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ID#: OGR-01-25

March 25th, 2025

DarkSky position briefing paper

INNA and its impact on Chile's dark skies

Executive summary

The INNA project, a large-scale industrial development proposed near Chile's world-class observatories, poses a serious threat to astronomical research due to light pollution, airborne dust, and atmospheric turbulence. Northern Chile's dark skies are globally significant, supporting groundbreaking discoveries and maintaining Chile's leadership in astronomy. While Chile has enacted strong light pollution regulations, they fail to account for the cumulative impact of multiple projects. DarkSky opposes INNA's current location and calls for establishing a legally protected buffer zone of at least 50 km with strict light pollution limits. We urge advocates worldwide to join us in protecting this irreplaceable resource.

Project overview

The INNA project, submitted by AES Andes to Chile's Environmental Impact Assessment System (SEIA) in December 2024, includes a large-scale wind farm, photovoltaic facility, seawater desalination plant, green hydrogen production, ammonia processing, and an industrial port for exports. The project site is located just 5 to 11 km from the Cherenkov Telescope Array Observatory-South (CTAO-South) and the Very Large Telescope (VLT), placing it in close proximity to some of the world's most important astronomical research facilities.

The project poses significant risks to astronomical observations due to light pollution, airborne dust, and atmospheric turbulence from wind turbines—all of which can degrade the region's uniquely dark and stable skies. Additionally, INNA's large-scale infrastructure could stimulate further industrial development, increasing long-term light pollution beyond current estimates. While some data on light pollution has been provided, AES Andes has not supplied sufficient information to evaluate other environmental impacts. Given these concerns, the project could severely affect Chile's leadership in astronomy and the integrity of its globally recognized dark skies.

Threat to dark skies

Northern Chile is home to some of Earth's darkest and clearest night skies, making it the world's premier location for astronomical research. The arrival of major international observatories, beginning in the 1960s, has cemented Chile's status as a global leader in space exploration. The European Southern Observatory (ESO) operates groundbreaking facilities like the Very Large Telescope (VLT) at Cerro Paranal and has chosen the region for its most ambitious projects, including the Extremely Large Telescope (ELT) and the upcoming Cherenkov Telescope Array Observatory-South (CTAO-South). These observatories drive cutting-edge discoveries and contribute significantly to Chilean research, education, and technological development. The operational lifespan of these facilities is projected at 50 years.

However, light pollution poses a growing threat to the region's astronomical legacy. Studies confirm that Paranal and Armazones are currently among the darkest observatory sites in the world, but even a 2-3x increase in light pollution could compromise their status. Poorly designed artificial lighting endangers astronomical research, ecosystems, and human health.

The Illumina light pollution model, developed by Prof. Martin Aubé, has been used to assess the impact of the INNA project on the dark skies of the Paranal Observatory. This advanced 3D radiation transfer model simulates how artificial light spreads through the atmosphere, incorporating data from satellites, existing industrial sites, and projected emissions. Current results confirm that Paranal remains one of the darkest sites on Earth, with no significant artificial light sources within 50 km. However, the INNA project would significantly degrade these conditions, reducing the unpolluted sky and increasing artificial brightness. Additionally, the model projects the impact of a fivefold increase in industrial activity, based on AES Andes' representations of INNA's future growth, showing that this level of expansion would make the site brighter than the city of Antofagasta and the Escondida mine combined. The Illumina model also shows that relocating the project 50 km away would maintain current low light pollution levels, reinforcing the need for a protected buffer zone.

Protecting Chile's dark skies is critical to maintaining its global leadership in astronomy and ensuring that future generations continue to benefit from its scientific and economic contributions. DarkSky supports policies that minimize light pollution to safeguard this irreplaceable resource.

Chile's national light pollution law

Chile has made significant progress in regulating light pollution, with Decreto Supremo (DS) No. 1 of 2022, which sets emission standards for outdoor lighting, and DS No. 2 of 2023, which designates Astronomical Areas to protect key observatories. These regulations impose strict limits on lighting, including the exclusive use of warm lights with minimal blue light emissions, and require environmental impact assessments for any industrial project near observatories.

However, current laws regulate individual light sources but do not account for the cumulative impact of multiple projects, which could still degrade the region's dark skies over time. The 10% artificial light pollution threshold used in environmental assessments far exceeds the current <1% level at Paranal-Armazones, threatening the ability to conduct cutting-edge research, including the search for life on exoplanets.

DarkSky's position and key concerns

DarkSky supports responsible economic and green energy development, but the INNA project's location threatens Chile's world-class dark skies. We oppose the project in its current location due to its impact on astronomical research. To protect these skies, we advocate for establishing a 50 km buffer zone in national law and ensuring that light pollution within this zone does not exceed 1% above natural background levels. We call for the project's relocation outside this buffer zone to safeguard Chile's leadership in astronomy while allowing for sustainable development in a more compatible location.

Call to action—Stand with Chile to protect the world's darkest skies

The pristine night skies of northern Chile are a globally significant resource, essential for astronomical discovery, environmental conservation, and cultural heritage. We stand with Chileans advocating to protect these skies from the threat of light pollution and to ensure that future generations can continue to explore the universe from one of the world's most important astronomical sites.

We call on DarkSky advocates worldwide to join this effort by endorsing our position of opposing the INNA project in its current location, supporting a nationally protected buffer zone of at least 50 km, and ensuring that light pollution in this critical region remains below 1% above natural background levels.

Join us in protecting the dark skies of Chile—sign on to support this critical initiative today.

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