio-environmental damage and the power of the corporations involved.

II. What do we mean by environmental mitigation in this analysis?

It is crucial to distinguish between "climate change mitigation" and "environmental mitigation." While the former is more common, it focuses specifically on reducing GHG emissions. Environmental mitigation, on the other hand, has a much broader scope[3].

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[2] Carrillo M-Feduchi, G. (13 de diciembre de 2022). ¿Qué medidas están tomando los centros de datos para ser más sostenibles y reducir el cambio climático? DataCenterDynamics. https://www.datacenterdynamics.com/es/features/qu%C3%A9-medidas-est%C3%A1n-tomando-los-centros-de-datos-para-ser-m%C3%A1s-sostenibles-y-reducir-el-cambio-clim%C3%A1tico/

[3] California Department of Transportation. (n.d.). Mitigation. Retrieved January 22, 2026, from https://dot.ca.gov/programs/environmental-analysis/biology/mitigation

Environmental mitigation measures are actions aimed at preventing, reducing, or offsetting the negative environmental impacts of an economic activity. This includes, in addition to GHG reduction, minimizing the use of natural resources or compensating for damage already caused.

Within the framework of comparative Environmental Impact Assessments (EIA), environmental mitigation is governed by the "mitigation hierarchy"[4], which establishes a logical sequence of actions:

1. **Avoid:** Prevent the impact at the source.

2. **Reduce:** Decrease the magnitude of the impact.

3. **Restore:** Return affected elements to their original state.

4. **Compensate:** Generate an equivalent environmental benefit when it is not possible to avoid, reduce, or restore.

In many countries, these measures are legally binding, including compensation for biodiversity loss. In this way, the aim is to protect the environment and promote sustainable development.

Additionally, the concept of environmental mitigation can encompass measures that fall outside the strict framework of EIAs, such as those implemented under Corporate Social Responsibility (CSR). These initiatives are often funded by non-governmental organizations (NGOs) and foundations, thereby contributing to environmental and social well-being.

In this analysis, we will work with the hierarchical typology of mitigation, in addition to those carried out at the CSR level.

III. Environmental mitigation measures in data centers

Large technology companies, such as Google and Microsoft, have integrated sustainability into their corporate objectives. This includes ambitious goals such as becoming carbon negative, achieving sustainable water management (often declaring the goal of being "water positive" by 2030)[5], promoting the circular economy, and biodiversity protection initiatives.

In general, communities directly affected by the environmental impacts of these infrastructures prioritize measures that have a direct impact on their lives, related to the efficient use of energy and water, greenhouse gas mitigation, and waste management.

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[4] The Biodiversity Consultancy. (n.d.). Mitigation Hierarchy. Retrieved January 22, 2026, from https://www.thebiodiversityconsultancy.com/services/site-level-advisory/mitigation-hierarchy/

[5] Kantharaj, K. (2025). *Big Techs' next stop is becoming 'water positive' by 2030*. CIOInsider India. Retrieved January 22, 2026, from https://www.cioinsiderindia.com/tech-buzz/big-techs--next-stop-is-becoming--water-positive--by-2030-tbid-3318.html

In general, data centers say they are improving energy and water efficiency by optimizing their processes, often through the application of new technologies. In the case of energy, for example, the measures they are implementing are:

- Increasing server hosting density.

- Optimizing energy performance.

- Adopting advanced technologies, such as the use of renewable energy and more efficient cooling equipment.

- Implementing energy efficiency standards.

In terms of waste management, recycling programs are being implemented to reduce waste and material consumption. For water consumption, data centers are adopting measures such as installing water-saving fixtures and rainwater collection systems.

IV. Legal framework for mitigation in Chile

In Chile, as of July 2025[6], 22 data centers had entered the Environmental Impact Assessment System (SEIA) by submitting an Environmental Impact Statement (EIS). This is because, due to the typology of "Production, disposal, or reuse of flammable substances (substances listed in Class 2 Division 2.1, 3, and 4 of NCh. 382, Of. 2004)," they must declare the high storage of fuels for their emergency generators.

Environmental mitigation, remediation, and compensation measures in Chile are mainly governed by Law No. 19,300 on General Environmental Principles and its regulations. The SEIA requires project owners to take responsibility for the environmental effects they generate by applying these measures, described in the SEIA Regulations as follows:

- **Environmental mitigation measures (Article 98 SEIA Regulations):** These are intended to prevent or reduce the adverse effects of a project or activity at any stage of its implementation.

- **Environmental remediation measures (Article 99 SEIA Regulations):** These seek to restore one or more components or elements of the environment to a quality similar to that prior to the impact, or to restore their basic properties if restoration is not possible.

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[6] In June 2025, it was revealed through investigative journalism that data centers in Chile were, in practice, exempt from entering this environmental assessment system. In RobotLabot. (June 16, 2025). RobotLabot. (16 de junio de 2025). *Chile libera a los data centers de la evaluación ambiental*. LaBot (newsletter). Retrieved January 22, 2026, from https://robotlabot.substack.com/p/chile-libera-a-los-data-centers-de

- **Environmental compensation measures (Article 100 SEIA Regulations):** These aim to produce or generate an alternative positive effect equivalent to an identified adverse effect that cannot be mitigated or repaired. They include replacing natural resources or environmental elements affected by others of similar characteristics, class, nature, quality, and function.

- **Voluntary environmental commitments:** commitments that the owner of a project subject to Environmental Assessment voluntarily undertakes. These may include the development of projects or the monitoring of impacts observed by the authorities or the public, and are adopted in the Environmental Qualification Resolution.

In Chile, as of the date of this report, only Google and Microsoft had implemented specific environmental mitigation projects through voluntary environmental commitments and NGO funding, particularly in the municipalities of Quilicura and Maipú in Santiago de Chile.

V. Case studies in Latin America

a. Google's Urban Forest (Quilicura, Chile)

In the Environmental Qualification Resolution (RCA) of March 7, 2018, which approved the expansion of its PARAM Data Center in Quilicura, Google committed to donating 1,000 native plant species to the Municipality of Quilicura. These trees were planted by the Cultiva Foundation on five hectares of land at the foot of Cerro Colorado. Google justified the initiative as a measure to offset 150% of the data center's atmospheric emissions from the expansion.

The massive reforestation of this "Urban Forest" included more than 1,500 native trees (plus an additional 500 provided by the Municipality of Quilicura), including Quillay, Maitén, Peumo, Huingán, Romerillo, and Espino. Educational signage, perimeter fencing, and a semi-technical irrigation system were installed, with maintenance scheduled for 5 years.

Neighbors, students, Google employees, municipal officials, and the local Mapuche community actively participated in the process, given the land's proximity to the Inaltu Winkul Mapuche Ceremonial Center and the Municipal Cemetery, both of which make it a heritage site of great importance to Quilicura. At the beginning of the work, a Mapuche prayer to Mother Earth was performed. The "Urban Forest" was inaugurated in October 2019, when the mayor at the time, Juan Carrasco, celebrated the completion of this "new green lung" for the community[7].

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[7] Cambio21. (October 16, 2019). *Google y Municipalidad de Quilicura inauguran inédito bosque urbano en la comuna*. Retrieved January 22, 2026, from https://cambio21.cl/pais/google-y-municipalidad-de-quilicura-inauguran-indito-bosque-urbano-en-la-comuna-5da7607caa2d7450ed5464b4

However, as shown in the fieldwork photographs by Diaz Bejarano & Valdivia[8], this project is currently in a state of neglect. It is clear that there has been no maintenance of the trails, irrigation systems, perimeter fences, or signage. In addition, the presence of an adjacent illegal dump significantly affects the landscape. The lack of coordination between the municipality, Google, and the Cultiva Foundation has led to a transfer of responsibilities and, consequently, discontent in the community, which has few quality public green spaces[9]. Furthermore, this neglect calls into question the commitment of the technology company Google itself, which justified the donation of trees as a measure to offset 150% of the atmospheric emissions produced by the expansion of the data center, but which seems to be satisfied with just making a donation and not with its destination: a dry forest is, quite simply, a greenwashing maneuver.

Photo by Diaz Bejarano, N., & Valdivia, A. (2025). Thirsty Forests and Expansive Droughts: The environmental impacts of data centers in Latin America. *Environment and Planning E: Nature and Space*, *0*(0). https://doi.org/10.1177/25148486251409055

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[8] Diaz Bejarano, N., & Valdivia, A. (2025). Thirsty Forests and Expansive Droughts: The environmental impacts of data centers in Latin America. Environment and Planning E: Nature and Space, 0(0). https://doi.org/10.1177/25148486251409055

[9] @rodrigovallejos.cl. (2024, October 14). ¿CONOCÍAS EL BOSQUE URBANO DE GOOGLE EN QUILICURA? [Video on Instagram]. Instagram. https://www.instagram.com/reel/DBH5ImxOMgO/?igsh=MWozZnE2aTM2Nm8xOQ==

For researchers Diaz Bajerano and Valdivia[10], the problem is that data center development is occurring in the Santiago commune of Quilicura, an area already experiencing structural water stress and rapid urban and industrial expansion. Thus, the water consumption required for the operation and cooling of data centers contributes to reducing local water availability, which manifests itself in "thirsty" forests and green areas. These forests require constant irrigation to survive in an increasingly dry environment, which intensifies pressure on already overexploited aquifers and supply systems.

These projects and their expansion occur alongside reforestation and environmental mitigation programs promoted by companies and authorities, which include tree planting as a compensatory measure. However, these initiatives generate new water demands, as planted trees—especially non-native or high-water-use species—require permanent irrigation to survive prolonged drought. For the authors, these processes produce a form of "feral" landscape, in which forests and green areas do not function as self-sufficient ecosystems, but as spaces that depend on intensive water infrastructure.

b. Clean and Safe Quilicura (Quilicura, Chile)

This social-environmental program is an initiative of the Fundación Ciudad Emergente, in collaboration with the Municipality of Quilicura, financed with $65,000,000 from Google's "Data Center Community Impact Program" corporate social responsibility fund[11]. Its main objective is to transform an informal landfill located in a 9,414 m² municipal space on Galvarino Street in Quilicura.

The program seeks to involve new actors in a public-private-civil society alliance, using participatory urban innovation methodologies in a three-stage cycle:

1. **Participatory Cleanups**: Thanks to community participation, including local schools, 180 tons of trash were removed. Twenty-five percent of this waste was recycled thanks to the efforts of the Quilicura Municipality's Environmental Department.

2. **Tactical Activations of Public Space**: 7,350 native trees were planted using the Miyawaki method, and elements such as a metal structure with a reed canopy and an innovative photocatalytic walkway that degrades CO_2 emissions were integrated. In addition, the site was declared an Environmental Protection Zone, protecting the "Canal San Ignacio" wetland, which is home to plant species (such as totora reeds) and local fauna.

3. **Final Public Space Design**: This included participatory workshops and community dialogues on waste management and space design. The results were overwhelming:

[10] Diaz Bejarano, N., & Valdivia, A. (2025). Thirsty Forests and Expansive Droughts: The environmental impacts of data centers in Latin America. Environment and Planning E: Nature and Space, 0(0). https://doi.org/10.1177/25148486251409055

[11] Barraza, V. (2024, July 9). *Quilicura Limpia y Segura: Transformando basurales en espacios públicos*. 24Horas. https://www.24horas.cl/conciencia-24-7/ciudad-y-transporte/quilicura-limpia-y-segura-transformando-basurales-en-espacios-publicos

84.2% of participants wanted the space to become a park or recreational area, 93.8% considered that the project had a positive impact on the environment, and 83.7% positively valued its impact on the community.

The program culminated with the presentation of the "Environmental Education Center Master Plan," which seeks to convert the space into a center for environmental education, community participation, and sustainable practices. This plan includes classrooms, workshops, laboratories, playgrounds, community gardens, interactive spaces, and green infrastructure. Although the Ciudad Emergente Foundation, with funding from Google, designed this Master Plan, the responsibility for its implementation lies with the Municipality of Quilicura, with an estimated investment of $4.5 million[12].

c. Infiltration Systems in Quebrada de Maipú (Chile)

With the goal of becoming a "water positive" company, Microsoft invested 43 billion pesos in the Maipo Resiliente project[13]. This initiative, promoted by the Government of Santiago, with technical advice from Fundación Chile's Escenarios Hídricos 2030 and support from the Municipality of Maipú, seeks to conserve water and soil.

The project involves the development of ditches and ponds in the Quebrada de la Plata Nature Sanctuary in Maipú, reducing the speed of surface runoff and promoting infiltration of water into the aquifer. This improves water security for the basin and downstream communities, protects the soil from erosion, and retains moisture, promoting local vegetation and wildlife. This is a triple-impact project. The volume of infiltration will be monitored for 10 years, with a partnership with the Municipality of Maipú for the maintenance of the works. In addition, the project synergizes with the "Germán Greve" reforestation initiative at the same university, supporting it with recharged water. It is estimated that this project will allow more than 30,000 m³/year of water to infiltrate during rainy periods, storing it in the aquifer and benefiting more than 29,203 inhabitants[14].

d. Microsoft and UN-Habitat's "Planning for a better quality of life in data center communities" project in Querétaro, Mexico.

In the state of Querétaro, Mexico, there are various documented social and environmental impacts on local communities, such as Colón and El Marqués, that have been exacerbated by the concentration of data centers: dry farmland, depleted wells, power outages, and water shortages, while governments celebrate investments in data centers and the supposed jobs they promise.

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[12] Caldera, G. (2024, August 14). *Quilicura Limpia y Segura*. Ciudad Emergente. https://ciudademergente.org/construir-tacticas/quilicuralimpiaysegura

[13] Gobierno Regional Metropolitano de Santiago & Fundación Chile. (2024). *Maipo Resiliente: de la crisis a la regeneración hídrica en la cuenca del río Maipo* (PDF). Escenarios Hídricos 2030. https://escenarioshidricos.cl/wp-content/uploads/2024/07/maipo-resiliente_2-18-julio.pdf

[14] Aravena, J. (2024, 17 de diciembre). *Microsoft invierte en proyectos del Gobierno de Santiago que aportan agua a la cuenca del Maipo*. Gobierno Regional Metropolitano de Santiago. https://www.gobiernosantiago.cl/microsoft-invierte-en-proyectos-del-gobierno-de-santiago-que-aportan-agua-a-la-cuenca-del-maipo/

In this context, Microsoft and UN-Habitat established their partnership in 2019 with the aim of generating social value and environmental resilience in communities around data centers through inclusive and participatory planning processes, understanding that drought was a major problem in the area[15].

This partnership sought to develop participatory planning processes with local actors and to develop strategic scenarios, recommendations, and action plans to make the areas where data centers are located more prosperous, sustainable, inclusive, and resilient.

The project was based on previous joint work between UN-Habitat and Microsoft that began in Sweden (municipalities where data centers were built) and later moved to Mexico (the state of Querétaro), integrating participatory methodologies with local authorities and communities.

The program proposed an investment of more than 80 million Mexican pesos (≈ USD 4.3 million) to improve infrastructure in eight communities affected by the arrival of data centers. As a result, there are specific proposals for works and interventions, for example, in public spaces, sports facilities, and accessibility.

And although Microsoft and UN-Habitat visited these communities in 2020 and released various public documents, several media outlets indicate that the planned projects were never carried out[16]. Furthermore, according to the media outlet Agencia Pública, when consulted, UN-Habitat responded that it had no information on the project's progress since it was delivered and was not aware of it.

Furthermore, given that local communities today face droughts, displacement, and a lack of access to drinking water, Díaz Bajerano and Valdivia[17] concluded in their research that none of the 21 interventions proposed by UN-Habitat and Microsoft addressed issues related to water scarcity.

In an interview for DataCenterBoom![18], Thomson Reuters Foundation journalist Diana Baptista, who has extensively covered data centers in Querétaro, said of this project: "These companies come in—it's not even greenwashing or pinkwashing, I don't even know what to call it—but it's like pretending to be the good guys, that they're going to bring progress and benefits to these communities, but they come in with empty promises. And even if they had

[15] UN-Habitat. (2022, April 13). UN-Habitat and Microsoft work to make data center communities more inclusive and sustainable. UN-Habitat. https://unhabitat.org/news/13-apr-2022/un-habitat-and-microsoft-work-to-make-datacentre-communities-more-inclusive-and

[16] See Jiménez Arandia, P., & Dib, D. (2025, August 9). *El patio trasero de la IA: Un mapa de la fiebre del oro del siglo XXI*. El País. https://elpais.com/tecnologia/2025-08-09/el-patio-trasero-de-la-ia-un-mapa-de-la-fiebre-del-oro-del-siglo-xxi.html, & Pradilla, A. (2025, October 30). In Mexico, the promised land of data centers. Agência Pública. https://apublica.org/2025/10/the-promised-land-of-data-centers/

[17] Diaz Bejarano, N., & Valdivia, A. (2025). Thirsty Forests and Expansive Droughts: The environmental impacts of data centers in Latin America. Environment and Planning E: Nature and Space, 0(0). https://doi.org/10.1177/25148486251409055

[18] Interview with Diana Baptista by Paz Peña, conducted on July 8, 2025.

fulfilled them! The truth is that putting grass on a soccer field compared to the profits these data centers make is ridiculous, insulting, especially when you're in those communities that haven't had drinking water for three months."

VI. Are data center mitigation measures effective?

The mitigation measures analyzed in this report are not always directly related to the damage assessed in formal environmental assessments. In many cases, they are initiatives implemented under the umbrella of Corporate Social Responsibility. This highlights the shortcomings in the environmental institutional framework for implementing and, above all, effectively monitoring these mitigation measures.

Although data center companies are making large investments as part of their corporate responsibility, these investments are often delegated to other entities seeking participation and partnerships. However, these investments cover only the initial phase of ambitious projects and do not always involve effective monitoring of their implementation. This responsibility is often transferred to local authorities, which, in many cases, do not perform their duties effectively (due to a lack of financial resources, management capacity, knowledge, etc.), generating discontent in communities.

These shortcomings pose significant challenges that must be addressed:

- It is necessary to **strengthen legislation** on appropriate and contextual mitigation measures that allow for effective monitoring mechanisms to be required.

- **Accessible and participatory information channels** with local communities are required with regard to these measures, whether voluntary or required by law.

- **Communities and authorities should be careful not to accept measures that are merely "greenwashing":** measures must be appropriate and contextual to the realities of the territories and communities and must consider the long-term management of their destinations. Above all, with regard to mitigation measures that rely on specific technical solutions, it is important to ensure that their evaluation is independent and takes into account the multiple social, economic, and environmental aspects affected.

- On the part of local governments, it is crucial to **strengthen the capacity to manage projects that involve coordination with the multiple actors involved**, in order to ensure effective and profitable investments for communities, especially in the medium and long term. Private companies should also promote this type of capacity, since measures that only aim to be effective in the short term end up being a setback for the public image of technology companies as well.

- In particular, communities and local authorities affected by the construction of these infrastructures must have **access to information on this type of containment strategy in other territories**, both private initiatives and those required by law, in order to discern the best measures for their case. This introductory document is intended to be an initial contribution in this area.

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