



Verifier's Report

Legal Name of Issuer:	Sacramento Municipal Utility District
Issue Description:	Electric Revenue Bonds, 2023 Series K (Green Bonds - Climate Bond Certified)
Project:	Electric System Improvements
Green Standards:	Climate Bonds Standard (Version 4.0) ICMA Green Bond Principles
Sector Criteria:	Electrical Grids and Storage
Keywords:	Renewables, transmission and distribution, electrification, net zero, decarbonized grid, climate resilience, decarbonizing green bond, California
Par:	\$200,000,000*
Evaluation Date:	May 24, 2023

*Preliminary, subject to change

CLIMATE BONDS DESIGNATION

The Sacramento Municipal Utility District ("SMUD") will issue Electric Revenue Bonds, 2023 Series K (Green Bonds - Climate Bond Certified) ("2023 Series K Bonds") to refund commercial paper and reimburse itself for capital spending that financed improvements to the transmission and distribution system to support SMUD's ambitious roadmap to eliminate carbon emissions from electricity production by 2030.

This Verifier's Report reflects Kestrel's view of SMUD's projects and financing, allocation and oversight, and conformance of the 2023 Series K Bonds with the Climate Bonds Standard (Version 4.0) and Certification Scheme, and *Electrical Grids and Storage* Sector Criteria. In our opinion, the Electric Revenue Bonds, 2023 Series K (Green Bonds - Climate Bond Certified) are highly impactful, net zero aligned, and conform with the internationally accepted Climate Bonds Standard (Version 4.0) and the *Electrical Grids and Storage* Sector Criteria (Version 1).

In recognition of the harmonization and alignment between the Climate Bonds Standard and the Green Bond Principles June 2021 (June 2022 Appendix I) established by the International Capital Market Association ("ICMA"), Kestrel has also evaluated and confirmed conformance of the 2023 Series K Bonds with the Green Bond Principles.

ABOUT THE ISSUER

The Sacramento Municipal Utility District (“SMUD”) is a community-owned, not-for-profit electric utility in Sacramento, California. SMUD has served Sacramento for over 75 years, is the sixth-largest community-owned electric utility in the US, and provides electricity to a service area of 1.5 million people.¹

As the first California utility to receive more than 20% of its energy from renewable sources, SMUD has established renewable energy and carbon emission reduction goals that are ahead of and more aggressive than California state mandates. In April 2021, the SMUD Board of Directors approved the Zero Carbon Plan, a roadmap to eliminate carbon emissions from electricity production by 2030 and the one of the most ambitious decarbonization plans of any large electric utility in the United States.² As of May 2023, SMUD continues to meet and exceed decarbonization targets included in the Zero Carbon Plan.³

Other significant sustainability objectives laid out in SMUD strategic planning documents include:

- Supply 90% of energy from renewable sources by 2030;
- Expand regional transportation and electrification of buildings; and
- Support equitable access to electrification projects, including through investments in and outreach to under-resourced and low-income communities.

SMUD implements several innovative and transformative programs within the community. One of SMUD’s most successful energy efficiency programs is Sacramento Shade, a free program that has delivered more than 600,000 shade trees to local homes and businesses since 1990. SMUD also maintains a voluntary Greenergy® program, which provides customers with the option to receive electricity from 100% renewable resources.

CONFORMANCE WITH CLIMATE BONDS STANDARD AND SECTOR CRITERIA

SMUD engaged Kestrel to provide an independent verification on alignment of the 2023 Series K Bonds with the Climate Bonds Standard (Version 4.0) and Certification Scheme (“Climate Bonds Standard”), and the *Electrical Grids and Storage* Sector Criteria. The Climate Bonds Initiative (“CBI”) administers the Standard and Sector Criteria. Additionally, Kestrel examined alignment of the 2023 Series K Bonds with the United Nations Sustainable Development Goals (“UN SDGs”).

Kestrel is a Climate Bonds Initiative Approved Verifier. The Kestrel Verification Team included environmental scientists, social scientists, and financial professionals. We performed a Reasonable Assurance engagement to independently verify that the 2023 Series K Bonds meet relevant criteria, in all material respects.

For this engagement, Kestrel reviewed SMUD’s bond disclosure documentation, Green Bond Framework, disclosures and documentation on the allocation and uses of bond proceeds, as well as relevant plans and alignment to SMUD’s overarching climate objectives. We examined public and non-public information and

¹ “Company information,” SMUD, accessed May 17, 2023, <https://www.smud.org/en/Corporate/About-us/Company-Information>.

² “2030 Zero Carbon Plan,” SMUD, April 2021, <https://www.smud.org/-/media/Documents/Corporate/Environmental-Leadership/ZeroCarbon/2030-Zero-Carbon-Plan-Technical-Report.ashx>.

³ “2030 Zero Carbon Plan: Progress Report,” SMUD, April 2023, https://www.smud.org/-/media/Documents/Corporate/Environmental-Leadership/ZeroCarbon/2030-ZCP-Progress-Report---April-2023_FINAL.ashx.

interviewed members of SMUD. Our goal was to understand the planned use of proceeds, procedures for managing proceeds, and plans and practices for reporting in sufficient detail to verify the bonds.

Relevant Climate Bonds Sector Criteria and Other Standards

The Bonds align with the Climate Bonds Standard (Version 4.0) and *Electrical Grids and Storage Criteria* (Version 1.0).

Assurance Approach

Kestrel's responsibility was to conduct a Reasonable Assurance engagement to determine whether the 2023 Series K Bonds meet, in all material respects, the requirements of the Climate Bonds Standard. Our Reasonable Assurance was conducted in accordance with the Climate Bonds Standard (Version 4.0) and the *International Standard on Assurance Engagements (ISAE) 3000 (Revised), Assurance Engagements Other than Audits or Reviews of Historical Financial Information*. Information relating to this engagement and the Verifier's and Issuer's Responsibilities, and Independence and Quality Control are available in Appendix E.

Kestrel has relied on information provided by SMUD. There are inherent limitations in performing our assurance; fraud, error or non-compliance may occur and not be detected. Kestrel is not responsible or liable for any opinions, findings or conclusions within the information provided by SMUD that are incorrect. Our assurance is limited to the review of SMUD's policies and procedures that are, in Kestrel's view, relevant to the key components of the Climate Bonds Standard (Version 4.0). The distribution and use of this verification report are at the sole discretion of SMUD. Kestrel does not accept or assume any responsibility for distribution to any other person or organization.

Use of Proceeds

The 2023 Series K Bonds refund commercial paper that financed improvements to the transmission and distribution system to support SMUD's ambitious roadmap to eliminate carbon emissions from electricity production by 2030. All financed projects, including substations, transformers, cable and pole replacements, and other infrastructure upgrades, are designed to support the rapid transformation of the electrical grid necessary to meet decarbonization targets.

Electrification of vehicles and buildings and addition of intermittent renewables to the resource mix create new demands on transmission and distribution infrastructure. Upgrades to this infrastructure are vital to the transition to a carbon-free grid by 2030. According to the National Renewable Energy Laboratory, transmission capacity needs are between two and three times the capacity installed in 2022 and require between 1,400 and 10,100 miles of new high-capacity lines per year.⁴ Investment needed for the entire US power system is estimated at \$330 billion to \$740 billion, a significant portion of which is transmission and distribution infrastructure.⁴

Infrastructure financed by the 2023 Series K Bonds is designed to improve flexibility and accommodate this shift to distributed (residential) and utility-scale renewables and storage. It is also designed for major shifts in demand expected as a result of large-scale electrification that is also necessary to meet emission reduction targets. Financed activities are summarized in Appendix B and include projects such as

⁴ Paul Denholm et al., "Examining Supply-Side Options to Achieve 100% Clean Electricity by 2035," National Renewable Energy Laboratory, 2022, <https://www.nrel.gov/docs/fy22osti/81644.pdf>.

undergrounding powerlines to reduce wildfire risk and connecting transmission lines directly to solar installations, including Whiterock Solar and Sloughhouse Solar.

Net Zero Alignment

The 2023 Series K Bonds enable decarbonization of the power sector and advance SMUD's goal to be carbon-free by 2030. SMUD's goals exceed statewide renewable portfolio standard targets of 60% renewables by 2030 and 100% carbon-free by 2045. Electricity production is the third highest source of greenhouse gas emissions in California⁵ and providing renewable and carbon-free energy through local utilities is critical to reducing these emissions.⁶ The bond-financed projects exemplify SMUD's commitment to address climate change and lead with ambitious emission reduction targets.

Sector Criteria for Electrical Grids and Storage (Version 1.0)

As per the *Electrical Grids and Storage* Sector Criteria, bonds must meet both Mitigation and Adaptation & Resilience Criteria to demonstrate conformance.

Mitigation Criteria: More than 67% of new generation capacity in the system is expected to have emissions intensities below 100 g CO₂e/kWh over a rolling five-year period.

The 2023 Series K Bonds only finance transmission and distribution infrastructure to the SMUD system. SMUD has added a significant amount of renewables within the past five years and expects to continue to add renewables and carbon-free resources its portfolio. Nearly all (88%) resources added to the portfolio have emissions intensities less than 100 g CO₂e/kWh and thus, the transmission and distribution infrastructure projects meet the Mitigation criteria.

SMUD has significant plans and procedures in place to meet criteria in the Adaptation & Resilience checklist included in Appendix C. The operational lifetime of the financed assets exceeds the term of the 2023 Series K Bonds.

Advancing the Just Transition to a Decarbonized Economy

The 2023 Series K Bonds also finance activities which align with the *just transition*, characterized by the equitable inclusion and accommodation of all individuals, with a special focus on disadvantaged groups who may be directly or indirectly affected by the structural changes necessary for the transition to a low-carbon economy. As utilities rapidly transition to clean and renewable energy resources and overhaul infrastructure to accommodate the new resource mix, communities are at risk of being left behind in the transition. SMUD is facilitating a just transition by prioritizing environmental equity in resource planning, addressing disparities in under-resourced communities, and by involving diverse stakeholders and communities in the net zero vision.

ICMA Green Bond Principles

The bond-financed activities are eligible projects as defined by the Green Bond Principles in the *Renewable Energy* project category.

⁵ "Current California GHG Emission Inventory Data," California Air Resources Board, 2022, <https://ww2.arb.ca.gov/ghg-inventory-data>.

⁶ "Quick Facts (2021)," United States Census Bureau, <https://www.census.gov/quickfacts/fact/table/venturacountycalifornia,losangelescountycalifornia,US/PST045221>.

Process for Project Evaluation and Selection

The 2023 Series K Bonds advance (i) statewide GHG emission reduction goals, (ii) SMUD's adopted Integrated Resource Plan, and (iii) decarbonization targets set out in the 2030 Zero Carbon Plan. The 2023 Series K Bonds also align with SMUD's Green Bond Framework and Environmental Sustainability Roadmap.

SMUD has an adopted Integrated Resource Plan ("IRP") that is the primary planning document for long-term priorities and strategies. As required by state law, the IRP must be certified by the California Public Utilities Commission every two years. The IRP includes information about how SMUD will meet statewide requirements for reducing greenhouse gas emissions within the power sector while ensuring grid reliability and competitive rates. The 2019 IRP informed the development of the 2030 Zero Carbon Plan, both of which established the need for and prioritization of bond-financed projects.

Management of Proceeds

Proceeds from the 2023 Series K Bonds will be allocated to repay commercial paper notes that financed transmission and distribution projects and to pay certain costs of issuance. Bond proceeds will be used immediately at closing to repay the commercial paper and will not be held in temporary investments prior to spending. Treasury & Risk Management is responsible for overseeing the allocation of proceeds.

Reporting

SMUD provides multiple forms of ongoing financial disclosures and reporting on progress toward decarbonization goals. Reports include annual disclosure of emissions from energy delivered on the grid, annual utility-wide reports, continuing financial disclosures, and a Post-Issuance Report from Kestrel.

- As required by the California Energy Commission Power Source Disclosure Program, SMUD annually provides a power content label report that includes greenhouse gas emission data from all energy sources used for retail sales. These disclosures are made available on the California Energy Commission website: energy.ca.gov/programs-and-topics/programs/power-source-disclosure-program.
- As required by the California Energy Commission, SMUD submits annual reports that describe the status of progress toward the Renewable Portfolio Standard Plan.
- SMUD produces annual reports that highlight key impacts and progress toward decarbonization and customer service goals. These reports are made available on the SMUD website: smud.org/en/Corporate/About-us/Company-Information/Reports-and-Statements.
- SMUD will submit continuing financial disclosures to the Municipal Securities Rulemaking Board ("MSRB") as long as the 2023 Series K Bonds are outstanding, as well as reports in the event of material developments. This reporting will be done annually on the Electronic Municipal Market Access ("EMMA") system.
- In accordance with the Climate Bonds Standard, Kestrel will be engaged to provide one Post-Issuance Report within 24 months of issuance to confirm continued conformance of the 2023 Series K Bonds with the relevant Standards and Criteria.

ALIGNMENT WITH UN SDGs



The 2023 Series K Bonds support and advance the vision of the United Nations Sustainable Development Goals (“UN SDGs”), including:



Affordable and Clean Energy (Targets 7.1, 7.2)

Providing customers with reliable and clean energy;
Transmission infrastructure directly connected to renewable generation facilities and necessary for delivering clean energy to customers



Industry, Innovation and Infrastructure (Targets 9.1, 9.4)

Construction and retrofit of infrastructure to reduce wildfire risk and improve resilience;
Installation of infrastructure to increase flexibility of the grid in alignment with large-scale electrification and deployment of renewables



Sustainable Cities and Communities (Target 11.6)

Comprehensive upgrades to grid infrastructure to maintain service reliability with electrification of buildings and vehicles



Climate Action (Target 13.2)

Adoption of and continued implementation of projects to reach long-term climate action targets

Full text of the Targets for Goals 7, 9, 11, and 13 is available in Appendix A, with additional information available on the United Nations website: un.org/sustainabledevelopment

ASSURANCE STATEMENT AND CONCLUSIONS

Based on the Reasonable Assurance procedures we have conducted, in our opinion, the Electric Revenue Bonds, 2023 Series K (Green Bonds - Climate Bond Certified) are highly impactful, net zero aligned, and conform, in all material respects, with the current Climate Bonds Standard, and the bond-financed activities are completely aligned with the *Electrical Grids and Storage* Sector Criteria. The 2023 Series K Bonds also conform with the Green Bond Principles and are in complete alignment with the *Renewable Energy* eligible project category. The 2023 Series K Bonds advance SMUD’s ambitious decarbonization goals.

Sincerely,

A handwritten signature in black ink that reads "April Strid".

April Strid, Lead Verifier

Kestrel

Hood River, Oregon, United States

May 24, 2023

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About

Kestrel provides ESG Impact Data and verification services designed to bring greater transparency and insight to fixed income, helping to set the market standard for sustainable finance.

We are a team of environmental and social scientists, engineers, and finance professionals with deep, nuanced understandings of how state and local governments finance and deliver public projects. We understand the complex activities and infrastructure financed with municipal bonds and provide meaningful, material insights on their ESG characteristics with our innovative data offering.

We are also a leading provider of external reviews for green, social and sustainability bond transactions in US public finance, consistently garnering over 60% of the market share by par and by number of reviews. We are qualified to evaluate corporate and municipal bonds in all asset classes worldwide for conformance with international green and social bond standards.

kestrel360.com | info@kestrel360.com | +1 800-756-8099



For more information, contact:

Melissa Winkler, Senior Vice President
melissa.winkler@kestrel360.com
+1 415-800-5944



Verification Team

- Monica Reid - CEO
- April Strid, MS - Lead ESG Analyst
- Melissa Sherwood, MA - Senior ESG Analyst
- Joanne Ferrigan - VP, QA & Risk Management

Disclaimer

This Opinion aims to explain how and why the discussed financing meets the CBI Climate Bonds Standard based on the information that was provided by SMUD or made publicly available by SMUD and relied upon by Kestrel only during the time of this engagement (May – June 2023), and only for purposes of providing this Opinion.

We have relied on information obtained from sources believed to be reliable, and assumed the information to be accurate and complete. However, Kestrel can make no warranty, express or implied, nor can we guarantee the accuracy, comprehensive nature, merchantability, or fitness for a particular purpose of the information we were provided or obtained.

By providing this Opinion, Kestrel is neither addressing nor certifying the credit risk, liquidity risk, market value risk or price volatility of the projects financed by the Climate Bonds. It was beyond Kestrel's scope of work to review for regulatory compliance, and no surveys or site visits were conducted by us. Furthermore, we are not responsible for surveillance, monitoring, or implementation of the project, or use of proceeds.

The Opinion delivered by Kestrel is for informational purposes only, is current as of the date of issuance, and does not address financial performance of the Climate Bonds or the effectiveness of allocation of its proceeds. This Opinion does not make any assessment of the creditworthiness of SMUD, nor its ability to pay principal and interest when due. This Opinion does not address the suitability of a Bond as an investment, and contains no offer, solicitation, endorsement of the 2023 Series K Bonds nor any recommendation to buy, sell or hold the 2023 Series K Bonds. Kestrel accepts no liability for direct, indirect, special, punitive, consequential or any other damages (including lost profits), for any consequences when third parties use this Opinion either to make investment decisions or to undertake any other business transactions.

This Opinion may not be altered without the written consent of Kestrel. Kestrel reserves the right to revoke or withdraw this Opinion at any time. Kestrel certifies that there is no affiliation, involvement, financial or non-financial interest in SMUD or the projects discussed. We are 100% independent. Language in the offering disclosure supersedes any language included in this Opinion.

Use of the United Nations Sustainable Development Goal (SDG) logo and icons does not imply United Nations endorsement of the products, services, or bond-financed activities. The logo and icons are not being used for promotion or financial gain. Rather, use of the logo and icons is primarily illustrative, to communicate SDG-related activities.

Appendix A.

UN SDG TARGET DEFINITIONS

Target 7.1

By 2030, ensure universal access to affordable, reliable and modern energy services

Target 7.2

By 2030, increase the share of renewable energy in the global energy mix

Target 9.1

Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

Target 9.4

By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

Target 11.6

By 2030, reduce the adverse per capita environmental impact of cities, including paying special attention to air quality and municipal and other waste management

Target 13.2

Integrate climate change measures into national policies, strategies and planning

Appendix B.

NOMINATED PROJECTS

Table B.1. Summary of projects financed by the commercial paper to be refunded by the 2023 Series K Bonds.

Project Category	Description	Expected Commercial Paper to be Refunded by the 2023 Series K Bonds
Transmission System	Transmission improvements include transmission line structure replacements; substation improvements including switchgears and transformers; pole replacements; line sensor upgrades; and interconnection projects	\$209,917,440
Distribution System	Distribution improvements include line upgrades and replacements, substation improvements to accommodate new capacity, including switchgears and transformers; pole replacements; and new service connections	\$28,583,195

Appendix C.

ADAPTATION & RESILIENCE CHECKLIST

Adaptation and Resilience Checklist for Grid and Storage Infrastructure (Tables C.1–C.5)

Table C.1. Clear boundaries and critical interdependencies between the infrastructure and the system it operates within are identified.

No.	Adaptation and resilience checklist for grid and storage infrastructure	Submitted
1.1	<p>Boundaries of the infrastructure are defined using (1) a listing of all infrastructure and assets and activities associated with the use of the bond proceeds, (2) a map of their location, and (3) identification of the expected operational life of the activity, asset or project.</p>	<p>A detailed budget and list of all infrastructure has been provided. The service area and locations are defined. The average operational life of the nominated assets exceeds the term of the 2023 Series K Bonds.</p>
1.2	<p>Critical interdependencies between the infrastructure and the system within which it operates are identified. Identification of these interdependencies should consider the potential for adverse impacts arising from, but not limited to:</p> <ul style="list-style-type: none"> (1) the effects of supply disruption or interruption on dependent electricity users or populations; (2) exacerbation of wildfires; (3) relationships of the asset/project to nearby flood zones; (4) reduction in pollinating insects and birds; (5) reduction in biodiversity or High Conservation Value¹⁰ habitat; (6) damage or reduction in value of neighboring property due to boundary structures at risk of falling during storm events; (7) fire and other practices that affect air quality; (8) appropriation of land or economic assets from nearby vulnerable groups¹¹; <p>¹⁰High Conservation Value (HCV) habitat criteria in accordance with https://www.hcvnetwork.org</p> <p>¹¹ According to IFC Performance Standards</p>	<p>Interdependencies and potential effects on factors listed in criteria 1.2 are identified. Factors including effects on pollinating insects and birds, High Conservation Value habitat and appropriation of land from vulnerable groups are addressed in environmental impact assessments required by local and state regulations. The potential effects of supply disruption and wildfire risks are addressed in Integrated Resource Plans and Wildfire Mitigation Plans.</p>

Table C.2. An assessment has been undertaken to identify the key physical climate hazards to which the infrastructure will be exposed and vulnerable to over its operating life.

No.	Adaptation and resilience checklist for grid and storage infrastructure	Submitted
2.1	<p>Key physical climate risks and indicators of these risks are identified in line with the following guidelines.</p> <p>Risks are identified based on (a) a range of climate hazards, and (b) information about risks in the current local context, including reference to any previously identified relevant hazard zones, e.g., flood zones.</p> <p>In order to be confident that assets and activities are robust and flexible in the face of climate change uncertainties, it is essential that the climate risks being assessed and addressed cover those that are of greatest relevance to T&D grids and electrical energy storage. The physical characteristics of climate change that must be considered in the risk assessment include:</p> <ul style="list-style-type: none"> • Temperature rise <ul style="list-style-type: none"> ○ High temperatures can impact the electrical rating of assets, reducing transmission capacity and potentially reducing the ability of the network to meet demand. ○ Increasing temperatures can also result in extension of overhead lines, which reduces the clearance above trees. ○ Increased temperatures may also result in changes to the load on assets, due to increased cooling demands (higher summer peak demands) and less winter heating (reduced winter peak). • Increased heavy rainfall <ul style="list-style-type: none"> ○ Heavy rainfall can result in flash pluvial flooding, which could significantly impact electrical assets, particularly ground mounted assets. • Sea-level rises <ul style="list-style-type: none"> ○ Potential for flooding of coastal infrastructure and assets at risk from storm surge events. • Increased lightning <ul style="list-style-type: none"> ○ Lightning strikes have potential to cause transient outages due to power surges. • Increased winds / gales <ul style="list-style-type: none"> ○ Strong winds can cause damage to overhead transmission and distribution lines and supporting infrastructure (pylons and poles). ○ Up-rooting of trees and vegetation can also have an impact on power lines. • Increased snow, sleet, ice, freezing fog <ul style="list-style-type: none"> ○ Ice and snow accretion can make overhead power lines vulnerable to high-winds ○ Snow and ice can also impede access to sites for repairs in the event of a fault. • Increased coastal / river erosion <ul style="list-style-type: none"> ○ Risk to assets in coastal or riverbank locations • Wildfires <ul style="list-style-type: none"> ○ Wildfires present a risk to electricity infrastructure in affected areas and can significantly inhibit access to repair damaged infrastructure. ○ Electricity infrastructure can also be a cause of wildfires. For example, contact between transmission lines and dry vegetation has potential to start fires. • Landslides / ground movement <ul style="list-style-type: none"> ○ Potential to risk to both underground and above ground infrastructure from ground movement. ○ Potential for access to be impeded for repairs. 	<p>SMUD monitors scientific literature and new findings related to the long-term physical impacts of climate change. SMUD evaluates these findings for impact on the service territory, as well as the locations where SMUD purchases, generates or transmits electricity and procures critical equipment.</p> <p>In accordance with California's policy direction, adaptation measures that also include a mitigation benefit are prioritized.</p> <p>Multiple risks are addressed in Integrated Resource Plans, including new technology, renewable resource costs, regulatory and market uncertainty, regional economic growth, pace of electrification, distributed energy resources, and behind-the-meter generation and storage.</p> <p>Multiple models are used for resource planning, including tools to model GHG emissions and varying climate scenarios. Models are described in detail in Integrated Resource Plans and include PATHWAYS, RESOLVE, RECAP, and PLEXOS.</p>

No.	Adaptation and resilience checklist for grid and storage infrastructure	Submitted
	<p>Issuers might consider the climate risks posed through specific interdependencies which might include, for example:</p> <ul style="list-style-type: none"> • Availability of telecommunications for control systems and operational / field staff communications when dealing with extreme weather events, where the telecommunications rely on third party providers and infrastructure. • Flood risk and resilience will likely have interdependencies with local and national agencies, for example related to local flood defenses, coastal flood risk management, shoreline management plans etc. <p>Optional guidance for carrying out risk assessments:</p> <ul style="list-style-type: none"> • Users should apply climate scenarios based on representative concentration pathway (RCP) 4.5 and 8.5 or similar / equivalent to ensure consideration for worst case scenario. • A broad range of models can be used to generate climate scenarios. • Time horizons for assessing climate risk in agriculture can be based on annual seasonal forecasts and every ten years for the lifetime of the assets and projects. Where accurate assessments of climate variability for specific locations are not possible, use worst-case scenarios. • Risks can be characterized by the associated annual probability of failure or annual costs of loss or damage. • For risk assessment, the TCFD The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities is recommended. 	

Table C.3. The measures that have or will be taken to address those risks, mitigate them to a level such that the infrastructure is suitable to climate change conditions over its operational life.

No.	Adaptation and resilience checklist for grid and storage infrastructure	Submitted
3.1	<p>The following are examples of risk management activities that bond issuers might consider, or that might be adopted as part of regulations (e.g. codes and standards). This list is not exhaustive and bond issuers should fully assess the mitigation measures that are relevant to the climate risks and impacts identified in the risk assessment.</p> <p>Temperature</p> <ul style="list-style-type: none"> - Design standards that maintain equipment rating over its lifetime performance in the face of all potential ranges of temperature rise - Manage vegetation under power lines to ensure adequate clearance is maintained - Assess changing demand profile (milder winters, increased summer cooling) over equipment lifetime <p>Rainfall:</p> <ul style="list-style-type: none"> - Design for resilience to pluvial flooding - Assessment of site drainage requirements - Impact of restricted access to sites / lines due to flooding <p>Increased lightning</p> <ul style="list-style-type: none"> - Design of electrical equipment to withstand lightning impulses, including shielding and surge suppression devices - Redundancy <p>Increased winds / gales</p> <ul style="list-style-type: none"> - Design to withstand extreme winds - Cut vegetation regularly to safe distance to reduce risk from up-rooting - Invest in storm and hurricane forecasting tools - Consider placing cables underground - Redundancy <p>Increased snow, sleet, ice, freezing fog</p> <ul style="list-style-type: none"> - Design equipment for ice loading - Suitable vehicles for access to sites in heavy snow / icy conditions <p>Increased flooding</p> <ul style="list-style-type: none"> - Flood risk assessment and planning - Site ground installations outside of potentially affected zones - Ensure flood defense systems and coastal management plans are adequate - Consideration of site access during flooding events <p>Increased coastal / river erosion</p> <ul style="list-style-type: none"> - Shoreline management plans / coastal erosion assessment <p>Wildfires</p> <ul style="list-style-type: none"> - Management of vegetation around electricity infrastructure to ensure adequate clearance <p>Landslides / ground movement</p> <ul style="list-style-type: none"> - The potential for ground movement and landslides should be taken into account when assessing sites for installing grid infrastructure. 	<p>SMUD has and continues to implement a wide range of risk-mitigating activities. In recent years and on an ongoing basis, SMUD has:</p> <ul style="list-style-type: none"> • Prepared and annually updated a Wildfire Mitigation Plan in accordance with California state law. • Supported sustainable forest fuel management activities that reduce impacts of catastrophic wildfires. • Received funding from the California Governor’s Office of Emergency Services Federal Emergency Management Agency Hazard Mitigation Grant Program and is implementing hazard mitigation programs including cool roof programs to reduce heat for high social vulnerability zones within Sacramento County; a farm-based flood control program that will use nature-based solutions for flood control; and an urban greening program to maximize long-term heat reduction potential. • Continuously evaluated and implemented options to increase reliability of the transmission system, including shunt capacitors for voltage support and transmission line reconductor projects to mitigate potential thermal overloads at high demand levels. • Installed automated switches to provide real-time remote monitoring and control for distribution operators, including voltage regulators on 21 kV and 12 kV systems to address power quality issues and plan for distributed energy resources. • Installed supervisory control and data acquisition (SCADA) functionality for all 69 kV and 21 kV substations. Almost three-quarters of 12 kV substation transformers have SCADA functionality. • Completed undergrounding projects and maintain a comprehensive vegetation management program. • Been an active participant in the Capital Region Climate Readiness Collaborative that is a coalition of local and regional organizations from the six-county Sacramento region with a primary goal of working together to build resilience against climate change.

No.	Adaptation and resilience checklist for grid and storage infrastructure	Submitted
	General risk mitigation measures: <ul style="list-style-type: none"> - Business continuity plans - System restoration plans - Black start - Islanded operation / microgrids - System security standards 	
3.2	Risk reduction measures must be tolerant to a range of climate hazards and not lock-in conditions that could result in maladaptation.	Long-term planning periods and interdependency analysis in Integrated Resource Planning avoid lock-in conditions.

Table C.4. The infrastructure enhances the climate resilience of the defined system it operates within, as indicated by the boundaries of and critical interdependencies with that system as identified in item 1 in this checklist.

No.	Adaptation and resilience checklist for grid and storage infrastructure	Submitted
4.1	<p>Issuers are to assess the climate resilience benefits of system focused assets and activities and demonstrate they are ‘fit for purpose’, in the sense that they enhance climate resilience at a systemic level, with the flexibility to take into account the uncertainty around future climate change impacts.</p> <p>The assessment is conducted according to the principle of best available evidence during the investment period taking into account the infrastructure’s boundaries and critical interdependencies as defined in Criteria 1. ‘Fit for purpose’ is defined as measures that mitigate the following effects:</p> <ol style="list-style-type: none"> (1) the effects of supply disruption or interruption on dependent electricity users or populations; (2) exacerbation of wildfires; (3) relationships of the asset/project to nearby flood zones; (4) reduction in pollinating insects and birds; (5) reduction in biodiversity or High Conservation Value¹² habitat; (6) damage or reduction in value of neighboring property due to boundary structures at risk of falling during storm events; (7) fire and other practices that affect air quality; (8) appropriation of land or economic assets from nearby vulnerable groups¹³; <p>¹² High Conservation Value (HCV) habitat criteria in accordance with https://www.hcvnetwork.org.</p> <p>¹³ According to IFC Performance Standards</p>	<p>SMUD’s ambitious decarbonization targets are an important contributor to mitigating the worst effects of unabated greenhouse gas emissions and improving regional resilience. Multiple programs and infrastructure upgrades, including those listed in Criteria No. 3.1, enhance reliability and resilience of the system. Examples include upgrades to reduce likelihood of supply disruptions for the entire service area, reducing climate-related risks in disadvantaged communities, and a comprehensive approach to wildfire risk mitigation that benefits both local communities and the entire region.</p>

Table C.5. The issuance is required to demonstrate that there will be ongoing monitoring and evaluation of the relevance of the risks and resilience measures and related adjustments to those measures will be taken as needed.

No.	Adaptation and resilience checklist for grid and storage infrastructure	Submitted
5.1	Indicators for risks identified under item 2 in this checklist are provided.	Operations are subject to regulations and Federal Energy Regulatory Commission (FERC), North American Electric Reliability Corporation (NERC), and the California Energy Commission (CEC). SMUD is required to meet thresholds in planning criteria and have a reserve margin for extreme weather and unexpected changes. Not meeting reliability standards is one of the primary indicators of key climate hazards. Automated monitoring and SCADA systems are critical infrastructure to long-term and real-time of risk identification.
5.2	Indicators for risk mitigation measures identified under item 3 in this checklist are provided.	Risk indicators described in 5.1 trigger the need for risk mitigation. Key performance indicators are part of programs and infrastructure upgrades described in Item 3.
5.3	Indicators for “fit for purpose” resilience benefit measures identified under item 4 in this checklist are provided.	Indicators and the need for modification of “fit for purpose” resilience measures are identified through annual capital and resource planning and operational performance.
5.4	Issuers have a viable plan to annually monitor (a) climate risks linked to the infrastructure, (b) climate resilience performance, (c) appropriateness of climate resilience measure(s) and to adjust as necessary to address evolving climate risks.	SMUD monitors scientific literature and new findings related to the long-term physical impacts of climate change and evaluates them for impact on the service territory as well as the locations in which SMUD purchases, generates or transmits electricity and procures critical equipment. SMUD has a scoring methodology for identifying and ranking risks and meets regularly with management to rank and adjust operational plans to improve resilience to any identified risks. In accordance with California’s policy direction, adaptation measures that also include a mitigation benefit are prioritized.
5.5	Where electricity supply has been interrupted, the number of customer interruptions and customer minutes lost (i.e. aggregate duration of supply interruptions) should be measured and reported, together with the cause of the interruption. Any actions taken to reduce the risk of further impacts should also be recorded.	The Board Strategic Direction 4 is Reliability. Staff reports annually to the Board on the frequency and duration of customer outages, along with average outage minutes, the main drivers for the outages, and plans to improve the results. Reliability is also reported every other year as part of the rates process. Document is called "Chief Executive Officer & General Manager’s Report and Recommendation on Rates and Services."

Appendix D.

ASSURANCE PROCEDURES FOR USE OF PROCEEDS VERIFICATION

REQUIREMENT	ASSURANCE PROCEDURES
2.1. Utilization of Proceeds	
2.1.1. Project Documentation	Review documentation of the Nominated Projects assessed as likely to be Eligible Projects, and list of Nominated Projects that Issuer will keep up-to-date during the term of the bond.
2.1.2. Valuation	Review net proceeds of the bond to ensure they are not greater than the value of the project.
2.1.3. Multiple Nominations for Certified Debt Instruments	Review Nominated Projects or distinct portions of the Nominated Projects for previous nominations to other Certified Climate Debt Instruments, green bonds, or other designated instruments. Review and confirm whether Nominated Projects have been refinanced by other Certified Debt Instruments or bonds under assessment will refinance existing Certified Debt Instruments.
2.2. Process for Evaluation and Selection of Projects and Assets	
2.2.1. Process	Review documentation of the process the Issuer followed to identify projects and confirm eligibility requirements for inclusion of Nominated Projects in the bond. Review planning documents which establish goals, priorities and potential impact.
2.2.2. Environmental Statement, Eligibility & Technical Criteria (i.-vi.)	Review additional documentation Issuer provided on further aspects of identification process including strategic directions and standards. Review the Issuer's environmental and social integrity policy, exclusion criteria, and/or Green Bond Framework, and confirm its coverage of the Nominated Projects. Review statement of the climate-related objectives of the bond. Test Nominated Projects to determine whether they meet the minimum technical requirements of the Climate Bonds Standard and relevant Sector Criteria.
2.3. Management of Proceeds	
2.3.1. Documentation of Processes & Procedures	Confirm that policies, processes and procedures for tracking financial flows of bond proceeds to the Nominated Projects are in place.
a. Tracking of Proceeds	Review allocation of funds to ensure they can be tracked against Nominated Projects.
b. Managing of Unallocated Proceeds	Review documentation for the management of bond proceeds for funds prior to allocation to a Nominated Project and review eligible temporary investments for unallocated proceeds.
c. Earmarking Funds	Confirm policies, processes and procedures to identify flows of proceeds related to the Bond have been established.
2.3.2. Ring-Fenced Funds	Where proceeds will be ring-fenced, confirm processes and procedures to allocate funds to accounts, and track and monitor payments from the relevant accounts.
2.4. Pre-Issuance Reporting: Green Finance Framework and Disclosure Documentation	
2.4.1 Bond Disclosure Documentation	Review Issuer's Green Bond Framework and confirm plans to make the document publicly available and provide it to the Climate Bonds Standard Secretariat. Confirm inclusion of necessary information within the Green Bond Framework.
2.4.2. Confirmation of Alignment	
i.	In the Green Bond Framework, confirm documentation and review areas of investment align with the Climate Bonds Standard and review statements of alignment with other relevant standards.
ii. Uses of Proceeds	In the Green Bond Framework, confirm documentation and review expected uses of proceeds and amounts allocated to activities in relevant sectors and subsectors.

REQUIREMENT	ASSURANCE PROCEDURES
2.4. Pre-Issuance Reporting: Green Finance Framework and Disclosure Documentation <i>(continued)</i>	
iii. Decision-making Process	In the Green Bond Framework, confirm documentation of decision-making processes and positioning in the context of the Issuer’s overarching objectives.
iv. Management of Proceeds	In the Green Bond Framework, confirm documentation and review processes for managing proceeds.
v. Reporting and External Review	In the Green Bond Framework, confirm documentation and review processes for reporting and engagement of an Approved Verifier.
2.4.3. Sector Criteria	In the Green Bond Framework, confirm documentation of assumptions and methodologies to evaluate conformance with Sector Criteria.
i. Assumptions and Methodologies	
ii. Temporary Investment Instruments	In the Green Bond Framework, confirm documentation of allowable temporary investment instruments.
iii. Reporting Approach	In the Green Bond Framework, confirm disclosure of intended approach to providing Update Reports and/or undertaking periodic Assurance Engagements during term of bond to reaffirm conformance with the Climate Bonds Standard.
iv. List of Nominated Projects	In the Green Bond Framework, confirm disclosure of list of Nominated Projects likely to be eligible.
v. Refinancing	In the Green Bond Framework, confirm disclosure of proportion of proceeds for refinancing, if applicable.
2.4.4. Transparency	Confirm disclosure is comprehensive and as detailed as possible, given any Issuer or project-specific limitations such as confidentiality.
2.4.5. Disclosure Documentation	Confirm incorporation of key information in Disclosure Documentation.
i. Sector Criteria Disclosure	Confirm “investment areas,” or alignment with the Climate Bonds Taxonomy and relevant Sector Criteria for Nominated Projects.
ii. Temporary Investments	Confirm disclosure of eligible temporary investments for unallocated proceeds.
iii. Verifier	Confirm disclosure of Verifier selected for Pre-Issuance and Post-Issuance Engagements.
iv. Ongoing Reporting	Confirm disclosure of intended ongoing reporting on the Nominated Projects and allocation of proceeds.
v. CBI Disclaimer	Confirm incorporation of the CBI Disclaimer as provided in the Certification Agreement.

Appendix E.

RESPONSIBILITIES AND QUALITY CONTROL

Verifier's Responsibilities

Kestrel's responsibilities for confirming alignment of the 2023 Series K Bonds with the Climate Bonds Standard and *Electrical Grids and Storage* Criteria include:

- Assess the uses of proceeds for conformance with relevant Standard and Criteria;
- Assess and certify SMUD's internal processes and controls, including selection process for projects and assets, internal tracking of proceeds, and the allocation system for funds;
- Assess policies and procedures established by SMUD for reporting;
- Assess the readiness of SMUD to meet the Climate Bonds Standard (Version 4.0) and *Electrical Grids and Storage* Sector Criteria; and
- Express a Reasonable Assurance conclusion.

Issuer's Responsibilities

Issuer was responsible for providing detailed information and documents relating to:

- The details of the Nominated Projects and Assets and the project selection process;
- Maintaining adequate records and internal controls designed to support the Climate Bond Pre-Issuance Certification process; and
- The collection, preparation, and presentation of the subject matter in accordance with the Climate Bonds Standard and Criteria.

Independence and Quality Control

Kestrel provides green, social and sustainability bonds services for corporate and municipal issuers. The Kestrel Verification Team is committed to providing robust, transparent, and accurate verifications. For over 20 years Kestrel has been a trusted advisor to state and local governments, nonprofits, and corporations. Kestrel certifies that there is no affiliation, involvement, financial or non-financial interest in the Issuer or the projects discussed. We have no affiliation with any bond counsel, bond insurer, credit rating agency, financial advisor firm, municipal advisory firm, or other intermediary. Accredited as an Approved Verifier by the Climate Bonds Initiative, Kestrel is qualified to evaluate bonds against the Climate Bonds Initiative Standards and Criteria.