

S&P Global Municipal Climate Physical Risk Dataset

Addendum

S&P Global Sustainable1 – September 2026



This addendum has been prepared in response to ESMA's public disclosure requirements and is intended for a public audience. It provides supplementary information related to the methodology and supports analytical integrity, consistency, and transparency by offering additional clarity on the methodology's design, application, and governance.

ESMA Disclosure	Sustainable1's Response
Guidance	
an overview of the rating methodologies used and changes thereto, including whether analysis is backward-looking or forward-looking and the time horizon covered;	The rating methodology is titled "The S1 Physical Risk: Municipal Dataset Absolute Hazards and Exposure Scores".
	The methodology applies to "S1 Physical Risk: Municipal Dataset" metrics calculated "within the geographic boundaries of each issuer" (municipal/locality issuers) and used to screen "bonds/issuers" including "US muni bond focused" portfolios; includes linking to "Muni Bond CUSIP Identifiers".
	Not specified in methodology document. (Document describes projections/scenarios and time periods such as "2020s–2090s" for exposure scores but does not state a "validity" period.)
	Supporting models/datasets: Downscaled CMIP6 climate models used for hazard variables; drought derived from SPEI (SPEIbase/CSIC); fluvial flood combines basin-scale frequency projections with WRI Aqueduct flood extent data (ensemble of five GCMs listed). Key calculation approach (high level): four-step method: (1) Climate hazard modelling, (2) Shapefile mapping (issuer boundary), (3) GDP and population mapping, (4) Exposure metric calculation. Data quality / reliability: Rigorous quality assurance process... based on input data validation, model unit testing, output data validation and benchmarking... and delivery channel validation.
	Exposure Score (relative): "expressed as a 1 (least exposed) to 100 (most exposed) score" and is "relative to global conditions." Interpretation example: a score of 100 indicates "among the most exposed locations... globally." US Exposure Score (relative): 1–100 score "relative to conditions in the USA." Interpretation example: a score of 100 indicates "among the most exposed locations... within the USA." Absolute Hazard (absolute): "Absolute exposure... measured in physical units" (e.g., "fraction of extreme heat days per annum"), weighted by GDP distribution within issuer jurisdiction. Composite Exposure Scores: "equally-weighted additive combination" across hazards, then "rescaled to a 1-100 range using an exponential scoring curve."

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	Most recent update shown: Version 1.3 dated “01/17/2023.
the industry classification used;	Not applicable. The methodology does not reference or apply any industry classification system. The analysis is conducted at country and subnational geographic levels, not by industry or economic sector.
an overview of data sources, including whether data is sourced from sustainability statements required under Directive 2013/34/EU or from information disclosed under Regulation (EU) 2019/2088 and whether sources are public or non-public, and an overview of data processes, estimation of input data in case of unavailability and frequency of data updates;	Municipal Dataset is built from climate-model and geospatial reference datasets (rather than issuer sustainability disclosures), and the methodology states that it is designed to align with frameworks such as TCFD and SFDR, but it does not indicate that inputs are sourced from sustainability statements under Directive 2013/34/EU or from entity/product disclosures under Regulation (EU) 2019/2088 (SFDR). Data sources include NEX-GDDP downscaled CMIP6 for temperature/precipitation-derived hazards (extreme heat/cold, pluvial flood, wildfire, drought), GTSR plus supporting coastal datasets and sea level rise inputs for coastal flood, HydroATLAS plus WRI Aqueduct for fluvial flood and water stress, NASHM (Hall et al. 2015) for tropical cyclone, ESA land-use/land-cover for wildfire adjustment, and SPEIbase (CSIC) for drought. Several of these are publicly documented via links in the methodology (e.g., WCRP CMIP6, NASA NEX-GDDP, WRI Aqueduct), while the methodology itself is marked “Proprietary and Confidential”, and the overall workflow includes proprietary processing/methods to produce hazard maps and scores. The data process is summarized as four steps—climate hazard modelling, issuer boundary (shapefile) mapping, GDP and population mapping, and exposure metric calculation—including use of ensemble averaging across available CMIP6 GCMs and GDP-weighted aggregation of gridded hazard values within each issuer boundary. Where inputs are unavailable at required scenario/time combinations, the methodology describes estimation/mapping approaches, e.g., for fluvial flood, using WRI Aqueduct flood extent available only for select scenarios/decades and mapping RCP4.5→SSP1-2.6 and RCP8.5→SSP3-7.0, and mapping missing time periods to the nearest available decade “in the absence of better available data.” For update frequency, the document notes that population and GDP distribution datasets are historical and “infrequently updated” (due to reliance on censuses) and that future updates/superseding datasets will be incorporated “in a timely fashion,” but it does not provide a fixed calendar update cadence for the full dataset; it also describes ongoing maintenance/enhancement supported by QA (input validation, unit testing, output validation and benchmarking, and delivery-channel validation).
the ownership structure of the ESG rating provider;	Ownership structure of the ESG rating provider
information on whether and how the rating methodologies are based on scientific evidence;	Relevant scientific evidence is identified by leveraging the latest peer-reviewed and widely recognized climate science datasets and models, particularly the CMIP6 climate models that underpin the IPCC assessments. The methodology selects evidence from authoritative scientific sources such as NASA's NEX-GDDP downscaled CMIP6 data, WRI Aqueduct, HydroATLAS, GTSR flood models, and other established hazard-specific datasets to assess nine climate hazards. These datasets are evaluated across multiple climate scenarios (SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5) and future decades to capture a range of plausible climate futures. The selected scientific inputs are processed into standardized hazard maps and exposure metrics, enabling consistent assessment of climate risks across U.S. counties and states. The methodology also

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	incorporates quality assurance, validation, and benchmarking processes to ensure that the scientific evidence remains robust, transparent, and fit for purpose.
information on the ESG rating's clearly defined objective and marking whether the rating is assessing risks, impacts, or both, according to the double materiality principle, or any other dimensions, and in the case of double materiality the proportion of the risk and impact materiality;	Climate change physical risk exposure dataset for US municipal issuers (counties and states) and related general obligation municipal bonds, covering nine physical climate hazards: coastal flood, fluvial flood, pluvial flood, extreme heat, extreme cold, tropical cyclone, wildfire, water stress, and drought. It covers both chronic hazards (longer-term shifts in climate patterns, e.g., extreme heat/cold, drought, water stress) and acute event hazards (e.g., tropical cyclone, wildfire, and flooding). The methodology generates absolute hazard metrics (average hazard intensity within issuer boundaries) and physical risk exposure scores benchmarking a locality's exposure relative to global and US distributions across scenarios and time periods.
	The methodology does not describe an "impact" assessment in the sense of an entity's impacts on the environment or society; instead, it quantifies exposure and its materiality via two lenses: GDP Exposed (economic exposure—share of local GDP located in pixels exceeding hazard materiality thresholds) and Population Exposed (social/public welfare exposure—share of population located in pixels exceeding thresholds). It also states the dataset can indicate which counties may face the greatest risks to property markets, supply chains, tourism and other industries, and fiscal health, but these are described as potential areas of risk enabled by the exposure analytics rather than modeled impact outcomes in this methodology.
	The methodology applies materiality through hazard materiality thresholds used to calculate percent GDP exposed and percent population exposed (e.g., thresholds such as "equivalent to three months of extreme heat days," flood probability thresholds, and "high water stress as defined by WRI Aqueduct"). It notes that expert judgment was used to set thresholds and that review of external sources did not identify literature defining the basis for the US thresholds. However, the document does not reference the double materiality principle (financial materiality + impact materiality) or describe a process for combining risk and impact materiality consistent with double materiality; it focuses on financial/economic exposure (GDP) and social/public welfare exposure (population) as two separate perspectives on exposure materiality.
	The methodology does not define ESG rating based on "materiality dimensions" beyond its exposure-materiality framing: (1) economic perspective via GDP Exposed (significance/materiality of exposure from an economic perspective, including ranking issuers), and (2) social/public welfare perspective via Population Exposed (significance/materiality of exposure from a social/public welfare perspective, including ranking issuers).
the ESG rating's scope, namely, whether it covers an individual E, S, or G factor or whether it is an aggregated rating aggregating E, S and G factors, or whether it covers specific issues such as transition risks;	The methodology does not describe an aggregated ESG rating (combining E, S, and G) or a standalone S or G rating; instead, it describes a S&P Global Sustainable1 (S1) Physical Risk: Municipal Dataset that focuses specifically on climate change physical risk exposure (i.e., an Environmental (E)-related, physical climate risk analytics dataset). Its scope is limited to physical climate hazards—covering both chronic hazards (extreme heat, extreme cold, drought, water stress) and acute event hazards (tropical cyclone, wildfire, and coastal, fluvial, and pluvial flood)—and it provides hazard intensity metrics, exposure scores, and percent GDP and population exposed across scenarios and decades. The document does not state that it covers transition risks (e.g., policy, technology, or market risks related to decarbonization) or broader social/governance factors.

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general information on criteria used for establishing fees charged to clients, specifying the various elements taken into consideration, and general information on the business/payment model;	S&P Global ESG Ratings Europe Limited with support from its commercial affiliates (“SPGE ESG REL”) maintains a pricing framework for its regulated ESG rating products that is designed to support pricing that is fair, reasonable, transparent, and non-discriminatory. Pricing for ESG rating products is determined using objective and documented criteria within a common pricing framework. The pricing framework is supported by internal procedures, training and governance processes, including review and approval requirements for any discounts, exceptions or other departures from standard pricing parameters. SPGE ESG REL currently operates a subscription and non-subscription paid model for its regulated ESG rating products. Regulated ESG rating products are priced and invoiced separately from non-regulated products and services, with fees identified as separate line items for clients.
any limitation in data sources and methodologies used for the construction of ESG ratings;	The methodology highlights several key data-source and methodological limitations: (1) modeling uncertainty because the underlying CMIP6 climate models are complex and uncertain, and S1 assumes that averaging across available CMIP6 GCM outputs is broadly representative, while noting future work could assess the full range of GCM outcomes; (2) a bias toward productive areas because regional hazard metrics are GDP-weighted at the 1km×1km cell level (with population-weighting suggested as a future alternative); (3) materiality/threshold limitations because hazard thresholds used to compute percent GDP/population exposed rely on expert judgment, and S1 did not identify literature defining the basis for the US thresholds—plus local vulnerability may mean significant impacts can occur below the defined extremes; (4) spatial resolution constraints, where climate modeling resolution is intended to be sufficient but could be enhanced; (5) independently modeled hazards, meaning correlations, co-occurrence, and compound events (and related vulnerability) are not explicitly modeled; and (6) data timeline and projection constraints, since GDP and population distributions are historical/infrequently updated (census-dependent) and are also held constant in future scenario projections, so shifts in where people live and where economic activity occurs are not reflected in forward-looking exposure metrics.
the main risks of conflicts of interest and the steps taken to mitigate them;	Conflict of Interest Management Policy
if an ESG rating of a rated item covers the E factor, information on whether that rating takes into account the targets and objectives of the Paris Agreement or any other relevant	The methodology does not state that it assesses Paris Agreement alignment or explicitly incorporates the targets and objectives of the Paris Agreement (or other international agreements) into an E-factor rating framework. Instead, it models physical climate hazards under four climate change scenarios based on IPCC Shared Socioeconomic Pathway (SSP) and Representative Concentration Pathway (RCP) scenarios and provides hazard/exposure metrics across decades, which can support climate risk disclosure and reporting use cases (e.g., alignment with TCFD/SFDR) but is not presented as an assessment against Paris temperature goals.

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international agreements;	
if an ESG rating of a rated item covers the S and G factors, information on whether that rating takes into account any relevant international agreements;	The ESG rating does not cover Social (S) or Governance (G) factors and therefore does not take into account any international agreements relevant to those dimensions.

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