DRAFT - Cryptocurrency Staff Report

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Contents

Executive Summary

District staff proposes a cryptocurrency customer rate classification and associated rate as a means to mitigate the identified operational and financial costs and risks associated with serving these loads. Staff's recommendation is the product of lengthy fact finding by staff, several public presentations by staff to the Board, and public input including input from cryptocurrency customers.

Consistent with that guidance, staff has designed its recommended cryptocurrency rate to recover the total costs that are expected to be incurred by the District from serving cryptocurrency customers. The rate includes monthly customer, delivery and supply charges, which is the same rate structure as is used in the District's commercial and industrial rates. Because of the cost characteristics of cryptocurrency customers, the customer and delivery charges are based on the cost to serve the District's commercial and industrial customers. The basic and demand charges are the same as the High Density Load (HDL) rate, Rate Schedule 35, except for in residential areas. In residential areas, the demand charge is updated to reflect the increased costs of the demands imposed on the electric system by cryptocurrency customers in parts of the District's distribution system that were designed and built for the load characteristics of residential customers. The energy charge is based on the cost of purchasing energy from the wholesale market due to the aggregate size of the class and the highly variable load growth and load volatility of the class. The volatility creates uncertainty in cryptocurrency load forecasting, which prevents the District from managing its resource portfolio in the typical manner with respect to these customers. Serving cryptocurrency with the production cost based rate in the HDL rate would jeopardize the District's ability to manage the resource portfolio in a manner that returns substantial value to the rest of the District's customer classes and stabilizes the District's finances. This would shift costs and financial risk to the other District customer classes. Serving cryptocurrency load with market power, rather than District-generated power, creates the flexibility needed to meet load and protects the District against the volatility of the class. Like the HDL rate, the cryptocurrency rate includes an upfront charge to address the District's increased capital expense for electrical system assets and increased risk of stranded assets associated with cryptocurrency customers. The upfront capital charge would be due prior to connection of service.

Staff's rate recommendation has its genesis in March 2018 when, in response to a dramatic increase in inquiries for new service for loads for cryptocurrency operations, the Board imposed a moratorium on accepting or processing applications for new or increased cryptocurrency loads. In September 2018, the Board directed staff to prepare a rate proposal. This report provides staff's recommendation. Section 1 of this report describes the cost characteristics of cryptocurrency loads as customers of the District and the need for rate action. Section 2 summarizes the criteria applicable to this classification and rate setting action. Section 3 describes the procedural history related to the rate recommendation. Section 4 explains staff's recommended definition of the cryptocurrency class. Section 5 provides the cost analysis and rate design in support of staff's rate recommendation.

Summary of Staff's Recommendation

Staff's Recommended Rate Class Definition:

Cryptocurrency Processing; Blockchain Processing; and Similar Loads - This Schedule applies to any customer involved in computing or data processing load related to cryptocurrency mining, Bitcoin, blockchain, proof-of-work or other loads having, in the District's determination, similar characteristics

including any of the following: high energy use density, high load factor, need for more than routine alterations to the District's Electric Service Facilities in order to maintain safety, load that is portable and distributable, highly variable load growth or load reduction as an individual customer and/or in aggregate with similar customers in the District's service area, able to relocate quickly in response to short-term economic signals, high sensitivity to volatile commodity or asset prices, or part of an industry with potential to quickly become a large concentration of power demand in the District's service area.

Summary of Staff's Recommended Cryptocurrency and Blockchain Processing Rate:

3 MW and less	
Basic Charge:	**Per month per meter**
Up to 300 kW	$130
300 kW to < 1 MW	$560
1 MW to ≤ 3 MW	$860
Monthly Demand Charge, Residential:	$5.50 per kW of Demand (effective prior to 4/1/2020) $15 per kW of Demand (effective 4/1/2020)
Monthly Demand Charge, Non-Residential:	$5.50 per kW of Demand
Energy Charge:	2.31¢ per kWh + market energy charge*
Upfront Capital Charge:	**Per kW of new or expanded Electric Service under this schedule**
	Amount of upfront capital charge is set forth in the District's Fees and Charges Schedule
Over 3 MW	
Service will require a Contract between the Customer and the District prior to connection of Service that will address any special circumstances and conditions applicable to the Customer's needs. Contracts will address any terms and conditions considered appropriate by the District, which may include but are not limited to scheduling, maintenance and decommissioning of infrastructure, load balancing, ancillary services, transactional costs, security, and financial risk.	

*Estimated market energy charge for the period 4/1/2019-3/31/2020: 2.847¢/kWh + 6% admin fee = 3.02¢/kWh (estimate as of 11/15/18).

A draft rate schedule containing staff's recommendations is attached as Appendix A. Upfront charges will be set by staff in accordance with District policies.

Section 1 – Cryptocurrency Customers

Overview

In 2015-2016, the District undertook an effort to identify and classify a group of customers interested in service that was of a very different profile than any existing customer class. From this effort, the High Density Load (HDL) class was established and a new rate (HDL rate or Schedule 35) went into effect January 1, 2017. As the HDL customer class has grown, the District has gained a better understanding of their energy needs as well as a better understanding of the subsequent impact to the District's delivery and energy systems. The experience has validated prior assumptions (profiles, mobility, energy use intensity) and identified areas needing additional measures (relation between cryptocurrency value and its electricity demand, equipment sizing and capacity needs for safe, reliable operation.)

In late 2017, a rapid increase in the value of the cryptocurrency bitcoin led to an equally rapid influx of inquiries and electric service requests ranging from a few kilowatts to a gigawatt. Most service requests come with expectations to be up and running in just a few months. By early 2018, the District had received formal applications for over 200 MW of service and inquiries for much more. As a public utility with about 50,000 electric customers and an average load just reaching 200 aMW, this increase effected the regular course of business and threatened the District's historic cost and financial models.

Due to the high reliance on the price of the cryptocurrency mined, the cryptocurrency operations also can have unpredictable electrical use fluctuations in the affected areas of the electrical system, which can cause considerable stress to the transmission and distribution system that was designed to handle traditional, predictable residential and commercial loads. The same unpredictability makes it difficult if not impossible to manage the District's resource portfolio in a predictable way and also serve cryptocurrency customers from the District's hydroelectric resources in the same manner as other customers. Unlike cryptocurrency customers, traditional retail customers of the District, in the aggregate, have fairly predictable loads on the District's planning horizons. In sum, cryptocurrency loads have the potential to drastically change the configuration of the District's transmission and distribution infrastructure and the way the District manages its power resource portfolio.

As mentioned, the District received applications for service from cryptocurrency miners at such a high rate that, by early 2018, if all such requests were served, the added load would have doubled the District's current total retail load. If all of the additional inquiries, above the actual applications, were served, the added load could increase the District's retail load by several multiples. The District recognized that serving this rapidly growing type of customer load under existing rate schedules, which assume the use and cost of District generated energy, was unreasonable and unsustainable from an operational and financial perspective. The District is currently well positioned to serve the forecasted needs of its historical customers and new customers with similar characteristics. However, despite the currently good finances and substantial generating portfolio of the District, it cannot reasonably ignore the potential magnitude of cryptocurrency loads and the cost of serving such loads. The reasonable long-term solution for serving these customers is to develop a new rate designed to recover the costs and address the risks of serving such loads with an energy rate based on the cost of purchasing market power in order to protect the stability of the District finances and generation portfolio management and keep the District's other customers financially neutral to cryptocurrency customers, including their risks and uncertainties.

Over the course of a lengthy fact finding by staff, numerous presentations to the Board, and discussion with the public, including cryptocurrency customers, the Board directed staff to recommend a new rate class and rate for all sizes of cryptocurrency mining operations. This section summarizes the reasons underlying staff's recommendations in this report.

Key Characteristics of Cryptocurrency Load

The cryptocurrency loads share many characteristics with high density loads (HDL) discussed in Section 1 of the District's *Final High Density Load Staff Report* (2016) ("HDL Staff Report").[1] The shared characteristics include high energy use intensity, high load factor and low diversity factor, and magnitude of load plus the additional class characteristics of unprecedented mobility and the unpredictability of forecasting the load. Cryptocurrency loads are similar to the loads described in the HDL staff report but exhibit extreme versions of certain characteristics. Indeed, cryptocurrency loads have proven to be significantly more mobile and less predictable in their use and ramping than typical server farms or other high density loads. Cryptocurrency loads also have a higher potential to become a large portion of the District's load within a short period of time. Because of these outlier characteristics, described in more detail below, the HDL rate schedule would not adequately recover the costs incurred by the District to serve cryptocurrency loads.

Extra Alterations to District Service Facilities Required

Due in part to their high load factor, cryptocurrency loads often require extraordinary alterations and upgrades to the District's transmission and distribution facilities in order to maintain safety. High load factor loads require a significant de-rating of infrastructure in order to avoid overheating, which shortens the lifespan of equipment, leads to service interruptions for other customers, and, in the worse cases, creates fire hazards.[2] Much of the District's system is designed and engineered for residential and commercial loads which have low load factors. Cryptocurrency loads often site in these places because they are more accessible, particularly for smaller operations. Adding a cryptocurrency load to a residential distribution feeder may require alterations to expand and reinforce the District's facilities in order to prevent overheating and to maintain safety and reliability.

Portable and Distributable

Cryptocurrency mining operation systems are portable and distributable to a much greater degree than traditional server farms. Each specialized mining computer is physically self-contained in about the size of a shoe box.[3] Within the global cryptocurrency networks in which they participate, their function is distributable across the participating computers without regard to location. This means that they perform their tasks with equal effect whether there are 1000 computers in a single warehouse or the same number spread across 100 residences.

High Sensitivity to Volatile Commodity or Asset Prices

Spikes up or down in cryptocurrency prices directly result in a dramatic upswing or drop-off in demand for power from cryptocurrency miners. Preceding the moratoriums established by the Board in December 2014 and in March 2018, a spike in the price of bitcoin led to a spike in requests to the District for new electricity service. The pattern is clear: higher cryptocurrency values lead to higher volumes of mining.[4]

[1] In Resolution No. 16-14059, the Board adopted the HDL Staff Report as a basis for the HDL rate.

[2] In early 2018, the District strengthened enforcement rules related to unauthorized cryptocurrency mining because of chronic unauthorized mining activity, often discovered in residential areas such as apartments, which endangered neighbors by creating fire hazards.

[3] The Antminer S9j ASIC Bitcoin Miner consumes 1.35 kW and has the dimensions 13.8 x 5.3 x 6.2 inches.

[4] The cost of mining a cryptocurrency is the cost of computer hardware, power, and overhead. The earning of mining is the cryptocurrency. Increases in the price of bitcoin are supportive of increased mining and can also support increased power consumption to run the mining operations worldwide.

Figure 1: Bitcoin prices over a two-year period, including the price spike in late 2017.

Specialized mining machines and concentrated mining existed in 2014, which in part drove the search for cheaper power by the mining industry. By the next major bitcoin price spike, in late 2017, the mining industry had further matured with significantly more specialized mining computers, larger operations, and more available capital. This meant that the District saw a near immediate jump in service requests following the bitcoin price rise.

Highly Variable Load Growth and Load Reduction

Many factors affect the growth and reduction of cryptocurrency within the District's service area. In brief, the portable and distributable nature of cryptocurrency computing combined with high sensitivity to the prices of cryptocurrencies, which are themselves volatile, create the potential for massive load swings over the course of days, months, or a few years. Limited governmental regulation of the industry,[5] competition amongst miners, comparative electricity prices elsewhere, global scale of exposure,[6] and changes in cryptocurrency technologies also contribute to the potential for high variability in cryptocurrency load.[7]

Potential to be Large Concentration of Power Demand

In the few months preceding the March 2018 moratorium, the District received over 200 MW of applications for cryptocurrency mining load. That amount of load, if added to the system, would double the District's average annual load. Had the District not instituted a moratorium and prepared responsive policies, the volume of applications in 2018 likely would have been much larger. The potential for a large concentration of retail load in a single industry compounds the other characteristics. The District's current load is diverse, and no single foreseeable economic event would lead to a 50% load reduction in a year. In contrast, it is foreseeable that 200 MW of cryptocurrency load (if added to the system) could

[5] Governmental regulators for the most part have not settled on regulatory regimes for bitcoin and other cryptocurrencies, which is a source of considerable uncertainty. Where they have developed regulations, different jurisdictions go in different directions, which creates a patchwork of regulation around the world.

[6] Larger cryptocurrency loads choose from locations all around the world with relative ease.

[7] In addition to changes to the hardware used for mining, the energy intensive nature of mining can change with a revision to a cryptocurrency's protocol. Indeed, many cryptocurrencies already operate without the energy intensive mining protocol relied upon by bitcoin.

leave or shut down in less than a year in response to cryptocurrency prices or for a number of other reasons discussed in this report. In short, a large concentration coupled with exposure to volatile commodity prices creates substantial risk.

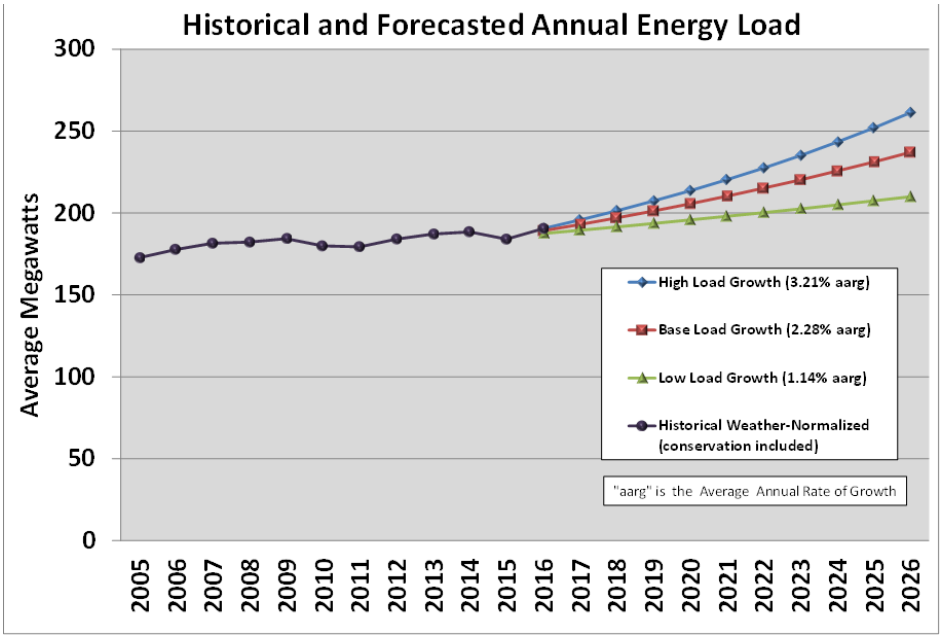
Cost and Risk Characteristics

The District incurs operational, financial, safety, and reliability, risks and costs because of the above described characteristics of cryptocurrency loads. Cryptocurrency shares many of the same cost and risk characteristics as HDL loads described in HDL Staff Report, including safety and reliability risks, accelerated capital investment, risks of cost recovery over time and stranded assets, increased demands on customer service, and cost of uncertainty in energy planning. This section describes additional risks and costs of service to cryptocurrency customers that differ from typical HDL loads like server farms, largely relating to the potential for massive swings in load and requests for load. In short, serving cryptocurrency customers imposes unique costs on the District's electric system and financial models and affects the District's ability to efficiently and economically serve current loads. Such costs are not reflected in the District's existing rates.

Uncertainty in Capital Investment and Resource Portfolio Management

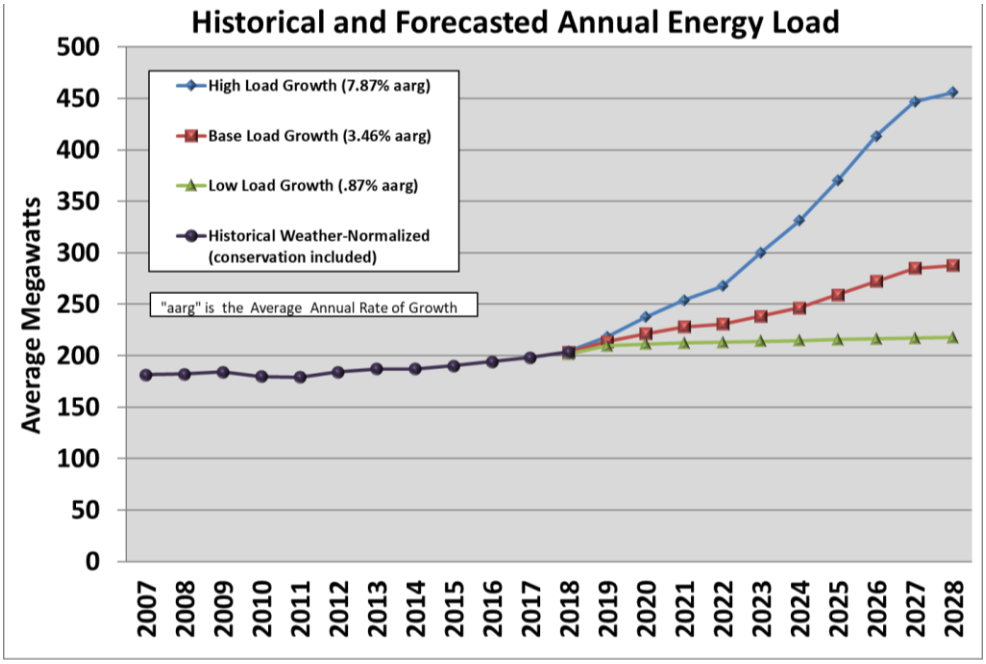
The 2016 IRP was the first District Integrated Resource Plan (IRP) to forecast HDL load growth.

2016 IRP Load Forecast:



Two years later, the District's 2018 IRP Progress Update showed not only a dramatic increase in the "High Load Growth" forecast, but wide ranges between the "High", "Base", and "Low" forecasts.

2018 IRP Load Forecast:



The forecast represents current policy and known service inquiries and applications and an estimate of potential effects of changes to rates and policies. Forecasting cryptocurrency load is challenging due to the mobility of cryptocurrency loads, and the overall size and inherent volatility of the cryptocurrency industry, discussed above. The flexibility of cryptocurrency operations allows them to install large amounts of load wherever they can connect to the system. They appear to have little infrastructure requirements other than electricity, protection from the elements, and high-speed internet. In contrast, other energy intensive customers typically make substantial investments in infrastructure, equipment, and workforce with long-term plans. When making inquiries to the District, prospective cryptocurrency customers often ask where there is available capacity on the system. The cryptocurrency customers often seek to use all available capacity all the time even though the District may have intended that capacity for multiple years of historical growth. This leaves the District at risk of being unable to serve other future customers and requires accelerated investment in system upgrades. In addition, the expansion of the District's transmission and distribution system that would be necessary to serve 200 MW of cryptocurrency exposes the District to stranded asset risks. If cryptocurrency loads were to shut down or relocate after substantial expansion of the District's system, the system would be substantially overbuilt for the remaining customers.

The increased uncertainty also has implications for the District's resource planning. To meet compliance requirements and prudent utility practices, the District must closely balance the power needs of its customers – based on forecasted load – with the output of its hydroelectric projects both in the short and long term. Excess generation is committed for terms of years through long-term contracts in a manner designed to protect the District from streamflow and operational risks and to reduce the District's exposure to fluctuations in the market prices of power. In accordance with current hedging policies, the District has hedged an amount of energy in 2019 through 2021 equal to the District's maximum hedge target. After serving forecasted load, this leaves approximately 24 aMW of surplus energy in an average water year. In a low water year, the District would likely need to purchase additional energy to serve its forecasted load. Similarly, the District may have to purchase energy if

unplanned loads exceed the load forecast under normal operating conditions. Rapid and volatile changes in cryptocurrency load disrupt the hedging program, forcing the District to buy or sell additional energy unexpectedly.[8] Unexpected power transactions, and the consequent inability to balance closely the power needs of customers over time, increases the District's financial exposure to market volatility.

Cost Recovery through Rates

Schedules 35 was adopted in 2016 and designed for HDL loads. Unless the District creates a new rate class, cryptocurrency loads would fall under Schedule 35. Schedules 35 was not designed to and does not cover the cost or risk of serving cryptocurrency customers, and therefore, the District cannot serve cryptocurrency customers under this rate schedule without incurring the additional costs and risks described in this report. As staff evaluated the cryptocurrency industry, the approach to mitigating the impacts of this particular class of customers with unique characteristics has evolved. After considering public input from cryptocurrency customers and others, staff proposes a rate structure for cryptocurrency service that includes an upfront capital charge to recover the incremental cost of system capacity required to serve the cryptocurrency customer, coupled with monthly charges to recover the expected ongoing cost of serving the customer.

Ongoing Monthly Rates

Staff recommends that the Board establish a rate schedule for cryptocurrency customers based on the District's current cost of service analysis and, for the energy supply component, expected costs, financial impacts, and increased risks to serve them. A cost of service analysis is a tool for tracking revenue requirements and attributing them to customers.[9]

Defining what is to be included in the costs for a customer class includes many decisions based on the business judgment of the District. The Board, staff, and the public had significant discussions regarding the rate design during staff presentations, informational meetings, and the rate hearing process.

The District typically analyzes the cost of serving load in three components, customer, delivery, and energy. Energy can be priced at the cost of producing or purchasing the energy, or it can be priced at the market prices to reflect the value or "opportunity cost" of the energy. Depending on how often the rate is updated to market prices, market pricing leads to less stable customer rates compared with cost of production pricing. Staff recommends basing the energy charge in the cryptocurrency rate on the cost of purchasing the energy in order to protect the District from the risks and uncertainties of cryptocurrency loads and to keep the District's other customers financially neutral. This is similar to the approach proposed by the New York Municipal Power Agency (NYMPA) and approved by the New York Public Service Commission earlier this year in which NYMPA created a special rate largely for cryptocurrency operations that assigned the cost of purchasing incremental power for the class directly to the class, in part because doing otherwise would have significantly increased rates for other customers of NYMPA.[10]

For the customer and delivery costs, the District's existing cost of service model categorizes the cost of existing customer classes but not the cryptocurrency class. The District lacks sufficient historical information for the new cryptocurrency class to be added into the cost of service model. Until the rate is

[8] An example of an unexpected purchase occurred in early 2018, when, due to an unexpected increase in the load forecast, the District purchased 16 aMW, 5 aMW, and 8 aMW for 2019, 2020, and 2021, respectively, in order to comply with current hedging policy.

[9] Cost of service is discussed at length in Section 5.

[10] *Tariff Filing by the New York Municipal Power Agency to Implement a New Rider A - Rates and Charges for High Density Load Service*, New York Public Service Commission, Case 18-E-0126, "Order Approving Tariff Amendments with Modifications", 3 (March 19, 2018).

revisited after additional information is gathered, staff recommends following the method in Schedule 35 and using a cryptocurrency rate based on the cost to serve commercial and industrial customers. Staff recommends that the heightened costs of delivery to cryptocurrency loads in residential areas be addressed through a demand charge designed specifically for residential cryptocurrency.

Upfront Capital Charge
As with Schedule 35, staff recommends applying upfront capital charges to cryptocurrency customers in order to address incremental infrastructure costs and the risk of not recovering these costs over time through rates.

Demand Exceedance Charge
As described in this section, cryptocurrency customers often seek to use all the capacity available at a location. Thus the maximum usage allowance for a cryptocurrency customer is often the upper edge of what the engineer determines to be acceptable in terms of public safety and equipment degradation. Usage levels in excess of the safe limits reduce safety and reliability and shorten the lifespan of equipment.

The District monitors peak usage for all cryptocurrency customers at least monthly and in some cases more often. When exceedances are identified the engineers must be consulted to determine whether the exceedance creates a public safety hazard requiring immediate disconnection or whether the customer should be notified and monitored. Typically in cases where exceedances are small or are non-recurring, the customer is notified of the exceedance and given the opportunity to decrease and monitor load. There are many off the shelf products available to monitor personal electric usage. Staff recommends a demand exceedance charge to recover estimated costs of customer service, systems and engineering review, and equipment degradation.

Uncertainty in Rate Development
Staff's recommendations in this report attempt to balance the need to take rate action now to allow the District to serve cryptocurrency customers in a reasonable manner over the long-term with the desire to gather more data to gain a more complete picture of the cost characteristics of cryptocurrency load before taking action. Due to the rapid influx of cryptocurrency load and the other costs identified in this report, staff recommends acting now.

Certain additional data, if it had been available to staff, would have informed staff's recommendation. For example, staff has no way to accurately forecast the actual number and size of cryptocurrency load that will be added to the District's system. Staff's recommended cryptocurrency rate, if adopted, will likely affect the growth rate of cryptocurrency load, but again there is no way to meaningfully forecast or test the effect without adopting the rate. Because the rate is higher than what would be paid under Schedule 35, some argue cryptocurrency load will be less than it otherwise would have. Staff does expect the upfront capital charge to decrease the frequency with which smaller cryptocurrency customers relocate within or out of the District's system, thereby reducing the District's exposure to the risk of stranded transmission and distribution assets. However, because the proposed cryptocurrency rate is low compared with the rates generally available on a national level, such rate may have little impact on cryptocurrency load growth, and may even attract cryptocurrency customers that perceive improved rate certainty in a rate based on their load characteristics.

Another example of uncertainty is the actual cost of building and maintaining the District's transmission and distribution system to serve more high density, high load factor loads. Staff has made its best estimate based on the available information. But as described in this section and in Section 5, staff lacks adequate data to quantify precisely the cost to the system from the stresses of serving cryptocurrency

loads. If the Board creates a new cryptocurrency rate class, it will facilitate staff's accumulation of data on cryptocurrency loads, which can be used at such time as the Board revisits the cryptocurrency rate. The District retains the ability to modify any of the rate components as deemed appropriate by the Board.

Section 2 - Criteria for Classification and Rate Setting

The Board has the authority to create rate classes and to establish and modify rates. Classifications are made based on reasonable distinctions between customers and they may rest on narrow distinctions. Classification criteria typically relate directly to the cost of serving the load. For example, the quantity of power used, the seasonality of use, or the maximum demand at any given moment are directly related to the cost of serving the load. However, other reasonable factors may be used. For example, a type of business or power use with distinct load characteristics may have its own classification. This practice is common in the utility industry, and the District currently has such classifications (e.g., frost protection, street lights, high-density load).

When setting a rate for a rate class, utilities consider, amongst other things, the impact to the utility and all its customers, the value of the service rendered, fair compensation and return on investment to the utility, and the long-term financial stability of the utility. The manner in which rates are fixed must not be arbitrary. Rates need not, and in fact cannot, be set to a mathematical certainty. Rather, rate setting is a legislative function in which reasonable considerations and philosophies are applied to generally accepted accounting principles. The District, in compliance with RCW 54.24.080 and if it has revenue obligations outstanding, is required to establish, maintain, and collect rates or charges for electric energy and water and other services, facilities, and commodities sold, furnished, or supplied by the District. The rates and charges must be fair, nondiscriminatory and adequate to provide revenues sufficient for the payment of the principal of and interest on such revenue obligations for which the payment has not otherwise been provided and all payments which the District is obligated to set aside in any special fund or funds created for such purpose, and for the proper operation and maintenance of the public utility and all necessary repairs, replacements, and renewals thereof.

By Resolution No. 80-6286 (April 28, 1980), the District adopted certain standards related to ratemaking under Section 111(d) of the Public Utility Regulatory Policies Act ("PURPA"), 16 U.S.C. § 2621(d). By Resolution No. 18-14256 (August 6, 2018), the District adopted procedures related to ratemaking. These resolutions include procedures and ratemaking considerations associated with the process of ratemaking, including use of a cost of service analysis. Section 3, *infra*, contains the procedural history of the ratemaking process to date. The cost of service is addressed in Section 5, *infra*. The Board may waive the standards and procedures in the resolutions when appropriate.

Staff's proposed tariff for the cryptocurrency mining class meets the District's criteria for classification and rate setting. Serving the proposed cryptocurrency customer class under existing rate schedules was not prudent or fair to other rate classifications. The growth of cryptocurrency customers in the District's service territory presents a type of load that is a significant departure from current and past customers and from load forecasts prior to the recent spike in applications from cryptocurrency loads. Given the stark differences between cryptocurrency customers and non-cryptocurrency customers, setting rates under currently used principles would not make good economic sense. In contradistinction, setting rates that reflect these characteristics furthers the District's ability to ensure it can serve this new type of load in a just and reasonable manner and consistently with prudent long-term planning, including protection for all non-cryptocurrency mining customers.

Section 3 - Notice and Procedural History

On March 19, 2018 the Board adopted a moratorium that halted the acceptance and processing of applications related to electric services for cryptocurrency services. The Board confirmed the moratorium with Resolution No. 18-14234 on April 2, 2018. The moratorium included all new and pending applications that had not paid in full all line extension and applicable connection charges.

Written notice of the moratorium was provided to affected applicants informing them of the status of their application. The District has maintained a summary of information on cryptocurrency policy development on its website, where members of the public can view presentations, submit comments, and find media coverage.

Moratorium Hearings Notices

During the moratorium, the Board held periodic public hearings to review progress towards addressing cryptocurrency services. Notice of the May 14 moratorium hearing began with display ads being placed in the Wenatchee World (April 8) and Leavenworth Echo, Lake Chelan Mirror, and Cashmere Record (April 11). Additional notices included: customer bill messages and direct mail postcards that cautioned of newly adopted fees related to unapproved mining operations. The postcard also provided customers an opportunity to self-report their unapproved mining operation in exchange for amnesty of the newly adopted fees.

Notice for the August 6 moratorium hearing included print ads in Wenatchee World (July 27) and Leavenworth Echo, Lake Chelan Mirror, and Cashmere Record (July 27). Social media and website updates informing customers of the upcoming meeting were launched August 2.

Rate Hearing Notices

The Board established a public outreach plan by motion on September 17, 2018. The District mailed postcards to existing HDL and cryptocurrency customers on Monday, October 22 which included notice of the November 7 Public Information Meeting and November 19 Rate Hearing. An electronic version of the postcard was emailed to those who elected to receive news of rate related activity. Print ads were published in the Wenatchee World (Oct. 28, Nov. 2, and Nov. 4), in the weekly publications included Leavenworth Echo, Lake Chelan Mirror, and Cashmere Record (Oct. 24, Oct. 31 and Nov. 7). Legal notice, which included notice of the November 7 Information Meeting, was published in the Wenatchee World on November 2.

Policy Changes

The District has changed fees and procedures throughout 2018 to address cryptocurrency mining, including new fees for unauthorized cryptocurrency mining. Additional changes are being developed in conjunction with this rate proposal.

Local Government and Community Outreach

Since the adoption of the moratorium, staff met with several local groups, planning commissions, city and county officials to discuss the impacts of cryptocurrency operations and how these loads affect growth and development plans.

- March 19, 2018 - North Central Washington Association of Realtors (NCWAR) and Building North Central Washington. Approximately 125 people were in attendance.

- April 17, 2018 - Building NCW attendance included builders, developers, contractors, and suppliers. Building NCW is a trade association aimed to promote and protect the building industry in the region.

  Common questions included:

- Is the District required to allow cryptocurrency mining loads?
- What will happen to the community and rates if the District allows all of these cryptocurrency customers to connect?
- Is there any benefit to the community from having more cryptocurrency mining loads?
- Even if cryptocurrency mining goes away, how is the District planning to handle the anticipated block-chain technology growth?
- What's happening with Alcoa? Could that area and/or load be used for cryptocurrency?
- Does the District collaborate with neighboring PUDs on how to handle cryptocurrency mining?
- How long will the moratorium last?

Staff was tasked with engaging the County and municipal stakeholders to encourage their development of recommendations around planning and zoning for cryptocurrency. Among the attendees, there was an understanding that electrical capacity was quickly being consumed by cryptocurrency applicants, thus, potentially obstructing new economic development. To incorporate cryptocurrency into the municipal growth planning models and comprehensive plans, proper zoning needed to be addressed. In June, staff facilitated an education seminar on cryptocurrency and the impact to the electrical system. Attending this meeting were municipal planners and utility engineers from the County and cities. At this meeting, discussion included a wide range of issues and challenges that culminated into a list of action items. The District was asked to bring information to each municipal planning commission to help inform potential change in zoning with a focus on addressing the impacts with cryptocurrency operations in traditional residential space.

On August 15, 2018, District staff continued meeting with local cities, county and municipal planning commissions. The discussions focused on the potential impacts of what widely distributed cryptocurrency residential load on the electrical distribution system. District staff also shared this with the City of Entiat, the City of Cashmere and the Chelan County Port District. Staff met with Chelan County Commissioners (September 25), and Chelan County Planning Commission (September 26).

Staff's Presentations to the Board in 2018

Throughout 2018, staff has provided numerous presentations. A majority of these presentations were held during regularly scheduled Board meetings, and no action was being sought by the Board. A summary of the Board presentation dates and content presented is provided in Appendix B.

Public Comments

Information meetings and rate hearings provide opportunities for the members of the public to voice their opinions, ask questions, and express support for or opposition to proposed action. The District received written and verbal comments from members of the public during public meetings and outside public meetings. Customer comments are available on the chelanpud.org website for review.

Section 4 – Classifying Cryptocurrency and Blockchain Processing and Similar Loads

Defining a rate class is the first step in designing a new rate. In developing the rate class definition, staff recognized that the customers having the impacts of greatest concern on the District tended to be cryptocurrency miners, as discussed in Section 1. The Board recognized this when it adopted a moratorium on accepting or processing applications for cryptocurrency load on March 19, 2018. The classification recommended by staff in this report is substantially the same as the draft classification presented by staff to the Board on August 6, 2018. It represents a refinement of the scope of the moratorium. Staff crafted the classification based on its investigation and the knowledge gained over months of experience with inquiries from and service to cryptocurrency customers. The following considerations and findings are fundamental to staff's recommended classification.

Key Considerations and Findings Regarding the Classification

Identified Characteristics and Costs; Cryptocurrency

The District's costs are not associated with serving cryptocurrency and blockchain processers per se. Rather they are associated with serving energy intensive loads that share the other load characteristics of cryptocurrency and blockchain processing loads described in Section 1. Currently, bitcoin mining and mining of similar blockchain-based cryptocurrencies are the most common types of digital processing associated with the identified characteristics. However, a rate classification limited only to bitcoin and blockchain would exclude customers with similar cost characteristics for two reasons.

First, technologies associated with cryptocurrency and blockchain processing are rapidly evolving. A classification limited to specific technologies would quickly become outdated as new technologies arose. The software for the first decentralized blockchain cryptocurrency, bitcoin, was released in 2009. The proof-of-work feature of bitcoin resulted in energy intensive computing; the energy consumption of bitcoin processors grew with the value of bitcoin. As of 2018, there are thousands of similar cryptocurrencies and similar applications with variations on the bitcoin protocol. It is conceivable that future variations that cannot reasonably be described as cryptocurrency or blockchain will exhibit similar load characteristics. Flexibility in the rate classification should allow it to be adaptive to changes in technology.

Second, the District cannot directly confirm the type of computations performed on a given computer. Staff cannot monitor whether a machine is mining bitcoin or training artificial intelligence or performing some other processing. It is important to note that the District has experienced several attempts by cryptocurrency customers to evade being classified as such during the moratorium by not informing the District of their presence or otherwise arguing the class definition does not apply to them. The flexibility in the rate classification allows staff to identify customers with the indicative characteristics of a cryptocurrency processor without needing to examine the individual computers.

Staff recommends including operations with similar characteristics in the class to build the needed flexibility into the rate. Including in the class definition the phrase "similar characteristics" allows the District to apply the rate to new computational technologies that have similar load characteristics as the existing HDL loads. Given the uncertainties, staff exercised some judgment – informed by its experience with these customers – to generate the indicative "similar characteristics" in the proposed classification. Because of the rapidly developing nature of the technology, the difficulty in describing and validating

the types of computer processing conducted by a particular customer, and some customers' propensity to evade classification, staff recommends a more inclusive classification with flexibility to prevent "gaming" of the District's policies.

Similar Classifications in the Utility Industry

In recent years, utilities have taken a variety of approaches to address the rise of cryptocurrency mining loads in their service territories. The District adopted a "High Density Load" rate class in 2016 due in part to growth in bitcoin mining in Chelan County. The New York Municipal Power Authority created a new tariff in 2018 for customers "generally involved in high-volume data processing for cryptocurrencies."[11] In August 2018, the Public Utility District of Grant County, Washington adopted a rate class for cryptocurrency miners based on similar characteristics.[12] In March 2018, the Public Utility District of Benton County, Washington adopted a policy for cryptocurrency customers in response to concerns about the distribution system safety and reliability.[13] Hydro-Québec is in an administrative proceeding on rates and policies specifically for the blockchain industry. These are just a few examples of recent responses to the rapid influx of cryptocurrency mining loads from utilities with similarly low-cost power.

Contract Threshold

The District has long required all customers larger than 5 aMW to enter into an individualized service contract with the District under Schedule 4 in order to address the customer's specific requirements and characteristics of the proposed service, including addressing any infrastructure upgrades needed. Due to the heightened risk associated with the unique characteristics of cryptocurrency mining, both for individual customers and in the aggregate, a lower limit is appropriate. Therefore, staff recommends a contract limit of 3 MW.

Geographic Availability

Staff recommends that service for cryptocurrency not be available in the Stehekin area and new or expanded service in the areas north and west of Leavenworth served by the Anderson Canyon-Summit transmission line. Stehekin is an isolated electrical system not connected to the electrical grid and with very limited capacity. Providing service to cryptocurrency in Stehekin would be imprudent given the state of the electric system serving the area. The Anderson Canyon-Summit line is 35 miles long and runs through mountainous terrain in a national forest. It was constructed in the early 1930s and still contains many of the original components; notably the line uses a very small conductor by modern standards. The current transmission planning assessments, conducted annually in accordance with North American Electric Reliability Company (NERC) requirements, indicate the current loading of the line is approaching the performance limitations that will require improvements to accommodate the small amount of native load growth that is anticipated along the line. The addition of load beyond typical native load growth will use up the small amount of remaining capacity. Load growth from cryptocurrency would accelerate the need for extensive improvements to provide reliable service that comports with the NERC requirements. Serving a large cryptocurrency customer or a number of smaller ones would likely necessitate or accelerate the need for a complete rebuild of the entire line, which would require time consuming and costly permitting and construction not contemplated by the rate or upfront capital charges.

[11] *Tariff Filing by the New York Municipal Power Agency to Implement a New Rider A - Rates and Charges for High Density Load Service*, New York Public Service Commission, Case 18-E-0126, "Order Approving Tariff Amendments with Modifications", 3 (March 19, 2018).

[12] Grant PUD's new Rate Schedule No. 17 covers "evolving industries" as defined in the rate schedule. The scope of the schedule is intended to be flexible in scope but initially covers only cryptocurrency mining.

[13] *See* Benton PUD's "Electricity Intensive Load Policy".

Staff's Recommended Rate Class Definition

Cryptocurrency Processing; Blockchain Processing; and Similar Loads - This Schedule applies to any customer involved in computing or data processing load related to cryptocurrency mining, Bitcoin, blockchain, proof-of-work or other loads having, in the District's determination, similar characteristics including any of the following: high energy use density, high load factor, need for more than routine alterations to the District's Electric Service Facilities in order to maintain safety, load that is portable and distributable, highly variable load growth or load reduction as an individual customer and/or in aggregate with similar customers in the District's service area, able to relocate quickly in response to short-term economic signals, high sensitivity to volatile commodity or asset prices, or part of an industry with potential to quickly become a large concentration of power demand in the District's service area.

Section 5 – Cost of Service and Design of Cryptocurrency Rate

Introduction

The Board directed staff to develop a rate for cryptocurrency customers that reflects in a fair, just, and not unreasonably discriminatory fashion the cost of serving such customers. Rate development is usually a two stage process of first attributing the cost of serving an aggregate class of customers (in this case the cryptocurrency class), then structuring individual charges for the in a rate to recover an appropriate share of the attributed class costs from individual cryptocurrency customers in approximate proportion to the costs incurred by the District to serve such individual customer. This first phase of rate development involves establishing an equitable allocation of the District's total revenue requirements, or cost of service, to the various customer classes taking electric service from the District based upon the general characteristics of each such class. In 2016, the District established a High Density Load (HDL) rate class based upon the Cost of Service Analysis (COSA) completed at that time, which was developed in 2008 and updated by the Strategic Financial Planning department. To develop the cryptocurrency rate, staff leveraged the COSA and rate design used for the HDL rate for the base (Customer) component and the demand (Delivery) component for the cryptocurrency rate because allocation methodologies and the COSA for these components have not materially changed since that effort was completed. Details and supporting calculations of the COSA performed for the HDL rate can be found in the HDL Staff Report. As recommended in the "Cost Recovery Through Rates" discussion in Section 1, the supply (Energy) component differs from the HDL rate because it is based on the cost of purchasing market energy rather than the cost of generation. Some supply costs, such as administrative and general overhead, overlap with the HDL rate, but most do not. The new supply costs are detailed in this section.

Because rate development involves a number of judgment calls, there is neither a uniquely correct way to carry out the analyses that is described in this section, nor any uniquely correct resulting rate. At each stage, numerous judgments must be made regarding the calculation and assignment of costs. Board direction and principles, internal District financial policies and accounting practices, past District practices, and generally accepted industry standards of cost accounting and rate design all influenced staff's choices in designing its rate recommendations.

This section describes the principles and methodologies used to design staff's recommended cryptocurrency rate. It includes an overview of the COSA methodologies used to functionalize, categorize and allocate the District's revenue requirements when the HDL rate was established. It also includes a description of the methodologies used to structure the rate based on the COSA and on the expected cost of market energy.

General Rate-setting Guidelines and Procedures

Developing rates that meet all the identified objectives and policies is a complex process. Recent COSA efforts have identified several general principles and objectives that rates should reflect or further:

- Fair, Equitable & Non-Discriminatory
- Revenue Stability & Sufficiency
- Cost Based
- Continuity in Philosophy
- Incorporate Strategic Objectives
- Conservation & Efficient Usage
- Simplicity in Administration & Understanding
- Major Shifts Adjusted Over Time

General rate-setting objectives often conflict with each other, so the resultant rate depends in part on how the District balances these objectives. The District's COSA and rate setting process employ industry accepted methodologies as well as specific methodologies adapted as needed for the special characteristics of the District and the costs it incurs. For example, since the state utility tax imposed on the electric system is based on the amount of revenue obtained from the retail customers, it is allocated proportionately only to retail customers and is not assigned to wholesale service, interdepartmental service or any other service that is exempt from this tax.

Cost of Service Analysis

The Strategic Financial Planning department manages the District's COSA on an ongoing basis. Staff last presented the District's COSA to the Board in 2008 (the "2008 COSA"), when the Board approved the reasonableness of its calculations. The 2008 COSA informed the design of current electricity rates. Since 2008, some aspects of the methodology in the COSA have been updated by Strategic and Financial Planning to meet changing circumstances. These changes include the implementation of new long-term power contracts, financial policy changes, changes to the District's market hedging program, public power benefit actions, and enhanced financial forecast modeling to mention a few. The 2008 model, with the above mentioned changes, is updated on an ongoing basis with current financial results and forecasted cost information. The District plans to perform a new COSA in 2019.

The three main steps in the COSA are to functionalize (assign revenue requirements to customer-related, delivery-related, or supply-related components), categorize (divide functionalized expenses among customer classes) and allocate (assign miscellaneous costs including District overheads) costs and revenues among the various customer classes. This process incorporates past practice, industry standards and the expertise and direction provided by key District employees to produce the cost of service result.

The initial steps of functionalization and categorization are closely related and have been combined in the District's cost of service supporting documentation. These combined steps involve assigning the revenue requirement among the general categories of supply-related, delivery/collection-related and customer-related (also referred to as energy, demand and basic, respectively) by customer class. This categorization closely resembles the existing structure of the District's financial accounting system and the financial forecasting system, but does require the application of some methodologies to properly assign or allocate some components of the revenue requirements. The following sections describe the general basis of the methodologies used in determining how the cost or revenue requirements have been categorized.

Functionalizing Costs into Customer, Delivery, and Supply Components

Customer (Basic) Cost Component - Customer costs are costs that vary primarily by the number of customers in a customer class and include customer billing, collections, records, meter reading, service, etc. along with a proportionate share of the District's administrative and general (A&G) costs that support all the District's activities. The costs in this category correlate to the number and characteristics of customers served by the District in each customer class and are not a direct function of the amount of energy used by the customer. Consistent with industry practice, these costs are the basic charge or minimum rate component in rates. The COSA methodologies for assigning these costs have not materially changed since adoption of the HDL rate in 2016 and are detailed in the HDL Staff Report.

Delivery/Collection (Demand) Cost Component - Delivery costs include the costs of transmission and distribution services, including a proportionate share of A&G and depreciation, and a rate of return on the District's investment in transmission and distribution facilities serving the customer class. These costs are generally driven by the maximum demand requirement imposed by the various customer

classes and customers, with the exception of the frost protection and street lights classes, for which costs are directly assigned. The assignment of this cost component varies by service and customer type and can be based on number of service drops, energy usage or demand. Cost inputs for this rate component for non-residential customers are detailed in the HDL staff report. Details supporting the newly developed Residential Cryptocurrency demand charge can be found in Appendix C.

Supply (Energy) Cost Component – This cost category is often referred to as "energy" costs. Supply costs include internal and external power purchases[14] and activities directly related to acquiring power, along with a proportionate share of A&G costs. These costs are primarily driven by the actual amount of electricity consumed by customers in each class. Limited surplus energy is available beyond the District's current contractual obligations and amounts reserved to serve local load, including a contingency for a low production year (such as a low water year). This practice of closely managing the District's resources through long-term sales and a hedging program protects the District with revenue certainty and reduces exposure to volatility from the variability of wholesale prices and streamflow and operational risks at its hydroelectric projects. The wholesale market is the next best resource to supply incremental customers such as cryptocurrency. As recommended in Section 1, the wholesale market price of energy is the basis for the supply cost component. Accordingly, the proposed rate incorporates a transparent market-based wholesale price in the energy rate component along with other associated energy charges.

The other energy charges include transactional costs directly associated with the purchase of energy, financial impacts, additional risk exposure, costs of administration of the District's energy portfolio, and costs of the provision of scheduling and other ancillary services. The other energy charges are summarized below:

Other Energy Charges

Specified Source – Covers the premium paid by the District to purchase carbon-free energy. Without this premium, the District may increase the carbon content of the power it uses to serve load. Importing non-clean power would be counter to the District's policy of serving load with clean power. It could also harm the District's ability to sell its generation into the California market with a carbon-free premium because the California Air Resources Board, the agency tasked with implementing and enforcing California's cap-and-trade program, is concerned with utilities exporting clean power into California and simultaneously serving their own load with non-clean power. While the setting of rates for utility services is not an action subject to environmental review, it is noted that this approach advances the District's Integrated Resource Plan and clean-power policies to the benefit of air resources.

I-937 Compliance – Covers the cost to comply with the Energy Independence Act (I-937). I-937 requires the District to use qualifying renewable resources to serve a certain percentage of its load.

Transaction Charges (Index Premium, Odd Lot Premium, Credit Premium) **–** Covers the cost associated with purchasing index energy from the wholesale market, charges of purchasing energy in non-standard sizes, and use of the District's credit capacity with other entities.

Overhead (Allocated and Direct) **–** Covers the costs directly associated with managing the District's energy portfolio and associated contracts, legal and credit review, risk management

[14] In the District's internal accounting, the District treats power from the District's generating resources used by the District's retail system as if the retail system purchased the power from the District's resources.

and monthly billings, along with a proportionate share of A&G costs that are included in the supply (energy) component of the cost of service.

Scheduling & Ancillary Services – Covers the costs of scheduling, load following, reserves and voltage control, etc.

Risk Premium - Covers incremental financial risks associated with cryptocurrency loads being transient in nature, subject to regulatory uncertainty, and having unpredictable growth and concentration. Multiple risks are addressed through this component. Operational safety and reliability risks include fire loss and interruptions to service. The market price risk includes the District's exposure to market prices due to fixing the market energy rate annually. The stranded asset risk relates an inability to recover costs of system expansion through rates over time if the customers move on. Customer class concentration risk involves possible concerns from ratings agencies if a single transient industry makes up a large portion of the District's customers. These and other risks are discussed in more detail in Appendix D.

Overhead Tax - State Utility Tax and Privilege Tax.

See Appendix D for additional detail.

Categorizing Costs into Rate Classes

Once the functionalization of costs has been completed, various methodologies are used to assign or "categorize" these cost components among the various rate classes and rate components. Rate classes include residential, commercial, industrial and other defined groups of customers that have similar service requirements. The methodologies used to accomplish the allocations are summarized below with supporting analysis in the HDL Staff Report. Note that the District's current division among customer classes is based in part on differences in total electricity (energy) use and the rate of use (demand).

The cryptocurrency revenue requirement for the basic (Customer) component and the demand (Delivery) component is derived from the calculated requirements of the HDL class from the HDL rate adopted in 2016, except that the demand component for residential cryptocurrency customers has been changed to reflect costs of serving on residential portions of our system, as explained below. The supply (Energy) component is a market-based rate along with additional charges associated with serving cryptocurrency loads with market purchases. The revenue requirement includes operating activity and the offsetting revenue associated with customer contributions in aid of construction as a credit to gross capital investment requirements.

Basic (Customer) Cost Component – Based on the number of customers in each customer class and the total customer costs of serving that class, the District created weighted customer allocation factors in the 2008 COSA. The weighting factors represent the cost of serving a customer of one class compared with the cost of serving a customer of another class. For example, the industrial class has a relatively high weighting factor because the District incurs more basic costs in serving a typical industrial customer than in serving a typical commercial or residential customer. This allocation factor has been applied to the basic cost component of the revenue requirement to determine the basic costs of each customer class. The weighting factors used here are unchanged from the 2008 COSA, but the customer counts were updated during the development of the HDL rates. Details of the allocation factors can be found in the HDL Staff Report. As explained below in the Design of the Cryptocurrency Rate section, staff's recommended cryptocurrency basic charge is based on the current Rate Schedule 35 – High Density Load basic charge developed in 2016 with the creation of the HDL rate class.

Demand (Delivery) Cost Component - System demand costs are categorized based on analyzing peak usage expectations for each customer rate class. The COSA process associates various feeders with rate classes to provide independent load factor profiles for the various customer classifications. In addition, seasonal load use and customer classification subset attributes are applied when direct supporting details are limited. The District primarily used a 3-month coincidental peak (CP) allocation factor. As explained below in the Design of the Cryptocurrency Rate section, staff's recommended non-residential cryptocurrency demand rate is the current Rate Schedule 35 – High Density Load demand charge developed in 2016 with the creation of the HDL rate class. Details of the cost distribution can be found in the HDL Staff Report.

A Residential Cryptocurrency demand charge has been added to the proposed rate structure. At the time the HDL Demand Charge was developed, the District did not have HDL loads in residential areas, thus the development of the High Density Load rate included only cost analysis of the commercial and industrial customer classes. Because commercial and industrial areas are typically centralized, closer to major equipment (e.g., substations), and often have a moderate load factor, the cost per unit delivered is less than areas built for residential service. In residential areas there are typically more line miles installed and more infrastructure required on a per unit served basis. Residential areas have a higher diversity factor (i.e., variations in load throughout the day) and a lower load factor, which allows more service connections per substation. For example there may be two or three homes connected to the same 25 kW system capacity. This design works for normal residential loads because even if they have a high peak load, the load drops off during periods of the day, allowing the electrical system equipment to cool off. The same design is not a good match for cryptocurrency loads because they run all on, all the time. Without the additional load of cryptocurrency, and without the cool-down period, residential distribution equipment will age prematurely and create safety and reliability risks. System alterations to mitigate these issues are costly and create non-routine maintenance needs. Because of the impacts associated with serving cryptocurrency customers in residential areas, staff recommends the residential demand charge to recover the additional costs.

Energy (Supply) Cost Component – The costs assigned to this component are directly associated with customer's total consumption or use of the service, and are allocated based on the measured energy usage (kWh) of each of the customer classes, including line losses. Because cryptocurrency loads will be served with market purchases, the assigned costs are the cost of the energy purchases along with the other energy charges associated with serving these loads with market purchases. This rate proposal does not account for line losses. Staff will recommend that a line loss adjustment be added in the future.

Design of the Cryptocurrency Rate

Staff recommends using the current Schedule 35 Basic and Demand charges for cryptocurrency services which is based on the Commercial and Industrial COSA analysis completed during adoption of the HDL rates in 2016. Staff also recommends adopting a Residential Cryptocurrency demand charge. Staff recommends a market-based rate for the Energy component. Following the planned review of the COSA in 2019 and after the District gains more experience with cryptocurrency customers, staff may recommend adjustments to the cryptocurrency rate.

Basic (Customer) Cost Component – Staff recommends using the current Schedule 35 HDL basic charge. The charge is tiered into three levels to reflect the wide range of sizes of cryptocurrency customer. The tiers allow for proportional assignment of costs for individual customers based on size rather than charging the same basic (customer) charge for all sizes which raises the charge higher for smaller customers than appears reasonable to staff. The tier thresholds are the same as the District uses for engineering and application fees: 300 kW and 1 MW.

Demand (Delivery) Cost Component Staff recommends using the current Schedule 35 – HDL demand charge for cryptocurrency customers in non-residential areas. The demand charge in the HDL rate uses the combined costs and three-month coincidental peak kW demand for commercial and industrial delivery developed in the COSA to determine a $/kW rate.[15]

The demand charge for residential cryptocurrency calculates a per customer delivery revenue requirement based on average energy usage of the residential class and the cost per kWh of the delivery component from the COSA for the residential class. Energy demand is then calculated utilizing the average load factor of current residential cryptocurrency customers of 74% to arrive at a $/kW rate. The calculation of the residential demand charge is detailed in Appendix C.

Energy (Supply) Cost Component – Cryptocurrency customers at 3 MW or below will be served at a fixed market rate that will be based on the Intercontinental Exchange (ICE) Mid-Columbia forward prices. The Mid-Columbia hub location price is consistent with the District's transactions when purchasing wholesale energy. ICE publishes monthly forward prices on a daily basis. In December of each year, the District will calculate the average Mid-Columbia flat forward price for the term April 1st of the following year through March 31st of the subsequent following year. This is not a guarantee as the Board always retains the ability to adjust the rate mid-year.

The calculated average market price will be in addition to the other energy charges. The other energy charges are directly associated with costs related to purchasing energy to serve cryptocurrency loads, administrative costs, ancillary charges and risk exposure. These components are listed in the table below and are explained in further detail in the "Functionalizing Costs into Customer, Delivery, and Supply Components" section, above, and in Appendix D.

Other Energy Charges	
Charge	Charge per kWh
Specified Source	0.34¢
Transaction charge (index premium, odd lot premium, credit premium)	0.14¢
Allocated overhead (current COSA model)	0.15¢
Direct Overhead (incremental resource time)	0.12¢
Scheduling & Ancillary Services (load following, reserves, voltage control)	0.13¢
Risk Premium	1.30¢
Overhead Tax	0.13¢
Total	**2.31¢**

Cryptocurrency customers at or above 3 MW will require a contract with the District that will address any special circumstances and conditions applicable to the Customer's needs and will address any terms and conditions considered appropriate by the District, including the manner which energy will be purchased and delivered.

[15] Calculation of HDL Demand Charge: Costs assigned to this component are distributed to each customer class using a three-month coincidental peak allocation factor. This calculated revenue requirement for commercial and industrial is combined and then divided by the combined commercial and industrial class average monthly demand to produce an average monthly cost per kW.

Staff's Recommended Monthly Cryptocurrency Rate	
3 MW and less	
Basic Charge:	**Per month per meter**
Up to 300 kW	$130
300 kW to < 1 MW	$560
1 MW to ≤ 3 MW	$860
Monthly Demand Charge, Residential:	$5.50 per kW of Demand (effective prior to 4/1/2020) $15 per kW of Demand (effective 4/1/2020)
Monthly Demand Charge, Non-Residential:	$5.50 per kW of Demand
Energy Charge:	2.31¢ per kWh + market energy charge[16]
Upfront Capital Charge:	**Per kW of new or expanded Electric Service under this schedule**
	Amount of upfront capital charge is set forth in the District's Fees and Charges Schedule
Over 3 MW	
Service will require a Contract between the Customer and the District prior to connection of Service that will address any special circumstances and conditions applicable to the Customer's needs. Contracts will address any terms and conditions considered appropriate by the District, which may include but is not limited to scheduling, maintenance and decommissioning of infrastructure, load balancing, ancillary services, transactional costs, security, and financial risk.	

Comparability of Rates with Other Utilities

Utilities develop their rates and charges based on a multitude of factors including their own assessment of a given customer class and their own financial circumstances, which reflect the availability and cost of power, transmission, and distribution. The cryptocurrency rates proposed in this report are within the range of residential, commercial, and industrial rates in Washington State and the Northwest. They are significantly lower than such rates in some other regions of the United States and higher than some rates that may be available to cryptocurrency miners. There have been comments made to the effect that other utilities may be willing to enter into contracts to serve cryptocurrency mining or other loads for a rate lower than the District's proposed rate. The District does not have insight into the circumstances of those particular utilities, but a number of factors could account for the differences if they exist. Rates may be lower because they have idle generation or due to specific features of their contracts with the Bonneville Power Administration. The presence of unused transmission and distribution capacity could also lead to lower rates. They may be lower because the utility did not assess the risks of serving cryptocurrency customers in the same manner as the District or because the utility is not exposed to the high volume of applications and potential concentration of risk that the District faces. Comparison with the rates of other utilities is informative, but is not necessarily indicative of appropriate rates for the District.

[16] Estimated market energy charge for the period 4/1/2019-3/31/2020: 2.847¢/kWh + 6% admin fee = 3.02¢/kWh (estimate as of 11/15/18).

Upfront Capital Charge

As mentioned in Section 1, and as with HDL customers, the District incurs costs for accelerating expansion of or upgrades to its electrical system to accommodate cryptocurrency customers, and it risks not recovering those costs over time if the cryptocurrency customers discontinue taking service (called "stranded asset risks"). The COSA-based rate recommended by staff above does not fully include these costs or ameliorate the stranded asset risks. Therefore, staff recommends the upfront charge developed in the HDL Staff Report, and as modified by the District, to recover the costs associated with electrical system capacity expansion that are not embedded in the staff's COSA-based rate recommendation described above. Because the upfront charge is a fee rather than a rate, in accordance with District policies, the Board does not need to approve the actual upfront charge or the methodology used to calculate it. Staff recommends following the same policy for applying the charge as is applied to the HDL customers as described in the HDL Staff Report.

Demand Exceedance Charge

Staff recommends a monthly fee of $150 plus, in each day an exceedance occurs, 1.5 times the applicable monthly demand charge on the amount by which the highest Demand in the day exceeded the maximum authorized demand. This is intended to recover costs of customer service, systems (Automated Energy) and engineering review associated with monitoring demand limits to which the customer agreed to operate, as well as the equipment degradation. Including a daily charge is reflective of the increasing and compounding damage caused by prolonged exceedances versus those that are temporary in nature.

Delayed Implementation of the Residential Demand Charge

Staff recommends that the residential demand charge of $15/kW be effective one year after the cryptocurrency rates goes into effect. This will phase in the rate for those customers transferred from the HDL rate. It will also reduce complications in the District's ongoing implementation of an upgraded customer information system.

Application to Existing Special Contracts

The District negotiated a number of customer-specific contracts with HDL customers during the implementation of the HDL rate. Some of the customers with those special contracts are mining cryptocurrency. The District will continue to honor the terms and conditions of the special contracts for their respective terms.

Appendix A Draft Cryptocurrency and Blockchain Processing Rate Schedule

DRAFT Cryptocurrency Processing; Blockchain Processing; and Similar Loads

Schedule [# TBD]

AVAILABILITY:

This Schedule applies to any customer involved in computing or data processing load related to cryptocurrency mining, Bitcoin, blockchain, proof-of-work or other loads having, in the District's determination, similar characteristics including any of the following: high energy use density, high load factor, need for more than routine alterations to the District's Electric Service Facilities in order to maintain safety, load that is portable and distributable, highly variable load growth or load reduction as an individual customer and/or in aggregate with similar customers in the District's service area, able to relocate quickly in response to short-term economic signals, high sensitivity to volatile commodity or asset prices, or part of an industry with potential to quickly become a large concentration of power demand in the District's service area.

This rate schedule is available throughout the District's service area with the exception of the Stehekin area and new or expanded service in the areas north and northwest of Leavenworth served by the Anderson Canyon-Summit transmission line.

Service under this schedule requires a power sales Contract between the Customer and the District prior to connection of service. Changes in Load, as defined in Utility Service Regulation 41, require a new service application to be submitted to the District to evaluate the impact of that changed load to existing Electrical Service Facilities.

Customers subject to the terms and conditions of Schedule __ must meet the following characteristics:

- Be served at one Premise through a single Point of Delivery as defined in the District's Service Regulations;
- Be in compliance with Chapter 296-46B WAC electrical safety standards, administration and installation; and
- Maintain satisfactory Power Factor determined in Schedule 24.

Customers with multiple locations and Energy loads will not be aggregated for billing purposes unless the District, in its sole discretion, determines the Customer is circumventing the size cap to meet the load requirements of a common Premise. A Customer with measured total connected loads may be required to be served under the rates and terms applicable to such total size.

UPFRONT CAPITAL CHARGE:

Prior to approval of service or increase in capacity, Customers to be served under this Schedule must pay an Upfront Capital Charge based upon the requested size of the new or increased amount of electric load. The Upfront Capital Charge does not apply to load amounts approved by the District prior to the effective date of this Schedule where: (1) the Customer has properly obtained District approval of the load prior to the effective date of this Schedule; (2) the load has not changed materially in load factor, size, or otherwise from the load approved by the District; (3) the Customer has fully complied and

continues to fully comply with the District's rules, policies, and regulations; and (4) the load is transferred onto this Schedule as of the effective date of the Schedule. Current amounts are included in the District's Fees and Charges schedule. Additional state and local taxes may apply. Additional charges may apply, including Line Extension costs.

RESIDENTIAL:

For purposes of the Demand Charge under this rate schedule, residential means premises located in areas of the distribution system that have been designed and constructed for loads with residential characteristics, such as high load diversity and low load size.

CHARACTER OF SERVICE:

Service to be furnished under this schedule may be either:

- Three phase, sixty hertz alternating current at primary voltage, or
- Secondary power single phase, three phase or four wire three phase, 60 cycle, alternating current at available phase and voltage up to 1 MW.

RATES:

3 MW and less

Basic Charge:	**Per month per meter**
Up to 300 kW	$130
300 kW to < 1 MW	$560
1 MW to ≤ 3 MW	$860
Monthly Demand Charge, Residential:	$5.50 per kW of Demand (effective prior to 4/1/2020) $15 per kW of Demand (effective 4/1/2020)
Monthly Demand Charge, Non-Residential:	$5.50 per kW of Demand
Energy Charge:	2.31¢ per kWh + market energy charge
Upfront Capital Charge:	**Per kW of new or expanded Electric Service under this schedule** Amount of upfront capital charge is set forth in the District's Fees and Charges Schedule

Over 3 MW

Service will require a Contract between the Customer and the District prior to connection of Service that will address any special circumstances and conditions applicable to the Customer's needs. Contracts will address any terms and conditions considered appropriate by the District, which may include but are not limited to scheduling, maintenance and decommissioning of infrastructure, load balancing, ancillary services, transactional costs, security, and financial risk.

MARKET ENERGY CHARGE:

The market energy charge portion of the Energy Charge will be fixed as of December 15 of each year by the District at the average flat price of the Mid-C Peak and Off-Peak Futures as published daily by the Intercontinental Exchange (ICE) for the 12-month period starting on April 1 of the following year plus a 6% administrative fee. If ICE futures are not published on December 15, they will be fixed as of the next following date they are published. If ICE Mid-C Peak and Off-Peak Futures cease to be published, the

District, in its reasonable discretion, may select a replacement source of futures for the purpose of fixing the market energy charge.

DEMAND EXCEEDANCE:

In addition to all other rates and charges, in each billing period in which Demand exceeds the Customer's maximum authorized demand, Customer will be assessed $150 plus, in each day an exceedance occurs, 1.5 times the applicable monthly demand charge on the amount by which the highest Demand in the day exceeded the maximum authorized demand. This charge is in addition to, not exclusive of, the District's rights to require additional protective measures, recover for damages sustained to the Electric Service Facilities, disconnect Service, terminate any Contract, or take any other remedial action available to recover losses and prevent future exceedances.

TAX ADJUSTMENT:

The amount of any tax levied by any city or town in accordance with R.C.W. 54.28.070 of the laws of the State of Washington, will be added to all charges for electricity sold within the limits of any such city or town.

SERVICE POLICY:

Service under this schedule is subject to the rules and regulations as defined in the District's Utility Service Regulations.

EFFECTIVE: **TBD**

Appendix B Relevant Staff Presentations to the Board in 2018

- **March 19, 2018 – Moratorium Implemented**
  - Moratorium on applications for electric services for cryptocurrency or similar operations
- **April 16, 2018 – Board presentation**
  - Unauthorized Use fees and charges
  - Investigation processes
- **May 15, 2018 – Moratorium Hearing**
  - Existing challenges
  - Actions completed since moratorium adoption
  - Future work and next steps
- **July 23, 2018 – Board presentation**
  - Preview of cryptocurrency rates
  - Infrastructure and capacity availability
- **August 6, 2018 – Moratorium hearing**
  - Public comment on proposed cryptocurrency rates
- **August 20, 2018 – Moratorium hearing**
  - Review of public comments
  - Additional rate considerations
- **September 4, 2018 – Board presentation**
  - Cryptocurrency Zoning & Planning
  - Summary of outreach efforts with county, city officials
- **September 4, 2018 – Board presentation**
  - Small mining operation overview
  - Residential rate considerations
  - Next steps
- **September 17, 2018 – Moratorium Hearing**
  - Overview of rate and phase-in recommendation
  - Rate outreach plan
  - Next steps
- **November 5, 2018 – Preview of Public Information Meeting**
  - Background on need for new rate
  - Proposed rate schedule
  - Calculation examples for customers
  - Upfront Capital Costs
  - Next steps
- **November 7, 2018 – Public Information Meeting**
  - Background on need for new rate
  - Proposed rate schedule
  - Calculation examples for customers
  - Upfront Capital Costs
  - Next steps
- **November 19, 2018 – Rate & Moratorium Hearing**
  - Review of actions taken throughout moratorium
  - Rate recommendation
  - Moratorium recommendation

- **November 19, 2018 – Board presentation**
    - Fees and Charges update

Appendix C Residential Demand Charge Calculation

The forecasted 5-year average (2019 -2023) residential revenue requirement from the COSA was applied to the average monthly usage of residential customers to determine a monthly revenue requirement per customer. Demand for typical residential customers is not currently metered. However, all cryptocurrency customers are demand metered. For this calculation, the average usage was divided by the peak demand to calculate load factor. The average load factor of existing residential cryptocurrency customers is 0.74. Dividing the monthly revenue requirement by this factor and converting the revenue requirement to a demand measure results in the calculated residential cryptocurrency demand charge of $15 per kW of demand. The detailed calculation of the rate is provided below.

[a] Residential average monthly usage (kWh)	1,825
[b] Residential revenue requirement (¢/kWh from COSA)	2.80
[c] Monthly revenue requirement per customer [a] * [b] ÷ 100	$51.10
[d] Average residential cryptocurrency load factor	74%
[e] Residential Cryptocurrency monthly demand (kW) [a] ÷ 730 ÷ [d]	3.38
730 = average hours in a month	
Residential Cryptocurrency Demand [c] ÷ [e] ($/kWh)	**$15.13**

Appendix D Other Energy Charges

Other Energy Charges			
Charge	Rate	Description	Methodology
Specified Source	.308¢/kWh	Covers the premium paid by the District to purchase carbon-free energy	E3 Carbon Curve converted based on unspecified emission factor established by cap-and-trade regulation
I-937 Compliance	.03¢/kWh	Cost to the District associated with I-937 compliance	3 year average of renewable purchase costs applied to I-937 requirement percentage for each customer
Index Premium	.05¢/kWh	Cost of purchasing index energy from the wholesale market	Estimates based on index premiums incurred from past participation in the wholesale market at various terms (i.e. day ahead, next month….)
Odd Lot Premium	.075¢/kWh	Charge to buy energy in non-standard sizes.	Based on current market for non-standard volumes
Credit Premium	.018¢/kWh	Charge to use the District's credit capacity with other entities.	5% fixed charge covering cost of posting line of credit to cover purchases
Risk Premium	1.3¢/kWh	Covers incremental financial risks associated with cryptocurrency loads being transient in nature, subject to regulatory uncertainty, and having unpredictable growth and concentration.	Discussed below
Allocated Overhead Charge	.15¢/kWh	Recovery of costs directly associated with managing the District's energy portfolio along with a proportionate share of A&G costs that are included in the supply (energy) component of the cost of service.	Five-year average of the energy portfolio management costs and A&G included in the supply component of the cost of service.
Incremental Resource/Direct Overhead	.115¢/kWh	Recovery of incremental resource time and direct overhead costs anticipated to serve cryptocurrency loads	Estimated incremental resource time required in the areas of customer service, energy planning and trading, credit & risk, billing and legal
Scheduling & Ancillary Services	.129¢/kWh	Recover costs of scheduling, regulation and load	Estimated incremental resource time required for

		following, spinning and operating reserves, and reactive supply and voltage control, etc.	scheduling power. Estimated costs of providing ancillary services of regulation and load following, spinning and operating reserves, and reactive supply and voltage control.
Overhead Tax	.131¢/kWh	State Utility & Privilege Taxes	6% of revenues collected from other energy charges

Risk Premium ($13.00/MWh or 1.3¢/kWh)

Cryptocurrency mining and their unique load requirements and characteristics are unprecedented in the electric utility sector and present the District with many challenges, risks and uncertainties that are not present in the more traditional and predictable loads for commercial and industrial businesses and residential homes. The utility business model requires investments in long-lived assets and infrastructure to serve ratepayers, the cost of which the utility recovers over generations through effective rate design and predictable revenue streams. The District's historical local load requirements and growth patterns have been very predictable with relatively small growth year over year. This has allowed the District to prudently and systematically plan and invest in transmission and distribution assets, protect the revenue streams offered by surplus generation through hedging strategies, reliably serve our customer owners and ratepayers with low rates, and effectively meet our strategic plan objective to do the best for the most for the longest. Cryptocurrency mining is new, has unproven sustainability and is currently an unregulated industry that is supported by a volatile commodity value generated by transient machines, which effectively does not fit the traditional utility model, creating new risks, exacerbating existing financial and operational risks, and causing uncertainty in load forecasting, revenue predictability and forward infrastructure and asset planning. Staff recommends that this rate include a risk premium to mitigate the risks and uncertainty associated with this specific rate class and to help protect other rate classes from unintended consequences that could harm District operations or financials.

The cryptocurrency industry exposes the District to risks that are difficult to quantify or ascertain the likelihood of occurrence given the effective newness of this industry and behaviors that may become more known over time as the industry matures. The list is not exhaustive, however the following risks are recognized as significant uncertainties that are factored in the risk premium consideration:

- **Operational / Asset Reliability and Safety Risk** – Cryptocurrency mining challenges the typical District infrastructure, which is not intended to withstand sustained high load factors. Without modification that requires cost and incremental staff and engineering time, infrastructure and assets age prematurely, asset failure rates more frequent, safety incidents may increase, including fires originating from District-owned infrastructure, and reliability to non-crypto customers may be diminished, which is contrary to our Mission, Vision and Values.
- **Cost Risk** – Premature aging, accelerated asset replacement and staff resource cost are all potential incremental cost impacts that are uncertain in magnitude and could fluctuate over time pending the magnitude and volatility of cryptocurrency load growth or decline over time.

- **Market Price Risk** – Because the rate would be fixed for a period based on market futures, the District holds the risk that actual market prices to serve this load will be higher than those forecast.
- **Stranded Asset Risk** – The potential cryptocurrency load growth dwarfs normal load growth for the District. A system expansion based on cryptocurrency growth, followed by a decline in cryptocurrency load, would result in the District's remaining customers paying for the ongoing maintenance and operation of an overbuilt system.
- **Administration/Institutional Risk –**This rate class is new to the District and there remains uncertainty of how much future staff resource time and administration requirements will be needed, pending load growth, magnitude of applications and needed contracts, size of loads, changes in the cryptocurrency industry and number of unique contracts, etc. will affect future costs of serving this load. Adapting to changes in the cryptocurrency industry takes inordinate resources at all levels of the District that would otherwise be put towards other District priorities. The District will likely incur significant ongoing costs to continuously adapt to cryptocurrency customers. The District also runs the risk of undertaking adaptive changes to its business processes and organization, such as adding or restructuring departments, that are rendered useless by subsequent changes in cryptocurrency.
- **Regulatory / Environmental Risk** – The high likelihood of carbon legislation being enacted in Washington creates uncertainty around carbon costs to the District. Although the rate includes specified source costs, the uncertainty of Washington state's carbon costs could not be calculated, and thus is a factor in the risk premium.
- **Customer Class Concentration Risk** – The cryptocurrency mining operations have potential to increase load obligations significantly. While load growth is contingent on having the appropriate infrastructure in place, this rate class has the ability to significantly outpace the District's traditional organic growth. Customer class concentration in an industry that is highly transient may cause concerns for rating agencies regarding revenue and load certainty over time. A decline in credit rating has many overarching and negative cost impacts to the District.
- **Community Zoning Uncertainty Risk –** The District serves the community by providing reliable and affordable utility services to the county and is a good community partner. The community leaders, including the port, county and cities are continuing their discussions regarding their position on cryptocurrency, including locations preferences, zoning or restrictions that could impact the District's strategy to serve this load.
- **Organic Growth Risk** – Cryptocurrency customers seek to utilize significant amounts of electricity for machines to process and demand significant infrastructure needs, and in doing so could increase the cost to the District to serve traditional organic growth due to limited available capacity.

Risk estimation is not a precise discipline and often requires that variables and assumptions are developed based on professional judgement and deliberation that can change over time as facts and circumstances change. The assessment of risk under novel circumstances involves essentially unbounded variables. It thus requires a high degree of judgment. Cryptocurrency – which is unique in terms of load characteristics and continues to rapidly evolve – lacks a meaningful track record from which to make assumptions. For example, it is within reason to predict that the District will be faced with additional requests for hundreds of megawatts. It is also reasonable to predict applications will trickle down to nothing. And it is foreseeable that the District could see a rapid influx of cryptocurrency load, followed by sudden departure of all of it. Some of the key uncertainties are volatile cryptocurrency prices, minimal governmental regulation of the industry, competition amongst miners, comparative

electricity prices elsewhere, global scale of exposure, and changes in cryptocurrency technologies. The District's experience in serving cryptocurrency loads over the past four years has reinforced this conclusion. Two years ago, after considerable process, the District rolled out new rates and policies to address the issues, only to be forced to revisit the issues because of a dramatic change in bitcoin prices and load inquiries that would double the District's current local load. Cryptocurrency load risk assessment does not lend itself to precise calculation because almost every significant variable one would use for a risk calculation has a big question mark around it. Therefore, significant judgment was needed in this risk assessment.

After exploring several possible methods for quantifying the many risks associated with serving cryptocurrency and blockchain loads, staff settled on $0.013/kWh as an appropriate risk premium given all the risk factors. Rather than trying to directly quantify all of the potential risks, the District used the following quantifiable metrics as proxies to benchmark and validated the recommended premium with the intent to keep our existing customer owners neutral. The following describes more specifically benchmarks.

- **Generation Portfolio Risk** – While the current energy component of the rate structure is based on market-based prices, immediate generation risk is not as prevalent. It is important to reflect though why the District has determined that the best energy rate approach at this time is not to serve from generation at cost of production, but rather rely on market purchases. The District relies on the generation surplus in the wholesale market to support our current and existing rate structure and local load requirements across rate classes. By design, the District has implemented a systematic hedge program for the generation portfolio to provide revenue certainty, reduce revenue volatility, and mitigate risks with streamflow conditions and operations that impacts the number of megawatts the hydro plants can generate to serve our customers and other contractual obligations. The program contractually commits on average 98% of the available generation resources during the delivery year to serve load, protect costs through long-term cost-plus slice contracts, mitigates price, streamflow and operation risks through market-based slices, and mitigates price risk through block sales. This approach effectively protects the downside risk of the wholesale market for the District and helps to accomplish its objective to protect current rates and avoid significant rate increases for traditional long-standing ratepayers in Chelan County.

  The District utilized a stochastic model to value wholesale market price risk, and while the risk value will vary based on market prices and volatility at different points in time, the model identified that there is approximately $10/MWh or 1.0¢/kWh of price risk on average over a 3-year period between the expected value and the 10th percentile (low price scenario) that would be at risk for unhedged positions. In addition, there exists streamflow risks that the hedging program mitigate that are valued at $1.50/MWh to $3.50/MWh (0.15 to 0.35¢/kWh), depending on valuation methodology, for unhedged positions. Effectively, the current hedging program offers our existing customer owners surplus revenue protection from those potential declines and provides revenue certainty for the surplus portfolio that helps support the District's current rate structure.

  This industry and rate class have the capability to move from one location to another quickly and mining sustainability is heavily reliant on the unregulated cryptocurrency market value, thus the District cannot effectively predict how frequent or to what magnitude this load will grow or decline over time, nor determine how much generation to leave unhedged to accommodate uncertain cryptocurrency loads. By doing so, the District would be adding $11.50 to

$13.50/MWh (1.15 to 1.35 cents/kWh) of streamflow and price risk alone to our existing customers, unless that risk is transferred to the rate class responsible for the risk.

Given the decision to protect our ratepayers from incremental generation portfolio risk by not altering the District's current hedging program, the District is pursuing a market-based energy component. However, that introduces a number of other risks that the District must mitigate or protect against through the risk adder, including:

- **Financial and Credit Rating Risk -** The District's current credit rating is AA+, AA+, and Aa3, as issued by Fitch, Standard and Poor's and Moody's, respectively, placing the District as one of the strongest rated public power utilities in the country. A strong "AA" external credit ratings is advantageous to our customer owners who rely on the District's financial strength for long-term rate stability and predictability. Strong financial credit ratings and long-term financial sustainability are also important to other external stakeholders, such as bondholders, banks and financial institutions, energy counterparties, and the local community for economic development, who all have a vested interest in our financial strength that supports uninterrupted access to financial markets at the lowest cost and at beneficial credit terms. Alternatively, credit rating downgrades have long-term negative impacts to the District through potential increased costs for borrowing, banking agreements, credit, margining, contractual obligations, and other examples, that impact our income statement. Eroding bottom line results can lead to additional borrowing and lower cash balances. Credit rating agencies consider not only the District's financial metrics, but also exposure to risks that can erode financial strength and long-term sustainability over the long-term. While retail revenue certainty is viewed positively, the cryptocurrency industry has potential to be a volatile transient revenue source that adds incremental risk to infrastructure.

  All of the District's ratings agencies consider an entity's relationship of cash and expenses. One of the rating agencies specifically utilizes a standardized methodology to score key rating drivers and financial strength measures that includes weighting by category and notching of particular key strength or risk areas that moves the rating score up or down. The District's credit rating relies on its financial strengths, including strong liquidity and cash position to pay for operating costs and debt service, to offset lower scored areas for generation surplus risk and cost recovery framework to maintain our strong credit rating.

  The District utilized a proxy methodology to identify cash requirements needed to maintain a key financial metric, often considered as one measure of financial strength, over a 3-year period that is impacted by additional operating costs such as purchasing power in the market, all with the consideration of maintaining existing customer owner's neutrality and protection from potential risks and cost impacts to the other rate classes. While the methodology is also a point in time view similar to price risk for the generation portfolio, the risk impact magnitude to maintain this financial metric was comparable to that of the generation portfolio risk at slightly over $10.00/MWh or $0.01/kWh. We are mitigating that by maintaining our current wholesale hedge program at 98% of average generation and protecting against declining prices.

- **Credit Rating Downgrade Risk** – A credit rating downgrade is a material event for the District and would signal to the external stakeholders, such as existing and future bondholders, that the financial strength and/or risk profile of the District has changed or perceived to be different based on changed conditions. This would immediately impact the District's bottom line income

potential with respect to an existing contract that supports the debt portfolio, a long-term contract that provides revenue from the credit spread, and would impact the District's ability to issue cost-effective debt in the future, which are costs that would be borne by all of the District's ratepayers. Staff estimates the costs of a one tier credit downgrade at 0.158¢/kWh.

- **Liquidity Risk** – Providing reliable electricity to the District's customer owners is a key part of the District's Mission Statement and continuing to improve that reliability metric is one of the District's strategic priorities. Additional costs may arise when market supply is limited or not readily available or energy is curtailed or is not cost-effective due to liquidity challenges. Staff estimates this cost at 0.065¢/kWh, which is the difference between forward on-peak and off-peak wholesale prices applied to peak hourly load divided by monthly average energy usage and applying a 10% scalar.

The three above risks total 1.3¢/kWh. Based on either a generation or market energy supply procurement strategy, the risk premium is a necessary component of the rate to effectively address the uncertainty of a transient load that is currently difficult to forecast or plan for beyond a short-term period with respect to generation, market supply, infrastructure impacts or long-term sustainability. The risk premium for this rate class is intended to address the many uncertainties that exist, but also the known incremental risks that the District is trying to protect against to keep our existing customer owners and ratepayers neutral and preserve current low rates that benefit the community. After considering a range of options, it is recommended that the rate include a risk premium of $0.013/kWh, which uses as a proxy for the overall risk premium the benchmarks discussed above based on the assumptions utilized. The risk premium will be reviewed and modified and may change as the industry and District experience evolves over time. The District will consider new and evolving circumstances associated with risk, the cryptocurrency industry and local experience with this rate class, rate class growth, regulations, generation portfolio mix and hedging strategies, and feedback from rating agencies during periodic reviews.